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Spectral Data for Highly Ionized Atoms: Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Kr, and Mo

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Foreword

The *Journal of Physical and Chemical Reference Data* is published by the American Institute of Physics for the National Institute of Standards and Technology (NIST). Its objective is to provide critically evaluated physical and chemistry property data, fully documented as to the original sources and the criteria used for evaluation. One of the principal sources of material for the journal is the NIST Standard Reference Data Program, a program promoting the compilation and critical evaluation of property data.

The regular issues of the *Journal of Physical and Chemical Reference Data* are published bimonthly and contain compilations and critical data reviews of moderate length. Longer works, volumes of collected tables, and other material unsuited to a periodical format have previously been published as *Supplements* to the *Journal*. Beginning in 1989, the generic title of these works has been changed to Monograph, which reflects their character as independent publications. This volume, "Spectral Data for Highly Ionized Atoms: Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Kr, and Mo," by T. Shirai, J. Sugar, A. Musgrove, and W. L. Wiese is presented as *Monograph No. 8 of the Journal of Physical and Chemical Reference Data.*

Malcolm W. Chase, Editor
Journal of Physical and Chemical Reference Data

Contents

1. INTRODUCTION

During the last 10 years we have published a series of spectroscopic data tables for highly ionized heavy atoms that occur either as impurities in fusion energy research devices or which have been injected into hot plasmas for diagnostic purposes. These spectroscopic data are required both for modeling the energy balance and impurity cooling effects in such plasmas as well as for applying non-perturbing spectroscopic techniques to determine plasma parameters. In addition, spectroscopic data needs for highly ionized atoms exist in astrophysics, especially the physics of the solar corona, and in atomic physics research. A significant amount of new spectral analysis work, both observations and calculations, has been done in recent years. We have critically compiled these spectroscopic data into single compilations for each element and have published such tables for the spectra listed in Table 1.

Since we have now completed this series, we are presenting all these data in this single volume to provide users with the convenience of a single source. Our new tables include three significant improvements: First, in cases where new or improved data have been published, we have included this updated material. This affects especially the early tables of Ti and Fe. Second, we have expanded some compilations by including additional lower ions, for example Ti III and IV are now included. Third, we have added a unified finding list, ordered in increasing wavelengths, which covers all transitions that we have compiled for these elements.

In the present tables we keep the data for each element as separate subunits. This includes the respective introductory comments for the various spectra and the lists of references. We also include a few typical Grotrian diagrams as representative examples. However, we do not include the extensive number of Grotrian diagrams contained in our earlier publications because these would make this volume very large and unwieldy. However, we offer to provide such diagrams on request (Contact: T. Shirai).

TABLE 1. Spectral data publications for elements of importance to fusion energy research.

Spectra	Year of Publication	J. Phys. Chem. Ref. Data
Ti V – Ti XXII	1986	[a]
V VI – V XXIII	1992	**21**, 273–390
Cr V – Cr XXIV	1993	**22**, 1279–1423
Mn VII – Mn XXV	1994	**23**, 179–294
Fe VIII – Fe XXVI	1990	**19**, 127–275
Co VIII – Co XXVII	1992	**21**, 23–121
Ni IX – Ni XXVIII	1987	[a]
Cu X – Cu XXIX	1991	**20**, 1–81
Kr V – Kr XXXVI	1995	**24**, 1577–1608
Mo VI – Mo XLII	1987	**16**, 327–377

[a]Published in At. Data Nucl. Data Tables **34**, 79 (1986) and **37**, 235 (1987)

In all our earlier compilations of Ti through Ni we began with data compiled by Sugar and Corliss [1], using their selection of references as our source of wavelengths. This was supplemented by the extensive tabulation of wavelengths by Kelly [2], the review article by Fawcett [3] and for the more recent work, the bibliographic database of NIST. For wavelengths of forbidden lines we adopted the compilation by Kaufman and Sugar [4]. For transition probabilities, we adopted the data compiled by Martin *et al.* [5] and Fuhr *et al.* [6] Again, we have searched the more recent literature for significant updates and additions. For the H and He sequences only theoretical results are given since they are considered to be more accurate than the experimental values.

In cases where no experimental wavelength data are available but for which f-values exist that are either calculated or derived from systematic trend studies, the quoted wavelengths (λ) are calculated from the known energy levels using the Ritz combination principle. The wavelengths are then used to calculate A-values from the f-values.

We tabulate A-values and gf-values in order to provide a measure of the strengths of the lines. A-values (or f-values) may be utilized to obtain line intensities from the general relation between the line intensity (I) and transition probability

$$I = (4\pi\lambda)^{-1} hcAN_u,$$

where N_u is the population of the upper energy level. The level populations are source-dependent and are, especially for low density plasmas, difficult to determine. However, for small energy ranges, relative populations may follow Boltzmann distributions, or may even be estimated as being approximately constant, aside from the statistical weight factors $g_u = 2J_u + 1$ (where J is the total angular momentum quantum number). Thus for two emission lines originating from closely spaced upper levels one may estimate

$$I_1/I_2 = (\lambda_2 A_1 g_{u_1}/\lambda_1 A_2 g_{u_2}).$$

For a number of spectra, both A-values and crude visual intensity estimates are available for many lines. If the intensity listings are extensive, we present both A-value data and the intensity estimates. The latter make possible rough order-of-magnitude estimates for A-values of lines with known intensity data. However, we caution that intensity estimates from photographic plates are usually visual estimates of relative plate blackening. There is generally no correlation between intensity estimates by different authors, or by the same author for different wavelength ranges.

We give wavelengths in air above 2000 Å and in vacuum below 2000 Å. It is customary, in nearly all of the papers quoted in this compilation, for the authors to give their wavelength measurement uncertainty to

1σ. When no uncertainty is given we attempt to estimate the 1σ value. For the conversion of ionization energies from cm^{-1} to eV, we use the conversion factor 8065.5410 ± 0.0024 cm^{-1}/eV given by Cohen and Taylor [7].

Classifications of lines are sometimes given when both energy levels involved in the transition are not known. The classifications may be based on theoretical predictions or isoelectronic studies. We have included these lines and classifications in the present work but they should be considered as tentative line identifications.

The uncertainty estimates for the transition probability data are taken from the NIST reference data tables [5,6] and are discussed there in detail.

1.1. Dedication

The first of this series of spectroscopic data compilations was published for titanium in 1986 by Dr. K. Mori [8] in collaboration with two of the present authors and with Y. Nakai, K. Ozawa, and T. Kato. Since the publication of that compilation, tokamak plasma diagnostic teams requested that we carry out similar compilations for other elements relevant to fusion energy research. We have thus published a series of compilations of Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Kr, and Mo (see Table 1) for the last decade. This data book is based on those single monographs and is dedicated to our earlier collaborators Mr. Y. Funatake, Dr. K. Ishii, Dr. K. Kato, Dr. A. Mengoni, Dr. K. Mori, Mr. T. Nakagaki, Dr. Y. Nakai, Dr. K. Okazaki, Dr. K. Ozawa, and Dr. H. Sakai.

We also owe a special acknowledgement to Dr. K. Mori, who inspired this work with earlier Grotrian diagrams for Fe VIII – Fe XXVI done in 1977 with his colleagues M. Otsuka and T. Kato in a Technical Report of the Institute of Plasma Physics, Nagoya University (1977).

1.2. Acknowledgements

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1.3. References for Introduction

[1] J. Sugar and C. Corliss, J. Phys. Chem. Ref. Data **14**, Suppl. 2 (1985).
[2] R. L. Kelly, J. Phys. Chem. Ref. Data **16**, Suppl. 1 (1987).
[3] B. C. Fawcett, J. Opt. Soc. Am. B **1**, 195 (1984).
[4] V. Kaufman and J. Sugar, J. Phys. Chem. Ref. Data **15**, 321 (1986).
[5] G. A. Martin, J. R. Fuhr, and W. L. Wiese, J. Phys. Chem. Ref. Data **17**, Suppl. 3 (1988).
[6] J. R. Fuhr, G. A. Martin, and W. L. Wiese, J. Phys. Chem. Ref. Data **17**, Suppl. 4 (1988).
[7] E. R. Cohen and B. N. Taylor, J. Phys. Chem. Ref. Data **2**, 663 (1973).
[8] K. Mori, W. L. Wiese, T. Shirai, Y. Nakai, K. Ozawa, and T. Kato, At. Data Nucl. Data Tables **34**, 79 (1986).

2. TABLES OF SPECTROSCOPIC DATA

2.1. Explanation of Tables

Wavelength (Å)

Wavelengths of listed spectral lines in Angstrom (Å) units (10^{-8} cm) are given in air above 2000 Å and in vacuum below 2000 Å.

C, T, P, S, L

Superscripts to the right of a wavelength value have the following meanings:

C wavelength calculated from energy level data using the Ritz combination principle.

T wavelength tentatively identified.

P wavelength predicted along an isoelectronic sequence.

S wavelength smoothed along an isoelectronic sequence.

L wavelength identified from isoelectronic study. The levels generating this line are not known.

Classification

Spectroscopic designation for lower and upper levels generating the spectral lines; electronic configurations followed by the term in *LS*-, *jj*- or *jK*-coupling notation. The superscript "°" on the term indicates odd parity. A term enclosed in parentheses refers to an intermediate state. Where only the total angular momentum *J* is given in successive listings, the preceding configuration and term labels apply.

Energy Levels (cm^{-1})

Level values are given in cm^{-1} for lower and upper level of the transition. A "?" after the level value indicates level was derived from a tentatively classified line. Theoretical levels are given in square brackets. A "+x" after the level value represents the error of the assumed connection (estimated or calculated) between this system and other levels of the spectrum.

Int.

Approximate intensity of a spectral line, generally visually estimated from the blackness (or density) of the line on photographic plates.

gf

This column lists the product of the statistical weight *g* of the lower level and the absorption oscillator strength or *f*-value for electric dipole transitions. 1.23−1 means 1.23×10^{-1}. Only *A* values are given for forbidden transitions.

A (s^{-1})

Radiative transition probability in s^{-1}. 1.23+11 means 1.23×10^{11}.

Acc.

Accuracy estimate for the oscillator strength and transition probability data, taken from the NIST reference tables on atomic transition probabilities (see, e.g. the introduction of Ref. 5 in section 1 for a detailed explanation). The accuracy is indicated by the following letter symbols, which are identical with the notation used in the NIST reference books:

A for uncertainties within 3 %

B for uncertainties within 10 %

C for uncertainties within 25 %

D for uncertainties within 50 %

E for uncertainties greater than 50 %

References

Reference sources for the data. The numbers are keyed to the bibliographic listing following the tables. When several references are listed, they are distinguished by superscripts on the numbers as follows:

° reference from which the adopted wavelength value is taken.

* reference containing the adopted oscillator strength and/or the transition probability.

△ reference from which the estimated intensity is taken.

2.2. Titanium

2.2.1. Brief Comments on Each Titanium Ion

Ti III

Ca I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^2\ \ ^3F_2$

Ionization energy 221 735.6 ± 2 cm^{-1}
(27.4917 ± 0.0003 eV)

Edlén and Swensson [1] extended the early observations by Russell and Lang [2] to include 724 lines in the range of 630 – 9300 Å by means of a pulsed hollow-cathode discharge. No wavelength uncertainties are given.

Edlén and Swensson [1] identified a total of 724 transitions among the levels of the following configurations: $3d4s$, $5s$, $6s$; $3d4p$, $5p$; $4s4p$; $3d^2$; $3d4d$, $5d$; $3d4f$, $5f$; $3d5g$, $6g$; $3d6h$; and $3d7h$. All levels were found except for the $3d7h$ configuration.

The series limit was determined from a polarization formula in Ref. [1].

Ti IV

K I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d\ \ ^2D_{3/2}$

Ionization energy 348 973.3 ± 1.5 cm^{-1}
(43.2672 ± 0.0002 eV)

Line identifications by Russell and Lang [2] were extended by Swensson and Edlén [3] who used a pulsed hollow-cathode discharge in the range of 2000 – 7800 Å and a sliding spark for 770 – 1470 Å.

They identified 59 transitions among the levels of the $n = 4-7s$, $4-6p$, $3-7d$, $4-5f$, $5-7g$, $6-7h$, $7-8i$, and $3p^53d^2\ \ ^2F^\circ_{5/2}$. The uncertainty of the wavelengths is estimated to be ±0.01 Å to ±0.02 Å.

The ionization energy was determined from a polarization formula using terms of ng, nh, and ni series in Ref. [3].

Ti V

Ar I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^6\ \ ^1S_0$

Ionization energy 800 700 ± 500 cm^{-1}
(99.30 ± 0.01 eV)

Svensson [4] identified 231 lines in the range of 144.551 – 2385.361 Å. These were classified in the arrays $3p^6-3p^5(3d,\ 4s,\ 5s,\ 6s)$, $3s^23p^6-3s3p^64p$, $3p^5(3d-4p,\ 4s-4p,\ 4p-4d,\ 4p-5s)$, $3s^23p^5(3d,\ 4s)-3s3p^63d$, and $3s3p^63d-3s^23p^5(4d,\ 5s)$. Wavelengths were measured with estimated uncertainties ranging from ±0.01 Å to ±0.005 Å using vacuum spark discharges.

Kastner *et al.* [5] identified 15 lines in the range of 103–146 Å as a Rydberg series arising from the transitions $3s^23p^6\ ^1S_0-3s3p^6np\ ^3P^\circ_1$ ($n=4-10$) and $3s^23p^6\ ^1S_0-3s3p^6np\ ^1P^\circ_1$ ($n=4-11$). Wavelengths were observed in spark spectra with an estimated uncertainty of ±0.005 Å.

The ionization energy was determined by extrapolation by Svensson and Ekberg [6].

Ti VI

Cl I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^5\ \ ^2P^\circ_{3/2}$

Ionization energy 964 100 ± 1000 cm^{-1}
(119.53 ± 0.1 eV)

The $3s^23p^5\ \ ^2P^\circ_{1/2,3/2}-3s3p^6\ \ ^2S_{1/2}$ transitions at 524.113 ± 0.002 Å and 508.575 ± 0.002 Å were measured by Svensson [7] in a vacuum spark discharge.

The $3p^5-3p^44s$ array was identified by Edlén [8]. Reobservation of this array was reported by Svensson and Ekberg [6], who also identified additional $3p^5-3p^4$ ($3d$, $4d$, $5s$, $5d$) transitions in a vacuum spark spectrum. The uncertainty of the wavelengths is estimated to be ±0.004 Å. A faint $3p\ \ ^2P^\circ_{3/2}-$ $(^1D)4s\ \ ^2D_{3/2}$ line at 192.705 Å was identified by Edlén.

The $3d-4f$ transitions in the range of 226 – 236 Å were classified by Fawcett *et al.* [9]. Their observations were made with a laser-produced plasma. The estimated uncertainty of their wavelengths is ±0.01 Å.

The ionization energy was determined by extrapolation in Ref. [6].

Ti VII

S I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^4\ \ ^3P_2$

Ionization energy 1 136 000 cm^{-1} (140.8 eV)

The $3s^23p^4-3s3p^5$ array in the range of 440–552 Å was identified by Svensson [7]. He measured wavelengths in a vacuum spark discharge with an uncertainty of ±0.002 Å

The $3p^4-3p^3$ ($3d$, $4s$, $4d$) transitions were observed and analyzed by Svensson and Ekberg [6] from vacuum spark spectra observed in the ranges of 248–333 Å, 164–180 Å, and 128 – 139 Å, respectively. The estimated uncertainty of wavelengths is ±0.004 Å.

The $3d-4f$ transitions in the range of 192–194 Å were classified by Fawcett *et al.* [9]. The estimated uncertainty of wavelengths is ±0.01 Å.

The value for the ionization energy was determined by Edlén by extrapolation in Ref. [8].

Ti VIII

P I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^3$ $^4S^o_{3/2}$

Ionization energy 1 374 000 cm^{-1} (170.4 eV)

The first observation of the $3p^3-3p^24s$ transitions was reported by Kruger and Pattin [10], from which only one line at 162.401 Å has been retained. The spectrum was reobserved by Ekberg and Svensson [11] with an estimated uncertainty of ±0.004 Å in the range of 149 – 409 Å, using a vacuum spark discharge. They identified the $3p^3-3p^23d$ and $4s$ transitions and two of the $3s^23p^3-3s3p^4$ transitions. More complete identifications of these arrays were given by Smitt *et al.* [12] using a similar light source. The estimated wavelength uncertainty in the range of 401 – 539 Å is ±0.008 Å.

The $3d-4f$ transitions in the range of 168 – 172 Å were classified by Fawcett *et al.* [9]. The estimated uncertainty of these wavelengths is ±0.01 Å.

The connection between the doublet and quartet terms has not been found. Therefore, we give all doublet energy levels with a systematic uncertainty of +x, which is approximately ±20 cm^{-1}.

The value for the ionization energy was determined by Lotz [13] by extrapolation.

Ti IX

Si I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^2$ $^3P_0$

Ionization energy 1 549 000 cm^{-1} (192.1 eV)

The $3s^23p^2-3s3p^3$, $3p^2-3p3d$, and $3p^2-3p4s$ arrays were classified by Ekberg and Svensson [11]. Wavelengths were observed in the range of 136 – 400 Å with an estimated uncertainty of ±0.004 Å using a vacuum spark source. The $3s^23p^2-3s3p^3$ transition was reobserved by Smitt *et al.* [12] in the range of 324 – 580 Å. The uncertainty of wavelengths is estimated to be ±0.008 Å.

The $3s^23p^2$ $^3P_{1,2}-3s3p^3$ $^5S^o_2$ intercombination transitions at 703.68± 0.5 Å and 724.42±0.25 Å were identified by Träbert *et al.* [14] from beam-foil observations.

The $3p3d-3p4f$ line at 149.560 Å and the $3p^2-3p4d$ lines at about 111 Å were observed by Fawcett *et al.* [9] with an estimated uncertainty of ±0.01 Å in a laser-produced plasma.

The value for the ionization energy was obtained by Ekberg and Svenson [11] by extrapolation.

Ti X

Al I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p$ $^2P^o_{1/2}$

Ionization energy 1 741 500 cm^{-1} (215.92 eV)

Fawcett [15], and Ekberg and Svensson [11] measured the $3s^23p$ $^2P^o-3s3p^2$ ^2S and ^2P transitions. Smitt *et al.* [12] remeasured these wavelengths and also identified the $^2P^o-^2D$ lines, all with an estimated uncertainty of ±0.008 Å. The $^2P^o-^4S$ intercombination lines in the range of 612 – 655 Å were identified by Träbert *et al.* [14] in a beam-foil measurement.

The $3s3p^2-3p^3$ transitions identified by Fawcett [15] were reobserved by Litzén and Redfors [16] with an estimated uncertainty of ±0.02 Å in a laser-produced plasma. Transitions between terms in the configurations $3s^23p$, $3s3p^2$, $3s^23d$, $3p^3$, and $3s3p3d$ (except for $^4F^o$) were identified by Redfors and Litzén [17]. Two $3s3p^2-3s3p(^3P^o)3d$ lines were reobserved by Levashov *et al.* [18]. They are the $^4P_{1/2}-^4P^o_{1/2}$ and $^4P_{3/2}-^4D^o_{1/2}$ lines at 290.93 Å and 291.037 Å, respectively. Pinnington *et al.* [19,20] measured 11 additional lines from beam-foil observations with estimated uncertainties of ±0.2 Å to ±0.3 Å.

The transition arrays $3p^3$, $3s3p3d-3p^23d$, $3s3d^2$ were identified by Churilov and Levashov [21] in a laser-produced plasma. Their measurement uncertainty was ±0.01 Å. They also redetermined all energy levels of the configurations with $n=3$. We have adopted their results. The $3s3p^2$ $^4P-3s3p(^3P^o)3d$ $^4D^o$ line at 288.462 Å ($J={}^1/_2-{}^3/_2$) reported by Ekberg and Svensson [11] is omitted, because it disagrees with the levels of Churilov and Levashov [21] by 0.35 Å.

Ekberg and Svensson [11] also identified the transitions from $n=3$ to $n=4-6$ in the range of 70 – 143 Å. Additional identifications of the $3s3p^2-3s^24p$ and $3s^23d-3s^24p$ transitions were made by Pinnington *et al.* [19] with an estimated uncertainty of ±0.1 Å.

The value for the ionization energy was obtained by Ekberg and Svensson [11] by extrapolation.

Ti XI

Mg I isoelectronic sequence

Ground state $1s^22s^22p^63s^2$ $^1S_0$

Ionization energy 2 137 900 ± 500 cm^{-1}
(265.07 ± 0.06 eV)

Ekberg [22] classified the spectrum observed by Svensson and Ekberg [23] in the range of 306 – 387 Å as the $3s^2-3s3p$ and $3s3p-3s3d$ transitions. Litzén and Redfors [24] extended the classifications between terms in the $n=3$ shell (except for $3d^2$) with a laser-produced plasma. The estimated uncertainty of wavelengths is

±0.02 Å. The deviation of the line at 439.75 Å from the energy level values is 0.06 Å. An additional spin-forbidden line $3s^2\ ^1S_0 - 3s3p\ ^3P^\circ_1$ at 568.98 ± 0.04 Å was measured by Peacock *et al.* [25] in a tokamak plasma.

The $3p3d - 3d^2$ transitions were measured by Redfors [26] and Levashov and Churilov [27] in laser-produced plasmas with an estimated uncertainty of ±0.02 Å. Wavelengths are taken from Ref. [26] and from Churilov *et al.* [28] for eight additional lines.

Energy levels of the $n = 3$ configurations are taken from Ref. [24], with the additions of $3d^2$ levels from Refs. [26] and [28]. It should be noted that the designations of $3p3d\ ^3D^\circ_1$ and $^3P^\circ_1$ in Ref. [28] have been interchanged, as required by the percentage compositions given in Ref. [28].

The spectrum obtained by Svensson and Ekberg [23] in the range of 54 – 136 Å was interpreted by Ekberg [22] as transitions among the $n = 3$ levels (except for $3p3d$ and $3d^2$) and $n = 4$ to 7 levels. Kastner *et al.* [29] tentatively identified $3s3d - 3p4d$ and $3p^2 - 3p4d$ transitions. The estimated uncertainty of wavelengths is ±0.004 Å. The $3p3d - 3p4f$ transitions were measured by Fawcett [30] with an estimated uncertainty of ±0.01 Å. Bashkin *et al.* [31] identified the $^1F^\circ_3 - ^1G_4$ transition in beam-foil observations.

Sugar and Corliss [32] calculated the ionization energy from the $3snf\ ^3F^\circ$ series.

Ti XII

Na I isoelectronic sequence

Ground state $1s^22s^22p^63s\ \ ^2S_{1/2}$

Ionization energy 2 351 080 ± 100 cm^{-1}
(291.497 ± 0.012 eV)

An analysis along Rydberg series was carried out by Ekberg and Svensson [33] for the $3s-np$ ($n = 3-6$), $3p-ns$ ($n = 4-6$), $3p-nd$ ($n = 3-8$), $3d-np$ (n=4,5), and $3d-nf$ ($n = 4-8$) series. Forty-three lines were identified in the range of 52 – 960 Å in a vacuum spark discharge. A few additional identifications of the *ns*-, *np*-, and *nd*-series up to $n = 7$, 11, and 10, respectively, were reported by Cohen and Behring [34]. An isoelectronic comparison of measured wavelengths of the $3s - 3p$, $3p - 3d$, and $3d-4f$ transitions with Dirac-Fock calculations was made by Reader *et al.* [35], who derived least squares adjusted wavelengths with an estimated uncertainty of ±0.007 Å. A beam-foil spectrum in the range of 127 – 1323 Å was observed by Westerlind [36] with estimated uncertainties ranging from ±0.04 Å to ±0.1 Å. He classified 28 new lines including transitions between terms with high n and l values up to $8k\ ^2K^\circ$.

The $2p^63s - 2p^53s^2$, $2p^63p - 2p^53s3p$, and $2p^63d - 2p^53s3d$ transitions in the range of 26 – 28 Å were observed in a laser-produced plasma and a vacuum spark discharge by Burkhalter *et al.* [37] with an estimated uncertainty of ±0.01 Å. However most lines are designated as blends of several closely spaced predicted transitions. We omit this group until more highly resolved data is available.

Jupén *et al.* [38] identified the line at 324.87±0.02 Å in a beam-foil spectrum as the $2p^53s3p\ ^4D^\circ_{7/2} - 2p^53s3d\ ^4F_{9/2}$ transition.

The value for the ionization energy was derived by Edlén [39] with core-polarization theory applied to the nf series.

Ti XIII

Ne I isoelectronic sequence

Ground state $1s^22s^22p^6\ \ ^1S_0$

Ionization energy 6 354 300 cm^{-1} (787.833 eV)

The $2p^6 - 2p^53s$ and $3d$ lines at ~27 Å and ~24 Å were identified by Edlén and Tyrén [40] using a vacuum spark source. The $2s^22p^6 - 2s2p^63p$ and $2p^6 - 2p^54s$, $4d$, $5d$ transitions were observed by Feldman and Cohen [41] with an estimated uncertainty of ±0.005 Å with a low-inductance vacuum spark source.

The $3s - 3p$ and $3p - 3d$ transitions were observed by Jupén and Litzén [42] in a laser-produced plasma with an estimated uncertainty of ±0.01 Å and by Träbert [43] in beam-foil observations with an estimated uncertainty of ±0.1 Å. Träbert also found the $2s2p^63s - 2s2p^63p$ and $2s2p^63p - 2s2p^63d$ transitions. Träbert and Jupén [44] reobserved the $2p^53s\ ^{1,3}P^\circ_1 - 2p^53p\ ^1S_0$ lines at 326.29 ± 0.05 Å and at 285.08 ± 0.05 Å, respectively. Designations have been given in the jK coupling notation by Jupén *et al.* [45].

Jupén *et al.* reobserved the spectrum in the range of 74 – 105 Å in a laser-produced plasma, in order to extend the earlier work on the $n = 3 - 4$ transitions by Kastner *et al.* [46] and Fawcett *et al.* [47]. They found 24 lines, including seven new ones, with an estimated uncertainty of ±0.01 Å, and derived the positions of the $2p^53l$ and $4l$ levels, which we have quoted here. In Ref. [47] six additional lines of the $3s - 4p$, $3d - 4f$, and $3d - 5f$ transitions are given, and energy levels are derived from these lines. It should be noted that a blended line classified as $2p^5(^2P^\circ_{3/2})3d\ ^2[\frac{3}{2}]^\circ_2 - 2p^5(^2P^\circ_{3/2})4f\ ^2[\frac{3}{2}]_2$ at 99.09 Å has been omitted because this identification does not fit the level scheme.

The value for the ionization energy was derived by Sugar and Corliss [32] from the $2p^5nd\ ^3D^\circ_1$ series for $n = 3 - 5$.

Ti XIV

F I isoelectronic sequence

Ground state $1s^22s^22p^5\ \ ^2P^\circ_{3/2}$

Ionization energy 6 966 000 cm^{-1} (863.6 eV)

The magnetic-dipole transition $2p^5(^2P^\circ_{3/2}-\,^2P^\circ_{1/2})$ at 2117.15 ± 0.07 Å was observed by Peacock *et al.* [25] in a tokamak discharge.

Stamp and Peacock [48] measured the values 121.985 ± 0.002 Å and 129.440 ± 0.002 Å in a tokamak plasma for the $2s^22p^5\ ^2P^\circ_{3/2,1/2} - 2s2p^6\ ^2S_{1/2}$ transitions. Kaufman *et al.* [49] obtained values within the above uncertainty with a laser-produced plasma. Wavelengths are quoted from Ref. [49].

The $2p-3s$ and $2p-3d$ transitions, including those of the $2s2p^6 - 2s2p^53s$ array, were identified by Feldman *et al.* [50] in the range of $21-26$ Å. Wavelengths were obtained with a low-inductance vacuum spark source with an estimated uncertainty of ±0.01 Å.

The $2p^43s - 2p^43p$ and $2p^43p - 2p^43d$ transitions were classified by Jupén *et al.* [51] in a beam-foil spectrum. Wavelengths in the range of $347-541$ Å are provided with an estimated uncertainty ranging from ±0.01 Å to ±0.1 Å. We have quoted their energy levels for the $n=3$ configuration, except for the $2p^4(^3P)3s\ ^4P_{1/2}$ level. For this we use 4 036 120 cm^{-1} to give a better fit with their results.

For the ionization energy we use a value calculated by Cheng [52] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [53].

Ti XV

O I isoelectronic sequence

Ground state $1s^22s^22p^4\ \ ^3P_2$

Ionization energy 7 613 000 cm^{-1} (943.9 eV)

The wavelength of the magnetic-dipole line $2s^22p^4(^3P_2-\,^3P_1)$ at 2545.08±0.08 Å was determined by Lawson *et al.* [54] in a tokamak discharge. Their value is more accurate than that of Suckewer *et al.* [55]. Two intercombination lines, $(^3P_2-\,^1D_2)$ and $(^3P_1-\,^1D_2)$ at 919.73±0.08 Å and 1440.2±0.8 Å, were given by Peacock *et al.* [25] and Finkenthal *et al.* [56], respectively.

The $2s^22p^4 - 2s2p^5$ transitions in the range of $102-166$ Å were identified by Fawcett [57] and with improved resolution by Doschek *et al.* [58] More accurate measurements were provided by Kaufman *et al.* [49] with a laser-produced plasma and reobserved by Stamp and Peacock [48] and Peacock *et al.* [25] in tokamak plasmas. The results of Kaufman *et al.*, including the identification of intercombination lines, are given here.

The $n = 2-3$ transitions in the range of $20-24$ Å were first observed by Goldsmith *et al.* [59]. Revisions and additions to this work were reported by Doschek *et al.* [60] for the $2p-3s$ and by Fawcett and Hayes [61] and Bromage and Fawcett [62] for the $2p-3d$ transitions.

For the ionization energy we use a value calculated by Cheng [52] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [53].

Ti XVI

N I isoelectronic sequence

Ground state $1s^22s^22p^3\ \ ^4S^\circ_{3/2}$

Ionization energy 8 404 000 cm^{-1} (1042.0 eV)

Two magnetic-dipole lines $2s^22p^3\ (^2D^\circ_{5/2}-\,^2P^\circ_{3/2})$ and $(^2D^\circ_{3/2}-\,^2P^\circ_{1/2})$ at 1129.2±0.4 Å and 1224.1±0.4 Å were identified by Finkenthal *et al.* [56].

The $2s^22p^3 - 2s2p^4$ and $2s2p^4 - 2p^5$ transition arrays were classified by Fawcett [57]. The spectrum was reobserved by Kaufman *et al.* [63] with a laser-produced plasma. The estimated uncertainty of their wavelengths is ±0.005 to ±0.01 Å. They give 25 lines, including the intercombination line $2s^22p^3\ \ ^4S^\circ_{3/2} - 2s2p^4\ \ ^2P_{3/2}$ at 102.393 Å. Two additional $2s^22p^3 - 2s2p^4$ lines at 142.57 Å and 146.57 Å are from Kasyanov *et al.* [64]. The $2s^22p^3 - 2s2p^4$ arrays were also observed by Stamp and Peacock [48] and Peacock *et al.* [25] in tokamak discharges.

The $2p^3 - 2p^23d$ transitions in the range of $19-21$ Å were identified by Fawcett and Hayes [61] and also by Bromage and Fawcett [65]. Wavelengths were measured with an estimated uncertainty of ±0.01 Å in laser-produced plasmas.

For the ionization energy we use a value calculated by Cheng [52] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [53].

Ti XVII

C I isoelectronic sequence

Ground state $1s^22s^22p^2\ \ ^3P_0$

Ionization energy 9 125 000 cm^{-1} (1131.3 eV)

The $2s^22p^2(^3P_1-\,^3P_2)$ and $(^3P_0-\,^3P_1)$ magnetic-dipole lines at 3834.4 ± 0.2 Å and 3370.8 ± 0.2 Å were observed by Suckewer *et al.* [55] in a tokamak plasma. Similar observations were reported by Lawson *et al.* [54] and Peacock *et al.* [25].

The $2s^22p^2 - 2s2p^3$ transitions were identified by Fawcett *et al.* [66] and by Kasyanov *et al.* [64]. Fawcett *et al.* [67] reobserved some of them and also identified the $2s2p^3 - 2p^4$ transitions with an uncertainty of ±0.05 Å. More accurate measurements with uncertainties varying from ±0.005 Å to ±0.01 Å were made by Sugar *et al.* [68], who confirmed the earlier identifications except for the $2s2p^3\ \ ^3S^\circ_1 - 2p^4\ ^3P_2$ and $2s2p^3\ ^3P^\circ - 2p^4\ ^3P$ transitions. They also identified the intersystem lines

$2s^22p^2\ ^3P_1 - 2s2p^3\ ^1P_1^\circ$ and $2s2p^3\ ^3D_3^\circ - 2p^4\ ^1D_2$, and the allowed lines $^3D_{2,1}^\circ - ^3P_{2,0}$. Denne and Hinnov [69] assigned a faint line at 359.8 Å to the intercombination transition $2s^22p^2\ ^3P_2 - 2s2p^3\ ^5S_2^\circ$.

The $2p^2 - 2p3s$, $2s2p^3 - 2s2p^2(3s, 3d)$, and $2p^2 - 2p3d$ transitions in the range of 18 – 21 Å were first classified by Goldsmith *et al.* [70]. The $2p^2 - 2p3d$ transitions were reanalyzed by Fawcett and Hayes [61] and more fully by Bromage and Fawcett [71] whose wavelengths are given here.

For the ionization energy we use a value calculated by Cheng [52] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [53].

Ti XVIII

B I isoelectronic sequence

Ground state $1s^22s^22p\ ^2P_{1/2}^\circ$

Ionization energy 9 844 000 cm^{-1} (1220.5 eV)

Suckewer *et al.* [55] identified the line at 1778.1 ± 0.1 Å in a tokamak spectrum as the $2s^22p$ ($^2P_{1/2}^\circ - ^2P_{3/2}^\circ$) magnetic-dipole transition. This line was reobserved by Lawson *et al.* [54], Peacock *et al.* [25], and Finkenthal *et al.* [56], also in tokamak plasmas.

The $2s2p^2 - 2p^3$ transitions were observed by Kasyanov *et al.* [64] and Fawcett *et al.* [67] with estimated uncertainties of ±0.02 Å and ±0.05 Å, respectively. An additional blended $^4P_{1/2} - ^4S_{3/2}^\circ$ line at 153.23 Å was given by Fawcett and Hayes [61], but it has been omitted because of a discrepancy of 0.12 Å from the level values adopted here. The $2s^22p - 2s2p^2$ transitions were classified by Fawcett and Hayes [61] and reobserved by Sugar *et al.* [72] in a laser-produced plasma with an estimated uncertainty of ±0.01 Å. Denne and Hinnov [69] tentatively identified two lines at 361.1 Å and 322.6 Å as the intercombination transition $2s^22p^2\ ^2P_{3/2,1/2}^\circ - 2s2p^2\ ^4P_{3/2,1/2}$.

The $2s2p^2 - 2s2p3d$, $2s^22p - 2s^23d$, and $2s^22p - 2s2p3p$ transitions in the range of 16 – 18 Å were identified by Fawcett and Hayes [61], and measured with an estimated uncertainty of ±0.01 Å in a laser-produced plasma.

For the ionization energy we use a value calculated by Cheng [52] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [53].

Ti XIX

Be I isoelectronic sequence

Ground state $1s^22s^2\ ^1S_0$

Ionization energy 10 863 000 cm^{-1} (1346.9 eV)

Lawson *et al.* [54] identified the magnetic-dipole transition $2s2p$ ($^3P_1^\circ - ^3P_2^\circ$) with a line at 2344.6±0.2 Å in a tokamak discharge.

The $2s2p - 2p^2$ array, including the $^3P_2^\circ - ^1D_2$ intercombination transition, was observed and classified by Fawcett *et al.* [67] in the range of 175 – 306 Å. They estimate their wavelength uncertainty to be ±0.05 Å.

The resonance line $2s^2\ ^1S_0 - 2s2p\ ^1P_1^\circ$ was identified by Kashanov *et al.* [64] at 169.59 Å. Stamp and Peacock [48] measured the $2s^2\ ^1S_0 - 2s2p\ ^{1,3}P_1^\circ$ transitions at 169.580 ± 0.002 Å and 328.278 ± 0.008 Å, which we have adopted.

The $n = 2 - 3$ transitions in the range of 15.6 – 17.2 Å were identified by Fawcett and Hayes [61] with estimated uncertainties of ±0.01 Å and by Boiko *et al.* [73,74] with estimated uncertainties of ±0.003 Å. Some blended lines in Refs. [73] and [74] have multiple classifications.

Six lines of the $n = 2 - 4$ transitions were newly classified by Moreno *et al.* [75] in the range of 12 – 13 Å in a laser-produced plasma. The estimated uncertainty of the wavelengths is ±0.01 Å. However, the classifications of the $2p^2\ ^3P_{1,2} - 2p4d\ ^3P_2^\circ$ transitions at 12.688 Å and 12.622 Å are erroneous, because the lower term splitting does not fit the value adopted here by nearly a factor of two. We omit the data from this paper.

For the ionization energy we use a value calculated by Cheng [52] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [53].

Ti XX

Li I isoelectronic sequence

Ground state $1s^22s\ ^2S_{1/2}$

Ionization energy 11 497 000 cm^{-1} (1425.4 eV)

The resonance doublet, $2s\ ^2S - 2p\ ^2P^\circ$, at 259.272 ± 0.004 Å and 309.072 ± 0.010 Å was first observed by Stamp and Peacock [48] in a tokamak discharge. Hinnov *et al.* [76] reobserved these lines at 259.300 ± 0.02 Å and 309.065 ± 0.015 Å also in a tokamak discharge. Recently Kim *et al.* [77] obtained smoothed wavelengths for this doublet of 259.292 Å and 309.099 Å. We adopt their results.

The $3d\ ^2D - 4f\ ^2F^\circ$ doublet at 46.69 ± 0.01 Å and 46.79 ± 0.01 Å was observed by Fawcett and Ridgely [78] using a laser-produced plasma.

The inner-shell $1s^22s - 1s2s2p$ and $1s^22p - 1s2p^2$ transitions near about 2.6 Å were observed by Aglitskii *et al.* [79] with estimated uncertainties ranging from ±0.0005 Å to ±0.0015 Å in a laser-produced plasma. Almost all the lines are blended. This spectrum was classified by Boiko *et al.* [74]

The $2s - np$ ($n = 3 - 9$), $2p - 3s$, and $2p - nd$ ($n = 3 - 8$) transitions in the range of 9.1 – 16.5 Å were found by Aglitskii *et al.* [80] with an estimated uncertainty of ±0.003 Å. Almost all the lines are blended.

Vainshtein and Safronova [81] calculated energy levels of the $1s^2nl$ configurations with $n = 2-5$, and $l = s$, p, and d. Their energy levels are adjusted to the $1s^22p$ $^2P^\circ_{1/2,3/2}$ levels of Kim *et al.* by adding 20 cm^{-1}. They also calculated wavelengths of the $1s^22s-1s2s2p$, $1s^22p-1s2p^2$, and $1s^22p-1s2s^2$ transitions. We use their results to derive these autoionizing levels.

New observations in the region of 2.2 Å were made by Aglitskii and Panin [82] using a low-inductance spark discharge. They identified the $1s^22p\,^2P^\circ_{3/2}-1s2pnp\,^2D_{5/2}$ transitions with $n = 3-5$.

The value for the ionization energy was derived by Sugar and Corliss [32] from the *nd* series.

Ti XXI

He I isoelectronic sequence

Ground state $1s^2$ $^1S_0$

Ionization energy 50 401 900 ± 800 cm^{-1}
(6249.0422 ± 0.1 eV)

The $n = 1$ to $n = 2$ transitions were observed by Aglitskii *et al.* [79] and Turechek and Kunze [83]. The resonance line $1s^2$ $^1S_0 - 1s2p$ $^1P^\circ_1$ was reobserved by Morita [84], Vainshtein *et al.* [85], Morita and Fujita [86], and Beiersdorfer *et al.* [87].

Vainshtein *et al.* also observed the $1s^2$ $^1S_0 - 1snp$ $^1P^\circ_1$ transitions with $n = 3-5$. Observations up to np $^{1,3}P^\circ_1$ levels with $n = 3-8$ were given by Aglitskii and Panin [82]. New observations were made by Beiersdorfer *et al.* [87] of the singlets with $n = 4$ and 5.

The $1s2s-1s2p$ and $1s2p-1s3d$ transitions were identified by Galvez *et al.* [88] and Moreno *et al.* [75], respectively.

The $1s2s-2s2p$ and $1s2p-2p^2$ transitions were first identified by Turechek and Kunze [83] and subsequently by Bitter *et al.* [93] with five lines near about 2.51 Å. We have adopted the calculated wavelengths of Vainshtein and Safronova [81] for transitions from the $n = 2$ doubly-excited states.

Cheng *et al.* [89] give calculated total energies for the ground and n=2 singlet states of selected He-like ions. We use a later calculation of both singlet and triplet states by Cheng [90] for all elements from Ti through Cu and Kr for the $n = 1$ and 2 configurations. With these data and the binding energy of the H-like ions [91] we obtain the value for the ionization energy of the He-like ions. For the $1s3l$ states we use the level values from Drake [92].

The levels $1s4l$ and $5l$ calculated by Vainshtein and Safronova [81] have been tabulated after increasing them by 1200 cm^{-1} to correspond with the values of lower n by Drake. All wavelengths have been derived from differences of the adopted energy levels.

Vainshtein and Safronova also calculated wavelengths of transitions between $1s2s-2s2p$, $1s2p-2s^2$, and $1s2p-2p^2$. We have compiled them without correction.

Ti XXII

H I isoelectronic sequence

Ground state $1s$ $^2S_{1/2}$

Ionization energy 53 440 740 ± 10 cm^{-1}
(6625.810 ± 0.001 eV)

For the $1s$ $^2S_{1/2} - 2p$ $^2P^\circ_{1/2,3/2}$ resonance transitions, measurements have been reported by Lie and Elton [94], Turechek and Kunze [83], and Bitter *et al.* [93]. We have tabulated the wavelengths calculated from the theoretical energy levels of Johnson and Soff [91] for the $n = 2$ shell whose estimated uncertainty is ±10 cm^{-1}. Their energy differences are in close agreement with those of Mohr [95]. The binding energies for the levels with $n = 2-5$ have been calculated by Erickson [96]. We subtracted his values for $n = 3-5$ from the binding energy of the ground state obtained by Johnson and Soff to obtain corrected values for Erickson's levels.

Transition probabilities and oscillator strengths were obtained by scaling the data tabulated for hydrogen by Wiese *et al.* [97].

The scaling was actually performed for the line strengths S, which for a hydrogenlike ion of nuclear charge Z are reduced according to $S_Z = Z^{-2}S_H$, so that

$$S_{\text{Ti XXII}} = S_H(22)^{-2} = S_H/484.$$

The f and A values were then obtained from the usual numerical conversion formulas, given for example in Ref. [98]. For these conversions the very accurate wavelengths listed in the first column of the Ti XXII table were used, in which relativistic and QED effects in the energies were taken into account. Relativistic effects in the line strengths are only of the order of 1 − 3% for Ti XXII, according to the work by Younger and Weiss [99], and have been neglected.

The value for the ionization energy is from Johnson and Soff [91].

2.2.2. Spectroscopic Data for Ti III through Ti XXII

Ti III

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
9303.06^{C}	$3d4f\ ^3H^o_4$	$3d5d\ ^3F_3$	159 022.93	169 769.13	1bl				1
9271.12	5	4	159 128.94	169 912.11	1	1.23 − 1	1.0+6	D	1°, 98*
9193.52	$3d4f\ ^3G^o_3$	$3d5d\ ^3F_2$	158 740.92	169 615.12	1				1
9081.40	5	4	158 903.55	169 912.11	2	1.2	1.1+7	D	1°, 98*
9024.05	$3d4f\ ^3F^o_2$	$3d5d\ ^3F_2$	158 536.63	169 615.12		2.1 − 1	3.4+6	D	1°, 98*
9017.10	$3d4f\ ^1H^o_5$	$3d5d\ ^1G_4$	160 054.90	171 141.93	3	1.7	1.5+7	D	1°, 98*
8938.06	$3d4f\ ^3D^o_3$	$3d5d\ ^3P_2$	159 481.95	170 666.94	1				1
8938.06	$3d5d\ ^1D_2$	$3d5f\ ^3D^o_3$	170 840.80	182 025.86	1				1
8931.21	$3d5d\ ^3P_2$	$3d5f\ ^1F^o_3$	170 666.94	181 860.55					1
8916.95	$3d5d\ ^1G_4$	$3d5f\ ^1H^o_5$	171 141.93	182 353.45	3	8.9	6.8+7	D	1°, 98*
8887.71	$3d5d\ ^3P_1$	$3d5f\ ^3D^o_2$	170 659.72	181 908.15		1.4	2.3+7	D	1°, 98*
8801.25	2	3	170 666.94	182 025.86	3				1
8801.25	$3d4f\ ^3D^o_3$	$3d5d\ ^1D_2$	159 481.95	170 840.80	3				1
8795.28	$3d5d\ ^1D_2$	$3d5f\ ^3P^o_2$	170 840.80	182 207.39	2				1
8745.99	$3d6s\ ^1D_2$	$3d5f\ ^1D^o_2$	170 270.02	181 700.72	2				1
8731.24	$3d5d\ ^3F_3$	$3d5f\ ^1G^o_4$	169 769.13	181 219.06	3	6.6 − 1	6.4+6	D	1°, 98*
8703.30	$3d4f\ ^1F^o_3$	$3d5d\ ^3P_2$	159 180.24	170 666.94	3				1
8699.85	$3d4d\ ^3P_2$	$3d5p\ ^1D^o_2$	135 721.51	147 212.77	5				1
8662.79	$3d5d\ ^3P_2$	$3d5f\ ^3P^o_2$	170 666.94	182 207.39	3				1
8611.06	2	1	170 666.94	182 276.75					1
8605.75	1	1	170 659.72	182 276.75	3	7.2 − 1	2.2+7	D	1°, 98*
8563.50	1	0	170 659.72	182 333.95	2	4.8 − 1	4.3+7	D	1°, 98*
8625.35	$3d6s\ ^1D_2$	$3d5f\ ^1F^o_3$	170 270.02	181 860.55	4				1
8618.79	$3d5d\ ^3F_3$	$3d5f\ ^3F^o_3$	169 769.13	181 368.45	2	4.0 − 1	5.1+6	D	1°, 98*
8544.89	4	4	169 912.11	181 611.79	5	9.9 − 1	1.0+7	D	1°, 98*
8527.03	2	2	169 615.12	181 339.27	6	1.2	2.2+7	D	1°, 98*
8505.88	2	3	169 615.12	181 368.45	7	2.0	2.6+7	D	1°, 98*
8584.05	$3d5d\ ^3F_4$	$3d5f\ ^3H^o_5$	169 912.11	181 558.44	6	1.5	1.2+7	D	1°, 98*
8566.24	3	4	169 769.13	181 439.64	5	1.2	1.2+7	D	1°, 98*
8573.53	$3d4f\ ^1F^o_3$	$3d5d\ ^1D_2$	159 180.24	170 840.80	1				1
8532.26	$3d4f\ ^1D^o_2$	$3d5d\ ^1D_2$	159 123.78	170 840.80	1				1
8516.40	$3d5d\ ^3F_3$	$3d5f\ ^3G^o_3$	169 769.13	181 507.92	5	9.8 − 1	1.3+7	D	1°, 98*
8439.19^{C}	4	4	169 912.11	181 758.34		1.4	1.5+7	D	1°, 98*
8406.15	2	3	169 615.12	181 507.92	8	2.5	3.4+7	D	1°, 98*
8394.20	4	5	169 912.11	181 821.83	12	6.5	5.6+7	D	1°, 98*
8338.54	3	4	169 769.13	181 758.34	10	4.0	4.2+7	D	1°, 98*
8504.05	$3d6s\ ^1D_2$	$3d5f\ ^3D^o_3$	170 270.02	182 025.86					1
8466.87	$3d4d\ ^1D_2$	$3d5p\ ^1D^o_2$	135 405.27	147 212.77	20				1
8358.45	$3d4d\ ^3P_1$	$3d5p\ ^3D^o_1$	135 601.47	147 562.14	2				1
8316.71	0	1	135 541.46	147 562.14	3				1
8311.38	2	2	135 721.51	147 749.89	4				1
8229.26	1	2	135 601.47	147 749.89	5				1
8182.42	2	3	135 721.51	147 939.47	10				1
8305.41	$3d(^2D_{5/2})5g\ [\frac{3}{2}]_2$	$3d(^2D_{5/2})6h\ [\frac{5}{2}]^o_3$	182 680.53	194 717.4	4				1
8305.41	1	2	182 680.27	194 717.4	4				1
8305.41	$3d(^2D_{5/2})5g\ [\frac{13}{2}]_6$	$3d(^2D_{5/2})6h\ [\frac{13}{2}]^o_6$	182 601.96	194 639.2	4				1
8301.8^{C}	7	7	182 596.87	194 639.2	1bl				1

Ti III – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
8278.69	$3d(^2D_{3/2})5g\ [\frac{11}{2}]_6$	$3d(^2D_{3/2})6h\ [\frac{11}{2}]^o_6$	182 170.72	194 246.5					1
8276.20	5	5	182 166.91	194 246.5					1
8267.32	$3d(^2D_{3/2})5g\ [\frac{5}{2}]_2$	$3d(^2D_{3/2})6h\ [\frac{7}{2}]^o_3$	182 225.09	194 317.2	15				1
8267.32	3	4	182 224.72	194 317.2	15				1
8267.32	$3d(^2D_{5/2})5g\ [\frac{13}{2}]_6$	$3d(^2D_{5/2})6h\ [\frac{15}{2}]^o_7$	182 601.96	194 694.6	15				1
8263.67	7	8	182 596.87	194 694.6	9				1
8267.32	$3d(^2D_{5/2})5g\ [\frac{5}{2}]_2$	$3d(^2D_{5/2})6h\ [\frac{7}{2}]^o_3$	182 587.62	194 680.2	15				1
8267.32	3	4	182 587.12	194 680.2	15				1
8252.85	$3d5d\ ^3F_4$	$3d5f\ ^3D^o_3$	169 912.11	182 025.86		1.4 − 1	2.1+6	D	1°, 98*
8235.58	3	2	169 769.13	181 908.15		2.2 − 1	4.3+6	D	1°, 98*
8241.10	$3d(^2D_{3/2})5g\ [\frac{11}{2}]_6$	$3d(^2D_{3/2})6h\ [\frac{13}{2}]^o_7$	182 170.72	194 301.6	8				1
8238.57	5	6	182 166.91	194 301.6	7				1
8213.35	$3d(^2D_{5/2})5g\ [\frac{7}{2}]_4$	$3d(^2D_{5/2})6h\ [\frac{9}{2}]^o_5$	182 474.38	194 646.3	7				1
8212.60	3	4	182 473.21	194 646.3	7				1
8202.13	$3d(^2D_{5/2})5g\ [\frac{11}{2}]_6$	$3d(^2D_{5/2})6h\ [\frac{11}{2}]^o_6$	182 439.62	194 628.2	1				1
8200.10	5	5	182 436.46	194 628.2	1				1
8199.17	$3d(^2D_{3/2})5g\ [\frac{7}{2}]_4$	$3d(^2D_{3/2})6h\ [\frac{9}{2}]^o_5$	182 068.87	194 261.8	8				1
8198.30	3	4	182 067.49	194 261.8	8				1
8194.75	$3d(^2D_{5/2})5g\ [\frac{11}{2}]_6$	$3d(^2D_{5/2})6h\ [\frac{13}{2}]^o_7$	182 439.62	194 639.2	9				1
8192.68	5	6	182 436.46	194 639.2	9				1
8190.57	$3d(^2D_{5/2})5g\ [\frac{7}{2}]_4$	$3d(^2D_{5/2})6h\ [\frac{7}{2}]^o_4$	182 474.38	194 680.2	1				1
8189.78	3	3	182 473.21	194 680.2					1
8187.79	$3d4d\ ^3P_2$	$3d5p\ ^3F^o_2$	135 721.51	147 931.47	1				1
8179.13	$3d(^2D_{5/2})5g\ [\frac{9}{2}]_4$	$3d(^2D_{5/2})6h\ [\frac{11}{2}]^o_5$	182 405.25	194 628.2	8				1
8178.00	5	6	182 403.64	194 628.2	9				1
8173.37	$3d(^2D_{3/2})5g\ [\frac{9}{2}]_4$	$3d(^2D_{3/2})6h\ [\frac{11}{2}]^o_5$	182 014.92	194 246.5	9				1
8172.21	5	6	182 013.32	194 246.5	10				1
8166.96	$3d(^2D_{5/2})5g\ [\frac{9}{2}]_4$	$3d(^2D_{5/2})6h\ [\frac{9}{2}]^o_4$	182 405.25	194 646.3					1
8165.85	5	5	182 403.64	194 646.3	1				1
8164.06	$3d5d\ ^3F_2$	$3d5f\ ^1F^o_3$	169 615.12	181 860.55		2.0 − 1	2.9+6	D	1°, 98*
8163.09	$3d(^2D_{3/2})5g\ [\frac{9}{2}]_4$	$3d(^2D_{3/2})6h\ [\frac{9}{2}]^o_4$	182 014.92	194 261.8					1
8161.84	5	5	182 013.32	194 261.8	1				1
8161.84	$3d(^2D_{3/2})5g\ [\frac{7}{2}]_4$	$3d(^2D_{3/2})6h\ [\frac{7}{2}]^o_4$	182 068.87	194 317.2	1				1
8161.84	3	3	182 067.49	194 317.2	1				1
8117.53	$3d5f\ ^1H^o_5$	$3d(^2D_{5/2})6g\ [\frac{13}{2}]_6$	182 353.45	194 669.10	3				1
8098.47	$3d4d\ ^1D_2$	$3d5p\ ^3D^o_2$	135 405.27	147 749.89	5				1
7975.94	2	3	135 405.27	147 939.47	4bl				1
8030.70	$3d5f\ ^3P^o_2$	$3d(^2D_{5/2})6g\ [\frac{5}{2}]_3$	182 207.39	194 656.18					1
7981.09	$3d4d\ ^1D_2$	$3d5p\ ^3F^o_2$	135 405.27	147 931.47	8				1
7955.11	$3d5f\ ^3D^o_3$	$3d(^2D_{5/2})6g\ [\frac{7}{2}]_4$	182 025.86	194 592.98	1				1
7881.83	2	3	181 908.15	194 592.07	1				1
7899.90	$3d5s\ ^1D_2$	$3d5p\ ^1D^o_2$	134 557.84	147 212.77	6				1
7895.57	$3d5f\ ^3G^o_3$	$3d(^2D_{3/2})6g\ [\frac{9}{2}]_4$	181 507.92	194 169.81	1				1
7875.79	$3d5f\ ^3G^o_3$	$3d(^2D_{3/2})6g\ [\frac{7}{2}]_4$	181 507.92	194 201.57	1				1
7874.28	$3d5f\ ^1F^o_3$	$3d(^2D_{5/2})6g\ [\frac{9}{2}]_4$	181 860.55	194 556.67	2				1
7867.90	$3d5f\ ^3H^o_5$	$3d(^2D_{3/2})6g\ [\frac{11}{2}]_6$	181 558.44	194 264.82	3				1
7797.34	4	5	181 439.64	194 261.00	3				1

Ti III – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
7842.22	$3d5f\ ^3G^o_5$	$3d(^2D_{5/2})6g\ [\frac{11}{2}]_6$	181 821.83	194 569.80	4				1
7805.03	4	5	181 758.34	194 567.08	2				1
7809.53	$3d5f\ ^3F^o_3$	$3d(^2D_{3/2})6g\ [\frac{9}{2}]_4$	181 368.45	194 169.81	1				1
7794.49	$3d5f\ ^3H^o_6$	$3d(^2D_{5/2})6g\ [\frac{13}{2}]_7$	181 837.98	194 664.08	4				1
7625.26	5	6	181 558.44	194 669.10					1
7775.95	$3d4f\ ^1G^o_4$	$3d5d\ ^1G_4$	158 285.34	171 141.93	2	1.9 – 1	2.3+6	D	1°, 98*
7773.19	$3d5f\ ^3F^o_2$	$3d(^2D_{3/2})6g\ [\frac{7}{2}]_3$	181 339.27	194 200.46	2				1
7742.64	$3d5d\ ^3G_4$	$3d5f\ ^1G^o_4$	168 307.06	181 219.06	1	3.8 – 1	4.7+6	D	1°, 98*
7720.39	$3d5f\ ^1G^o_4$	$3d(^2D_{3/2})6g\ [\frac{9}{2}]_5$	181 219.06	194 168.25	3				1
7704.80	$3d5d\ ^3S_1$	$3d5f\ ^3D^o_2$	168 932.83	181 908.15	2	3.9 – 1	8.7+6	D	1°, 98*
7687.67	$3d5s\ ^1D_2$	$3d5p\ ^3D^o_1$	134 557.84	147 562.14					1
7578.26	2	2	134 557.84	147 749.89	4				1
7595.75	$3d5d\ ^3D_3$	$3d5f\ ^3F^o_3$	168 206.79	181 368.45	1				1
7511.59	2	2	168 030.15	181 339.27		1.7 – 1	3.9+6	D	1°, 98*
7495.18	2	3	168 030.15	181 368.45	8	3.4	5.7+7	D	1°, 98*
7457.85	3	4	168 206.79	181 611.79	10				1
7441.72	1	2	167 905.19	181 339.27	5	3.0	7.4+7	D	1°, 98*
7566.25	$3d5s\ ^3D_2$	$3d5p\ ^1D^o_2$	133 999.79	147 212.77	9	3.8 – 1	8.9+6	D	1°, 98*
7508.65	1	2	133 898.50	147 212.77		1.9 – 1	4.4+6	D	1°, 98*
7554.86	$3d5d\ ^3D_3$	$3d5f\ ^3H^o_4$	168 206.79	181 439.64	1				1
7552.05	$3d5d\ ^3G_5$	$3d5f\ ^3G^o_4$	168 520.52	181 758.34		1.4 – 1	1.9+6	D	1°, 98*
7515.98	5	5	168 520.52	181 821.83	4	2.1	2.3+7	D	1°, 98*
7432.20	4	4	168 307.06	181 758.34	3	1.1	1.5+7	D	1°, 98*
7397.27	4	5	168 307.06	181 821.83	4	1.4	1.6+7	D	1°, 98*
7347.59	3	4	168 152.20	181 758.34	3				1
7544.29	$3d5d\ ^3G_4$	$3d5f\ ^3H^o_5$	168 307.06	181 558.44	12	8.7	9.3+7	D	1°, 98*
7523.85	3	4	168 152.20	181 439.64	10				1
7506.87	5	6	168 520.52	181 837.98	15	1.2+1	1.1+8	D	1°, 98*
7540.99	$3d4d\ ^3P_2$	$3d5p\ ^3P^o_1$	135 721.51	148 978.72	4	1.1 – 1	4.1+6	D	1°, 98*
7473.32	1	1	135 601.47	148 978.72	4				1
7450.45	1	0	135 601.47	149 019.75	5	1.3 – 1	1.6+7	D	1°, 98*
7439.94	0	1	135 541.46	148 978.72	4				1
7379.96	2	2	135 721.51	149 267.99	12	5.5 – 1	1.3+7	D	1°, 98*
7315.14	1	2	135 601.47	149 267.99	7	1.8 – 1	4.4+6	D	1°, 98*
7531.15	$3d5d\ ^3S_1$	$3d5f\ ^3P^o_2$	168 932.83	182 207.39	3	1.9	4.5+7	D	1°, 98*
7491.92	1	1	168 932.83	182 276.75	3	8.4 – 1	3.4+7	D	1°, 98*
7460.04	1	0	168 932.83	182 333.95	1	3.6 – 1	4.4+7	D	1°, 98*
7507.68	$3d4d\ ^1G_4$	$3d5p\ ^1F^o_3$	136 339.74	149 655.77	17	1.6	2.8+7	D	1°, 98*
7484.58	$3d5d\ ^1P_1$	$3d5f\ ^1D^o_2$	168 343.62	181 700.72	5	2.3	5.6+7	D	1°, 98*
7475.35	$3d5s\ ^1D_2$	$3d5p\ ^3F^o_2$	134 557.84	147 931.47	3				1
7376.27	2	3	134 557.84	148 111.10	4				1
7419.24	$3d5s\ ^3D_3$	$3d5p\ ^3D^o_2$	134 275.12	147 749.89	8				1
7371.34	2	1	133 999.79	147 562.14	7	3.9 – 1	1.6+7	D	1°, 98*
7316.68	1	1	133 898.50	147 562.14	10	8.7 – 1	3.6+7	D	1°, 98*
7316.30	3	3	134 275.12	147 939.47	14				1
7270.67	2	2	133 999.79	147 749.89	12				1
7217.50	1	2	133 898.50	147 749.89	10				1
7171.79	2	3	133 999.79	147 939.47	11				1
7417.60	$3d5d\ ^3D_2$	$3d5f\ ^3G^o_3$	168 030.15	181 507.92	2	1.0	1.8+7	D	1°, 98*
7408.13	$3d5d\ ^1F_3$	$3d5f\ ^1G^o_4$	167 724.09	181 219.06	10	6.4	8.7+7	D	1°, 98*
7370.14	$3d5d\ ^1P_1$	$3d5f\ ^3D^o_2$	168 343.62	181 908.15		4.5 – 1	1.1+7	D	1°, 98*
7335.41	$3d5d\ ^3S_1$	$3d5f\ ^1P^o_1$	168 932.83	182 561.61		3.3 – 1	1.3+7	D	1°, 98*

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Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
7320.63	$3d5s\ ^3D_3$	$3d5p\ ^3F^o_2$	134 275.12	147 931.47	4bl				1
7225.55	3	3	134 275.12	148 111.10	9				1
7175.92	2	2	133 999.79	147 931.47	10				1
7124.13	1	2	133 898.50	147 931.47	15				1
7084.57	2	3	133 999.79	148 111.10	18				1
7072.64	3	4	134 275.12	148 410.24	20	3.9	5.8+7	D	1°,98*
7306.02	$3d4d\ ^3P_2$	$3d5p\ ^1P^o_1$	135 721.51	149 403.52	3				1
7243.29	1	1	135 601.47	149 403.52	1				1
7211.94	0	1	135 541.46	149 403.52	2				1
7292.86	$3d5d\ ^3G_3$	$3d5f\ ^1F^o_3$	168 152.20	181 860.55	4bl				1
7288.98	$3d5d\ ^1F_3$	$3d5f\ ^3H^o_4$	167 724.09	181 439.64	1	4.3 − 1	6.1+6	D	1°,98*
7252.88	$3d5d\ ^1F_3$	$3d5f\ ^3G^o_3$	167 724.09	181 507.92	3	7.7 − 1	1.4+7	D	1°,98*
7234.39	$3d5d\ ^3D_3$	$3d5f\ ^3D^o_3$	168 206.79	182 025.86	4				1
7203.66	2	2	168 030.15	181 908.15	4	1.3	3.4+7	D	1°,98*
7228.40	$3d5d\ ^3D_2$	$3d5f\ ^1F^o_3$	168 030.15	181 860.55		2.0 − 1	3.6+6	D	1°,98*
7205.90	$3d5d\ ^3G_3$	$3d5f\ ^3D^o_3$	168 152.20	182 025.86	1				1
7141.76	$3d4d\ ^1D_2$	$3d5p\ ^1P^o_1$	135 405.27	149 403.52	4	1.1	4.9+7	D	1°,98*
7071.93	$3d5d\ ^1F_3$	$3d5f\ ^1F^o_3$	167 724.09	181 860.55	10	1.1	2.2+7	D	1°,98*
7031.40	$3d5d\ ^1P_1$	$3d5f\ ^1P^o_1$	168 343.62	182 561.61	2	1.1	5.0+7	D	1°,98*
7017.31	$3d5d\ ^3D_2$	$3d5f\ ^3P^o_1$	168 030.15	182 276.75		2.6 − 1	1.2+7	D	1°,98*
7015.38	$3d4d\ ^1D_2$	$3d5p\ ^1F^o_3$	135 405.27	149 655.77	12	3.0	5.8+7	D	1°,98*
6932.44	$3d5s\ ^1D_2$	$3d5p\ ^3P^o_1$	134 557.84	148 978.72	5	1.1 − 1	4.8+6	D	1°,98*
6796.12	2	2	134 557.84	149 267.99	4				1
6896.12	$3d4d\ ^3F_2$	$3d5p\ ^3D^o_1$	133 065.24	147 562.14	10	5.5 − 1	2.6+7	D	1°,98*
6874.35	3	2	133 207.10	147 749.89	12				1
6862.26	4	3	133 371.07	147 939.47	15				1
6807.96	2	2	133 065.24	147 749.89	3				1
6785.90	3	3	133 207.10	147 939.47	6				1
6782.37	$3d4d\ ^3F_4$	$3d5p\ ^3F^o_3$	133 371.07	148 111.10	1				1
6724.80	2	2	133 065.24	147 931.47	12				1
6707.76	3	3	133 207.10	148 111.10	14				1
6647.47	4	4	133 371.07	148 410.24	14	6.0 − 1	1.0+7	D	1°,98*
6644.51	2	3	133 065.24	148 111.10	4				1
6575.78	3	4	133 207.10	148 410.24	4				1
6734.10	$3d5s\ ^1D_2$	$3d5p\ ^1P^o_1$	134 557.84	149 403.52	16				1
6674.19	$3d5s\ ^3D_2$	$3d5p\ ^3P^o_1$	133 999.79	148 978.72	15	8.0 − 1	4.0+7	D	1°,98*
6667.99	3	2	134 275.12	149 267.99	18	1.8	5.5+7	D	1°,98*
6629.37	1	1	133 898.50	148 978.72	10	4.2 − 1	2.1+7	D	1°,98*
6611.38	1	0	133 898.50	149 019.75	12	4.8 − 1	7.1+7	D	1°,98*
6547.75	2	2	133 999.79	149 267.99	9	4.1 − 1	1.3+7	D	1°,98*
6504.60	1	2	133 898.50	149 267.99	3				1
6621.58	$3d5s\ ^1D_2$	$3d5p\ ^1F^o_3$	134 557.84	149 655.77	18				1
6499.86	$3d5s\ ^3D_3$	$3d5p\ ^1F^o_3$	134 275.12	149 655.77	1				1
6385.56	2	3	133 999.79	149 655.77	9				1
6490.14	$3d5s\ ^3D_2$	$3d5p\ ^1P^o_1$	133 999.79	149 403.52	7	1.6 − 1	8.4+6	D	1°,98*
6447.73	1	1	133 898.50	149 403.52	5				1
5817.44	$3d4d\ ^1S_0$	$4s4p\ ^1P^o_1$	140 019.24	157 204.16	10				1
5566.58	$3d4d\ ^1P_1$	$3d5p\ ^1D^o_2$	129 253.41	147 212.77	9	1.3 − 1	5.7+6	D	1°,98*
5533.01	$3d5p\ ^1F^o_3$	$3d5d\ ^1F_3$	149 655.77	167 724.09	12	1.3	4.1+7	D	1°,98*
5481.31	$3d4d\ ^3S_1$	$3d5p\ ^3P^o_1$	130 739.82	148 978.72	8bl	1.8 − 1	1.3+7	D	1°,98*
5468.98	1	0	130 739.82	149 019.75	6				1
5395.69	1	2	130 739.82	149 267.99	10	4.2 − 1	1.9+7	D	1°,98*

Ti III – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
5416.76	$3d5p\ ^3P^o_2$	$3d5d\ ^1F_3$	149 267.99	167 724.09	2				1
5404.94	$3d5p\ ^1F^o_3$	$3d5d\ ^3G_3$	149 655.77	168 152.20	3				1
5404.94	$3d4d\ ^1P_1$	$3d5p\ ^3D^o_2$	129 253.41	147 749.89	3				1
5389.05	$3d5p\ ^1F^o_3$	$3d5d\ ^3D_3$	149 655.77	168 206.79	7				1
5367.17	$3d5p\ ^1P^o_1$	$3d5d\ ^3D_2$	149 403.52	168 030.15	7	1.4 − 1	6.4+6	D	1°, 98*
5358.53	$3d4d\ ^3G_3$	$3d5p\ ^3D^o_2$	129 093.28	147 749.89	7				1
5349.91	4	3	129 252.74	147 939.47	3				1
5356.51	$3d4d\ ^3S_1$	$3d5p\ ^1P^o_1$	130 739.82	149 403.52	7				1
5355.75	$3d4d\ ^3D_2$	$3d5p\ ^1D^o_2$	128 546.38	147 212.77	3				1
5323.53	1	2	128 433.40	147 212.77	6				1
5352.39	$3d4d\ ^1P_1$	$3d5p\ ^3F^o_2$	129 253.41	147 931.47	3				1
5328.40	$3d5p\ ^3P^o_2$	$3d5d\ ^3D_2$	149 267.99	168 030.15	8	2.0 − 1	9.2+6	D	1°, 98*
5293.60	0	1	149 019.75	167 905.19	7	3.9 − 1	3.1+7	D	1°, 98*
5282.14	1	1	148 978.72	167 905.19	9	3.3 − 1	2.5+7	D	1°, 98*
5278.70	2	3	149 267.99	168 206.79	10				1
5247.49	1	2	148 978.72	168 030.15	11	1.0	5.0+7	D	1°, 98*
5306.88	$3d4d\ ^3G_3$	$3d5p\ ^3F^o_2$	129 093.28	147 931.47	15				1
5301.20	4	3	129 252.74	148 111.10	16				1
5278.12	5	4	129 469.37	148 410.24	17	3.0	7.9+7	D	1°, 98*
5256.77	3	3	129 093.28	148 111.10	8				1
5218.43	4	4	129 252.74	148 410.24	8	1.4 − 1	3.8+6	D	1°, 98*
5298.43	$3d4p\ ^1P^o_1$	$4s^2\ ^1S_0$	83 796.86	102 665.15	12				1
5293.95	$3d5p\ ^3P^o_2$	$3d5d\ ^3G_3$	149 267.99	168 152.20	9				1
5278.33[C]	$3d5p\ ^1P^o_1$	$3d5d\ ^1P_1$	149 403.52	168 343.62		1.2	9.4+7	D	1°, 98*
5257.33	$3d4d\ ^3D_2$	$3d5p\ ^3D^o_1$	128 546.38	147 562.14	8	1.0 − 1	8.2+6	D	1°, 98*
5245.06	3	2	128 689.67	147 749.89	9				1
5226.28	1	1	128 433.40	147 562.14	12bl	3.9 − 1	3.1+7	D	1°, 98*
5205.96	2	2	128 546.38	147 749.89	9bl				1
5193.42	3	3	128 689.67	147 939.47	9				1
5175.48	1	2	128 433.40	147 749.89	6				1
5155.04	2	3	128 546.38	147 939.47	8				1
5240.84	$3d5p\ ^3P^o_2$	$3d5d\ ^1P_1$	149 267.99	168 343.62	2				1
5162.55	1	1	148 978.72	168 343.62	9	3.6 − 1	3.1+7	D	1°, 98*
5161.19	$3d(^2D_{5/2})5g\ [\frac{5}{2}]$	$3d(^2D_{5/2})7h\ [\frac{7}{2}]^o$	182 587.3	201 958.3	1				1
5147.52[C]	$3d4d\ ^3D_3$	$3d5p\ ^3F^o_3$	128 689.67	148 111.10					1
5127.35	1	2	128 433.40	147 931.47	4bl				1
5109.81	2	3	128 546.38	148 111.10	5				1
5069.39	3	4	128 689.67	148 410.24	3bl	1.1 − 1	3.3+6	D	1°, 98*
5147.31	$3d4d\ ^1F_3$	$3d5p\ ^1D^o_2$	127 790.57	147 212.77	14	1.1	5.6+7	D	1°, 98*
5136.66	$3d(^2D_{5/2})5g\ [\frac{7}{2}]$	$3d(^2D_{5/2})7h\ [\frac{9}{2}]^o$	182 473.9	201 937.4	2				1
5130.67	$3d(^2D_{3/2})5g\ [\frac{7}{2}]$	$3d(^2D_{3/2})7h\ [\frac{9}{2}]^o$	182 068.3	201 553.5	2				1
5128.06	$3d(^2D_{5/2})5g\ [\frac{11}{2}]_5$	$3d(^2D_{5/2})7h\ [\frac{13}{2}]^o_6$	182 436.46	201 932.7					1
5121.31	$3d(^2D_{5/2})5g\ [\frac{9}{2}]$	$3d(^2D_{5/2})7h\ [\frac{11}{2}]^o$	182 404.4	201 926.0	2				1
5119.08	$3d5p\ ^1P^o_1$	$3d5d\ ^3S_1$	149 403.52	168 932.83	8	4.5 − 1	3.9+7	D	1°, 98*
5097.25	$3d5p\ ^3F^o_3$	$3d5d\ ^1F_3$	148 111.10	167 724.09	3				1
5083.80	$3d5p\ ^3P^o_2$	$3d5d\ ^3S_1$	149 267.99	168 932.83	10	1.1	9.7+7	D	1°, 98*
5020.43	0	1	149 019.75	168 932.83	3	2.8 − 1	2.5+7	D	1°, 98*
5010.14	1	1	148 978.72	168 932.83	5bl	4.8 − 1	4.3+7	D	1°, 98*
5068.22	$3d4d\ ^1P_1$	$3d5p\ ^3P^o_1$	129 253.41	148 978.72	7	1.2 − 1	1.1+7	D	1°, 98*

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Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
5064.00	$3d5p\ ^3F^o_4$	$3d5d\ ^3G_3$	148 410.24	168 152.20	2				1
5024.52	4	4	148 410.24	168 307.06	3	3.5 − 1	1.0+7	D	1°, 98*
4988.36	3	3	148 111.10	168 152.20	3				1
4971.194	4	5	148 410.24	168 520.52	10	8.7	2.1+8	D	1°, 98*
4950.104	3	4	148 111.10	168 307.06	10				1
4944.040	2	3	147 931.47	168 152.20	9				1
5049.98	$3d5p\ ^3F^o_4$	$3d5d\ ^3D_3$	148 410.24	168 206.79	3				1
5018.92	3	2	148 111.10	168 030.15	4				1
5005.16	2	1	147 931.47	167 905.19	4				1
4974.79	3	3	148 111.10	168 206.79	2				1
4930.735	2	3	147 931.47	168 206.79	8				1
5008.80	$3d4d\ ^1F_3$	$3d5p\ ^3D^o_2$	127 790.57	147 749.89	3				1
5008.80	$3d5p\ ^1F^o_3$	$3d5d\ ^3F_2$	149 655.77	169 615.12	3				1
4976.04	$3d5p\ ^3D^o_3$	$3d5d\ ^3D_2$	147 939.47	168 030.15	3				1
4960.10	2	1	147 749.89	167 905.19	2				1
4932.674	3	3	147 939.47	168 206.79	7				1
4929.533	2	2	147 749.89	168 030.15	7				1
4914.315	1	1	147 562.14	167 905.19	6	1.1	1.1+8	D	1°, 98*
4884.321	1	2	147 562.14	168 030.15	4	3.6 − 1	2.0+7	D	1°, 98*
4963.65	$3d4d\ ^1F_3$	$3d5p\ ^3F^o_2$	127 790.57	147 931.47	1				1
4961.36	$3d4d\ ^1P_1$	$3d5p\ ^1P^o_1$	129 253.41	149 403.52	7	5.1 − 1	4.5+7	D	1°, 98*
4946.000	$3d5p\ ^3D^o_3$	$3d5d\ ^3G_3$	147 939.47	168 152.20	6				1
4908.395	3	4	147 939.47	168 307.06	1				1
4907.61	$3d4f\ ^1P^o_1$	$3d(^2D_{3/2})5g\ [\frac{5}{2}]_2$	161 854.24	182 225.09	2	5.1 − 1	2.9+7	D	1°, 98*
4897.69	$3d5p\ ^3F^o_2$	$3d5d\ ^1P_1$	147 931.47	168 343.62	2				1
4892.840	$3d4d\ ^3D_2$	$3d5p\ ^3P^o_1$	128 546.38	148 978.72	6	3.6 − 1	3.3+7	D	1°, 98*
4865.938	1	1	128 433.40	148 978.72	3				1
4858.129	3	2	128 689.67	149 267.99	9	7.7 − 1	4.2+7	D	1°, 98*
4856.22	1	0	128 433.40	149 019.75	2	1.7 − 1	4.7+7	D	1°, 98*
4824.531	2	2	128 546.38	149 267.99	4				1
4873.995	$3d5p\ ^1D^o_2$	$3d5d\ ^1F_3$	147 212.77	167 724.09	10	3.7	1.5+8	D	1°, 98*
4854.49	$3d5p\ ^3D^o_2$	$3d5d\ ^1P_1$	147 749.89	168 343.62	1				1
4810.61	1	1	147 562.14	168 343.62	1				1
4849.658	$3d5p\ ^1F^o_3$	$3d6s\ ^1D_2$	149 655.77	170 270.02	7				1
4838.25	$3d5p\ ^3P^o_2$	$3d6s\ ^3D_2$	149 267.99	169 930.80	1				1
4793.503	0	1	149 019.75	169 875.52	3				1
4784.09	1	1	148 978.72	169 875.52	2				1
4771.46	1	2	148 978.72	169 930.80	6				1
4763.58	2	3	149 267.99	170 254.75	6				1
4831.33	$3d5p\ ^1D^o_2$	$3d5d\ ^3D_1$	147 212.77	167 905.19	3	2.1 − 1	2.0+7	D	1°, 98*
4802.32	2	2	147 212.77	168 030.15	1				1
4821.80	$3d4f\ ^1P^o_1$	$3d(^2D_{5/2})5g\ [\frac{5}{2}]_2$	161 854.24	182 587.62	3	8.4 − 1	4.9+7	D	1°, 98*
4800.273	$3d4f\ ^1P^o_1$	$3d(^2D_{5/2})5g\ [\frac{3}{2}]_2$	161 854.24	182 680.53	4	1.4	8.4+7	D	1°, 98*
4793.17	$3d4d\ ^3D_2$	$3d5p\ ^1P^o_1$	128 546.38	149 403.52	3				1
4767.36	1	1	128 433.40	149 403.52					1
4791.035	$3d5p\ ^1P^o_1$	$3d6s\ ^1D_2$	149 403.52	170 270.02	8				1
4774.35	$3d5p\ ^1D^o_2$	$3d5d\ ^3G_3$	147 212.77	168 152.20	1				1
4768.29	$3d4d\ ^3D_3$	$3d5p\ ^1F^o_3$	128 689.67	149 655.77	2				1
4760.11	$3d5p\ ^3P^o_2$	$3d6s\ ^1D_2$	149 267.99	170 270.02	3				1
4695.44	1	2	148 978.72	170 270.02	4				1
4731.11	$3d5p\ ^1D^o_2$	$3d5d\ ^1P_1$	147 212.77	168 343.62	5bl	3.7 − 1	3.6+7	D	1°, 98*

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Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
4720.90	3d5p $^1P^o_1$	3d5d $^3P_0$	149 403.52	170 579.96	3	1.1 – 1	3.1+7	D	1°, 98*
4703.18	1	1	149 403.52	170 659.72	3				1
4701.59	1	2	149 403.52	170 666.94	3				1
4718.98	3d5p $^1F^o_3$	3d5d $^1D_2$	149 655.77	170 840.80					1
4680.580	3d5p $^3F^o_4$	3d5d $^3F_3$	148 410.24	169 769.13	4	1.9 – 1	8.3+6	D	1°, 98*
4649.452	4	4	148 410.24	169 912.11	10	2.5	8.6+7	D	1°, 98*
4649.00	3	2	148 111.10	169 615.12	3				1
4615.931	3	3	148 111.10	169 769.13	9				1
4610.477	2	2	147 931.47	169 615.12	8				1
4673.396	3d5p $^3P^o_2$	3d5d $^3P_1$	149 267.99	170 659.72	8	9.0 – 1	9.1+7	D	1°, 98*
4671.816	2	2	149 267.99	170 666.94	8				1
4628.067	1	0	148 978.72	170 579.96	6	4.8 – 1	1.5+8	D	1°, 98*
4619.782	0	1	149 019.75	170 659.72	6	5.4 – 1	5.6+7	D	1°, 98*
4611.041	1	1	148 978.72	170 659.72	3	3.6 – 1	3.7+7	D	1°, 98*
4609.506	1	2	148 978.72	170 666.94	5				1
4663.462	3d5p $^1P^o_1$	3d5d $^1D_2$	149 403.52	170 840.80	5				1
4652.861	3d5p $^1F^o_3$	3d5d $^1G_4$	149 655.77	171 141.93	12	7.7	2.6+8	D	1°, 98*
4634.166	3d5p $^3P^o_2$	3d5d $^1D_2$	149 267.99	170 840.80	8				1
4572.85	1	2	148 978.72	170 840.80	1				1
4601.51	3d4p $^3P^o_1$	$4s^2$ $^1S_0$	80 939.19	102 665.15					1
4581.730	3d5p $^3F^o_3$	3d6s $^3D_2$	148 111.10	169 930.80	8				1
4576.532	4	3	148 410.24	170 254.75	9				1
4555.777	2	1	147 931.47	169 875.52	6				1
4544.314	2	2	147 931.47	169 930.80	2				1
4514.697	3	3	148 111.10	170 254.75	4				1
4579.642	3d5p $^3D^o_3$	3d5d $^3F_3$	147 939.47	169 769.13	6				1
4572.204	2	2	147 749.89	169 615.12	15bl				1
4549.842	3	4	147 939.47	169 912.11	15				1
4540.216	2	3	147 749.89	169 769.13	10				1
4533.26[C]	1	2	147 562.14	169 615.12		2.3	1.5+8	D	1°, 98*
4578.521	3d4d $^1S_0$	3d4f $^1P^o_1$	140 019.24	161 854.24	7	7.4 – 1	7.9+7	D	1°, 98*
4572.204	3d4d $^1F_3$	3d5p $^1F^o_3$	127 790.57	149 655.77	15bl				1
4555.456	3d4d $^1G_4$	3d4f $^1G^o_4$	136 339.74	158 285.34	10bl	6.3 – 1	2.3+7	D	1°, 98*
4545.976	3d5p $^3D^o_3$	3d6s $^3D_2$	147 939.47	169 930.80	4				1
4518.363	2	1	147 749.89	169 875.52	3				1
4507.112	2	2	147 749.89	169 930.80	5				1
4480.359	1	1	147 562.14	169 875.52	3				1
4479.969	3	3	147 939.47	170 254.75	6				1
4442.25	2	3	147 749.89	170 254.75	3				1
4521.146	3d4f $^1H^o_5$	$3d(^2D_{3/2})5g$ $[\frac{11}{2}]_5$	160 054.90	182 166.91	2	1.4 – 1	4.4+6	D	1°, 98*
4520.375	5	6	160 054.90	182 170.72	6	1.9	4.8+7	D	1°, 98*
4519.42	3d4f $^3P^o_1$	$3d(^2D_{3/2})5g$ $[\frac{5}{2}]_2$	160 104.61	182 225.09	2	2.5 – 1	1.6+7	D	1°, 98*
4496.510	2	3	159 991.54	182 224.72	4	8.0 – 1	3.7+7	D	1°, 98*
4511.579	3d5p $^3F^o_3$	3d6s $^1D_2$	148 111.10	170 270.02	4				1
4466.693	3d4f $^1H^o_5$	$3d(^2D_{5/2})5g$ $[\frac{11}{2}]_5$	160 054.90	182 436.46	1	4.1 – 1	1.2+7	D	1°, 98*
4466.078	5	6	160 054.90	182 439.62	3	1.4	3.8+7	D	1°, 98*
4462.558	3d5p $^1D^o_2$	3d5d $^3F_2$	147 212.77	169 615.12	4	6.0 – 1	4.1+7	D	1°, 98*
4446.559	3d4f $^3P^o_1$	$3d(^2D_{5/2})5g$ $[\frac{5}{2}]_2$	160 104.61	182 587.62	5	9.0 – 1	6.0+7	D	1°, 98*
4424.399	2	3	159 991.54	182 587.12	9	3.1 – 1	1.5+7	D	1°, 98*
4440.657[T]	3d4f $^3P^o_0$	$3d(^2D_{5/2})5g$ $[\frac{3}{2}]_1$	160 167.06	182 680.27	4	1.0	1.2+8	D	1°, 98*
4428.298	1	1	160 104.61	182 680.27	8				1
4428.298	1	2	160 104.61	182 680.53	8				1
4406.197	2	2	159 991.54	182 680.53	4	7.5 – 1	5.1+7	D	1°, 98*
4439.23	3d5p $^3D^o_2$	3d6s $^1D_2$	147 749.89	170 270.02	2				1
4402.53	1	2	147 562.14	170 270.02	1				1

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Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4433.912	$3d4f\ ^1H^o_5$	$3d(^2D_{5/2})5g\ [\frac{13}{2}]_6$	160 054.90	182 601.96	11	6.9	1.8+8	D	1°, 98*
4430.635	$3d4d\ ^1G_4$	$3d4f\ ^3G^o_5$	136 339.74	158 903.55	2				1
4414.489	$3d5s\ ^1D_2$	$4s4p\ ^1P^o_1$	134 557.84	157 204.16	6				1
4407.31	$3d4d\ ^1G_4$	$3d4f\ ^3H^o_4$	136 339.74	159 022.93	2				1
4400.570	$3d5p\ ^1D^o_2$	$3d6s\ ^3D_2$	147 212.77	169 930.80	4				1
4338.712	2	3	147 212.77	170 254.75	3				1
4398.729	$3d5p\ ^3D^o_3$	$3d5d\ ^3P_2$	147 939.47	170 666.94	4				1
4363.740	2	1	147 749.89	170 659.72	6				1
4362.34	2	2	147 749.89	170 666.94	1				1
4343.246	1	0	147 562.14	170 579.96	3	2.8 − 1	1.0+8	D	1°, 98*
4328.25	1	1	147 562.14	170 659.72	2	1.1 − 1	1.3+7	D	1°, 98*
4326.824	1	2	147 562.14	170 666.94	5				1
4380.734	$3d4f\ ^3D^o_2$	$3d(^2D_{3/2})5g\ [\frac{5}{2}]_3$	159 403.91	182 224.72	7				1
4378.938	1	2	159 394.89	182 225.09	7	2.3	1.6+8	D	1°, 98*
4378.08	$3d4f\ ^1F^o_3$	$3d(^2D_{3/2})5g\ [\frac{9}{2}]_4$	159 180.24	182 014.92	1				1
4377.77	$3d4d\ ^3P_2$	$3d4f\ ^3F^o_3$	135 721.51	158 557.76	2				1
4358.89	1	2	135 601.47	158 536.63	1				1
4376.93	$3d4d\ ^1G_4$	$3d4f\ ^1F^o_3$	136 339.74	159 180.24	2				1
4368.56	$3d4f\ ^3H^o_5$	$3d(^2D_{3/2})5g\ [\frac{9}{2}]_5$	159 128.94	182 013.32	2	3.2 − 1	1.0+7	D	1°, 98*
4348.40	4	5	159 022.93	182 013.32	3				1
4367.68	$3d4f\ ^1F^o_3$	$3d(^2D_{3/2})5g\ [\frac{7}{2}]_4$	159 180.24	182 068.87	9bl				1
4365.33	$3d4f\ ^3H^o_6$	$3d(^2D_{3/2})5g\ [\frac{11}{2}]_6$	159 269.53	182 170.72	4				1
4338.712	5	6	159 128.94	182 170.72	3				1
4319.561	4	5	159 022.93	182 166.91	5	3.5	1.1+8	D	1°, 98*
4365.33	$3d5p\ ^3D^o_3$	$3d5d\ ^1D_2$	147 939.47	170 840.80	4				1
4329.496	2	2	147 749.89	170 840.80	4				1
4363.740	$3d5p\ ^3F^o_2$	$3d5d\ ^1D_2$	147 931.47	170 840.80	6				1
4361.15	$3d4f\ ^3D^o_3$	$3d(^2D_{5/2})5g\ [\frac{9}{2}]_4$	159 481.95	182 405.25	2				1
4357.27	$3d4f\ ^1D^o_2$	$3d(^2D_{3/2})5g\ [\frac{7}{2}]_3$	159 123.78	182 067.49	2				1
4352.282	$3d5p\ ^1P^o_1$	$3d5d\ ^1S_0$	149 403.52	172 373.52	8	7.8 − 1	2.7+8	D	1°, 98*
4348.04	$3d4f\ ^3D^o_3$	$3d(^2D_{5/2})5g\ [\frac{7}{2}]_4$	159 481.95	182 474.38	10				1
4333.542	2	3	159 403.91	182 473.21	7				1
4338.22	$3d4f\ ^1F^o_3$	$3d(^2D_{3/2})5g\ [\frac{5}{2}]_3$	159 180.24	182 224.72	1				1
4335.81	$3d5p\ ^1D^o_2$	$3d6s\ ^1D_2$	147 212.77	170 270.02	3				1
4327.62	$3d4f\ ^1D^o_2$	$3d(^2D_{3/2})5g\ [\frac{5}{2}]$	159 123.78	182 224.9	7				1
4326.824	$3d4f\ ^3D^o_3$	$3d(^2D_{5/2})5g\ [\frac{5}{2}]_3$	159 481.95	182 587.12	5				1
4312.163	2	2	159 403.91	182 587.62	4				1
4310.481	1	2	159 394.89	182 587.62	4	4.8 − 1	3.5+7	D	1°, 98*
4325.93	$3d4f\ ^3G^o_5$	$3d(^2D_{3/2})5g\ [\frac{9}{2}]_5$	158 903.55	182 013.32	2	2.1 − 1	6.6+6	D	1°, 98*
4318.44	4	4	158 865.03	182 014.92					1
4295.42	3	4	158 740.92	182 014.92	8				1
4321.91	$3d4d\ ^1D_2$	$3d4f\ ^3F^o_2$	135 405.27	158 536.63	1				1
4317.98	2	3	135 405.27	158 557.76	1				1
4309.40	$3d4f\ ^3D^o_3$	$3d(^2D_{5/2})5g\ [\frac{3}{2}]_2$	159 481.95	182 680.53	1				1
4295.03	2	1	159 403.91	182 680.27	1				1
4293.34	1	1	159 394.89	182 680.27	3	2.6 − 1	3.1+7	D	1°, 98*
4308.39	$3d4f\ ^3G^o_4$	$3d(^2D_{3/2})5g\ [\frac{7}{2}]_4$	158 865.03	182 068.87	2				1
4304.505	$3d4f\ ^1F^o_3$	$3d(^2D_{5/2})5g\ [\frac{9}{2}]_4$	159 180.24	182 405.25	9				1

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Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4296.702	$3d4f\ ^3G^o_5$	$3d(^2D_{3/2})5g\ [\frac{11}{2}]_6$	158 903.55	182 170.72	11	5.9	1.6+8	D	1°, 98*
4295.03	$3d4f\ ^3H^o_5$	$3d(^2D_{5/2})5g\ [\frac{9}{2}]_4$	159 128.94	182 405.25	1				1
4275.823	4	5	159 022.93	182 403.64	2				1
4275.528	4	4	159 022.93	182 405.25	4	5.6 – 1	2.3+7	D	1°, 98*
4291.925	$3d4f\ ^1F^o_3$	$3d(^2D_{5/2})5g\ [\frac{7}{2}]_3$	159 180.24	182 473.21	5				1
4289.25	$3d4f\ ^3H^o_5$	$3d(^2D_{5/2})5g\ [\frac{11}{2}]_5$	159 128.94	182 436.46	3	6.5 – 1	2.1+7	D	1°, 98*
4288.66	5	6	159 128.94	182 439.62	8	4.1	1.1+8	D	1°, 98*
4269.84	4	5	159 022.93	182 436.46	11	5.0	1.7+8	D	1°, 98*
4286.516	$3d4f\ ^3F^o_4$	$3d(^2D_{3/2})5g\ [\frac{9}{2}]_5$	158 690.85	182 013.32	5				1
4261.904	3	4	158 557.76	182 014.92	6				1
4285.61	$3d4f\ ^3H^o_6$	$3d(^2D_{5/2})5g\ [\frac{13}{2}]_7$	159 269.53	182 596.87	9	1.2+1	3.0+8	D	1°, 98*
4284.67	6	6	159 269.53	182 601.96	1	1.3 – 1	3.8+6	D	1°, 98*
4259.009	5	6	159 128.94	182 601.96	6	3.3	9.4+7	D	1°, 98*
4284.090	$3d4d\ ^1D_2$	$3d4f\ ^3G^o_3$	135 405.27	158 740.92	4				1
4281.563	$3d4f\ ^1D^o_2$	$3d(^2D_{5/2})5g\ [\frac{7}{2}]_3$	159 123.78	182 473.21	7				1
4276.35	$3d4f\ ^3F^o_4$	$3d(^2D_{3/2})5g\ [\frac{7}{2}]_4$	158 690.85	182 068.87	1				1
4252.121	3	4	158 557.76	182 068.87	7				1
4248.540	2	3	158 536.63	182 067.49	8	4.4	2.3+8	D	1°, 98*
4271.86	$3d4d\ ^3P_2$	$3d4f\ ^1D^o_2$	135 721.51	159 123.78	3				1
4250.086	1	2	135 601.47	159 123.78	3	1.3	9.5+7	D	1°, 98*
4270.95	$3d4f\ ^1F^o_3$	$3d(^2D_{5/2})5g\ [\frac{5}{2}]_2$	159 180.24	182 587.62	1				1
4262.93	$3d4f\ ^3H^o_4$	$3d(^2D_{5/2})5g\ [\frac{7}{2}]_4$	159 022.93	182 474.38					1
4262.441	$3d5p\ ^1D^o_2$	$3d5d\ ^3P_2$	147 212.77	170 666.94	6				1
4260.763	$3d4f\ ^1D^o_2$	$3d(^2D_{5/2})5g\ [\frac{5}{2}]_3$	159 123.78	182 587.12	4				1
4258.472	$3d4f\ ^3F^o_4$	$3d(^2D_{3/2})5g\ [\frac{11}{2}]_5$	158 690.85	182 166.91	7				1
4257.045	$3d4f\ ^3G^o_3$	$3d(^2D_{3/2})5g\ [\frac{5}{2}]_3$	158 740.92	182 224.72	3				1
4254.114	$3d4f\ ^3G^o_5$	$3d(^2D_{5/2})5g\ [\frac{9}{2}]_5$	158 903.55	182 403.64	5	1.3	4.3+7	D	1°, 98*
4247.147	4	5	158 865.03	182 403.64	7				1
4246.24	4	4	158 865.03	182 405.25					1
4224.575	3	4	158 740.92	182 405.25	4				1
4247.615	$3d4f\ ^3G^o_5$	$3d(^2D_{5/2})5g\ [\frac{11}{2}]_6$	158 903.55	182 439.62	4	4.0	1.1+8	D	1°, 98*
4241.29	4	5	158 865.03	182 436.46	1				1
4243.89	$3d4f\ ^1D^o_2$	$3d(^2D_{5/2})5g\ [\frac{3}{2}]_1$	159 123.78	182 680.27	3				1
4243.89	2	2	159 123.78	182 680.53	3				1
4241.29	$3d4f\ ^3G^o_5$	$3d(^2D_{5/2})5g\ [\frac{7}{2}]_4$	158 903.55	182 474.38	1				1
4234.415	4	4	158 865.03	182 474.38	5				1
4212.47	3	3	158 740.92	182 473.21	2				1
4231.070	$3d5p\ ^1D^o_2$	$3d5d\ ^1D_2$	147 212.77	170 840.80	7				1
4224.127	$3d4f\ ^3F^o_3$	$3d(^2D_{3/2})5g\ [\frac{5}{2}]_3$	158 557.76	182 224.72	3				1
4220.282	2	2	158 536.63	182 225.09	4	5.5 – 1	4.2+7	D	1°, 98*
4222.98	$3d4d\ ^3P_2$	$3d4f\ ^3D^o_1$	135 721.51	159 394.89	3				1
4221.357	2	2	135 721.51	159 403.91	4				1
4207.491	2	3	135 721.51	159 481.95	9				1
4201.662	1	1	135 601.47	159 394.89	5	3.3 – 1	4.2+7	D	1°, 98*
4200.061	1	2	135 601.47	159 403.91	9				1
4191.091	0	1	135 541.46	159 394.89	7	6.3 – 1	8.0+7	D	1°, 98*
4218.518	$3d4f\ ^3G^o_5$	$3d(^2D_{5/2})5g\ [\frac{13}{2}]_6$	158 903.55	182 601.96	4	1.3 – 1	3.7+6	D	1°, 98*
4215.950	$3d4f\ ^3F^o_4$	$3d(^2D_{5/2})5g\ [\frac{9}{2}]_5$	158 690.85	182 403.64	7				1
4192.141	3	4	158 557.76	182 405.25	3				1
4215.525	$3d4d\ ^1G_4$	$3d4f\ ^1H^o_5$	136 339.74	160 054.90	11	6.3	2.2+8	D	1°, 98*

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Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4214.923	$3d4d\ ^1D_2$	$3d4f\ ^1D^o_2$	135 405.27	159 123.78	7				1
4214.29	$3d4f\ ^3G^o_4$	$3d(^2D_{5/2})5g\ [\frac{5}{2}]_3$	158 865.03	182 587.12	1				1
4213.257	$3d4f\ ^1G^o_4$	$3d(^2D_{3/2})5g\ [\frac{9}{2}]_5$	158 285.34	182 013.32	9	6.3	2.2+8	D	1°, 98*
4212.95	4	4	158 285.34	182 014.92	1	3.1 − 1	1.3+7	D	1°, 98*
4210.133	$3d4f\ ^3F^o_4$	$3d(^2D_{5/2})5g\ [\frac{11}{2}]_5$	158 690.85	182 436.46	4				1
4204.916	$3d4d\ ^1D_2$	$3d4f\ ^1F^o_3$	135 405.27	159 180.24	9				1
4203.410	$3d4f\ ^3F^o_4$	$3d(^2D_{5/2})5g\ [\frac{7}{2}]_4$	158 690.85	182 474.38	6				1
4180.22	3	3	158 557.76	182 473.21	2				1
4180.02	3	4	158 557.76	182 474.38	2				1
4176.540	2	3	158 536.63	182 473.21	3	3.1 − 1	1.7+7	D	1°, 98*
4203.410	$3d4f\ ^1G^o_4$	$3d(^2D_{3/2})5g\ [\frac{7}{2}]_4$	158 285.34	182 068.87	6				1
4183.58	$3d4f\ ^3F^o_4$	$3d(^2D_{5/2})5g\ [\frac{5}{2}]_3$	158 690.85	182 587.12	1				1
4160.42	3	3	158 557.76	182 587.12	1				1
4156.67	2	2	158 536.63	182 587.62	2				1
4165.721	$3d4d\ ^1D_2$	$3d4f\ ^3D^o_2$	135 405.27	159 403.91	3				1
4145.050	$3d4f\ ^1G^o_4$	$3d(^2D_{5/2})5g\ [\frac{9}{2}]_5$	158 285.34	182 403.64	3	2.2 − 1	7.7+6	D	1°, 98*
4144.772	4	4	158 285.34	182 405.25	3	2.2 − 1	9.4+6	D	1°, 98*
4139.424	$3d4f\ ^1G^o_4$	$3d(^2D_{5/2})5g\ [\frac{11}{2}]_5$	158 285.34	182 436.46	6	9.0 − 1	3.2+7	D	1°, 98*
4133.96[C]	$3d5s\ ^1D_2$	$3d4f\ ^3G^o_3$	134 557.84	158 740.92					1
4119.140	$3d4d\ ^3P_2$	$3d4f\ ^3P^o_2$	135 721.51	159 991.54	10	1.3	9.9+7	D	1°, 98*
4100.050	2	1	135 721.51	160 104.61	7	3.7 − 1	4.8+7	D	1°, 98*
4098.879	1	2	135 601.47	159 991.54	3	1.1 − 1	8.5+6	D	1°, 98*
4079.958	1	1	135 601.47	160 104.61	8	3.3 − 1	4.2+7	D	1°, 98*
4069.992	0	1	135 541.46	160 104.61	5	1.8 − 1	2.4+7	D	1°, 98*
4069.538	1	0	135 601.47	160 167.06	9				1
4069.538	$3d5s\ ^1D_2$	$3d4f\ ^1D^o_2$	134 557.84	159 123.78	9				1
4066.169	$3d4d\ ^1D_2$	$3d4f\ ^3P^o_2$	135 405.27	159 991.54	3				1
4047.538	2	1	135 405.27	160 104.61	2				1
4060.208	$3d5s\ ^1D_2$	$3d4f\ ^1F^o_3$	134 557.84	159 180.24	10				1
4012.631	$3d4d\ ^3F_4$	$3d4f\ ^1G^o_4$	133 371.07	158 285.34	3				1
3986.400	3	4	133 207.10	158 285.34	8				1
4011.047	$3d5s\ ^1D_2$	$3d4f\ ^3D^o_3$	134 557.84	159 481.95	3				1
3995.525	$4s4p\ ^1P^o_1$	$3d(^2D_{3/2})5g\ [\frac{5}{2}]_2$	157 204.16	182 225.09	4				1
3979.12	$3d5s\ ^3D_2$	$3d4f\ ^1D^o_2$	133 999.79	159 123.78	2bl				1
3970.204	$3d5s\ ^3D_2$	$3d4f\ ^1F^o_3$	133 999.79	159 180.24	2				1
3948.365	$3d4d\ ^3F_4$	$3d4f\ ^3F^o_4$	133 371.07	158 690.85	6				1
3946.843	3	2	133 207.10	158 536.63	3				1
3943.559	3	3	133 207.10	158 557.76	8				1
3924.860	2	2	133 065.24	158 536.63	10	8.5 − 1	7.4+7	D	1°, 98*
3922.953	3	4	133 207.10	158 690.85	12				1
3921.611	2	3	133 065.24	158 557.76	10				1
3940.570	$3d4d\ ^3F_4$	$3d4f\ ^3G^o_3$	133 371.07	158 740.92	2				1
3921.384	4	4	133 371.07	158 865.03	12				1
3915.472	4	5	133 371.07	158 903.55	15	5.2	2.1+8	D	1°, 98*
3915.253	3	3	133 207.10	158 740.92	8				1
3896.330	3	4	133 207.10	158 865.03	10				1
3893.629	2	3	133 065.24	158 740.92	12				1
3938.456	$4s4p\ ^1P^o_1$	$3d(^2D_{5/2})5g\ [\frac{5}{2}]_2$	157 204.16	182 587.62	3				1
3924.092	$4s4p\ ^1P^o_1$	$3d(^2D_{5/2})5g\ [\frac{3}{2}]_2$	157 204.16	182 680.53	3				1
3897.250	$3d4d\ ^3F_4$	$3d4f\ ^3H^o_4$	133 371.07	159 022.93	8				1
3881.212	4	5	133 371.07	159 128.94	12	4.1 − 1	1.7+7	D	1°, 98*
3872.495	3	4	133 207.10	159 022.93	12	3.2 − 1	1.6+7	D	1°, 98*

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Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
3873.491	$3d4d\ ^3F_4$	$3d4f\ ^1F^o_3$	133 371.07	159 180.24	2				1
3849.043	3	3	133 207.10	159 180.24	6				1
3836.42	$3d4d\ ^3F_2$	$3d4f\ ^1D^o_2$	133 065.24	159 123.78	2				1
3828.735	$3d4d\ ^3F_4$	$3d4f\ ^3D^o_3$	133 371.07	159 481.95	5				1
3816.178	3	2	133 207.10	159 403.91	6				1
3779.793	$3d4d\ ^1D_2$	$3d4f\ ^1P^o_1$	135 405.27	161 854.24	3				1
3576.70	$3d4d\ ^1P_1$	$4s4p\ ^1P^o_1$	129 253.41	157 204.16	3				1
3488.773	$3d4d\ ^3S_1$	$3d4f\ ^3D^o_1$	130 739.82	159 394.89	1				1
3487.669	1	2	130 739.82	159 403.91	3				1
3421.161	$3d4d\ ^3G_5$	$3d4f\ ^3F^o_4$	129 469.37	158 690.85	1				1
3411.404	4	3	129 252.74	158 557.76					1
3395.981	4	4	129 252.74	158 690.85	3				1
3395.387	3	2	129 093.28	158 536.63	1				1
3392.945	3	3	129 093.28	158 557.76	5				1
3377.686	3	4	129 093.28	158 690.85	4				1
3417.621	$3d4d\ ^3S_1$	$3d4f\ ^3P^o_2$	130 739.82	159 991.54	9	1.6	1.9+8	D	1°,98*
3404.462	1	1	130 739.82	160 104.61	7	9.3 − 1	1.8+8	D	1°,98*
3397.235	1	0	130 739.82	160 167.06	5	3.0 − 1	1.8+8	D	1°,98*
3400.891	$3d4d\ ^3G_5$	$3d4f\ ^3G^o_4$	129 469.37	158 865.03	2				1
3396.432	5	5	129 469.37	158 903.55	5	8.9 − 1	4.7+7	D	1°,98*
3390.222	4	3	129 252.74	158 740.92	2				1
3376.007	4	4	129 252.74	158 865.03	1				1
3371.971	3	3	129 093.28	158 740.92	2bl				1
3371.623	4	5	129 252.74	158 903.55	9	8.9 − 1	4.8+7	D	1°,98*
3357.922	3	4	129 093.28	158 865.03	6				1
3382.714	$3d4d\ ^3G_5$	$3d4f\ ^3H^o_4$	129 469.37	159 022.93	1				1
3370.625	5	5	129 469.37	159 128.94	7	6.7 − 1	3.6+7	D	1°,98*
3358.101	4	4	129 252.74	159 022.93	3	6.0 − 1	4.0+7	D	1°,98*
3354.71	5	6	129 469.37	159 269.53	12bl	9.6	4.4+8	D	1°,98*
3346.182	4	5	129 252.74	159 128.94	9	6.8	3.7+8	D	1°,98*
3340.202	3	4	129 093.28	159 022.93	7	5.5	3.7+8	D	1°,98*
3377.896	$3d4d\ ^3D_3$	$3d4f\ ^1G^o_4$	128 689.67	158 285.34	2	1.1 − 1	7.5+6	D	1°,98*
3346.82	$3d4d\ ^1P_1$	$3d4f\ ^1D^o_2$	129 253.41	159 123.78	9bl				1
3333.457	$3d4d\ ^3D_2$	$3d4f\ ^3F^o_2$	128 546.38	158 536.63	3	1.7 − 1	2.0+7	D	1°,98*
3332.252	3	4	128 689.67	158 690.85	7				1
3331.105	2	3	128 546.38	158 557.76	6				1
3320.943	1	2	128 433.40	158 536.63	7	2.3	2.8+8	D	1°,98*
3315.742	$3d4d\ ^1P_1$	$3d4f\ ^3D^o_2$	129 253.41	159 403.91	1				1
3313.008	$3d4d\ ^3D_3$	$3d4f\ ^3G^o_4$	128 689.67	158 865.03	7				1
3310.904	2	3	128 546.38	158 740.92	6				1
3295.764	$3d4d\ ^3D_3$	$3d4f\ ^3H^o_4$	128 689.67	159 022.93	3				1
3278.754	$3d4d\ ^3D_3$	$3d4f\ ^1F^o_3$	128 689.67	159 180.24	2				1
3263.426	2	3	128 546.38	159 180.24	1				1
3278.31^C	$3d4d\ ^1F_3$	$3d4f\ ^1G^o_4$	127 790.57	158 285.34		4.9	3.4+8	D	1°,98*
3254.881	$3d4d\ ^3D_3$	$3d4f\ ^3D^o_2$	128 689.67	159 403.91	2				1
3246.628	3	3	128 689.67	159 481.95	7				1
3240.71	2	1	128 546.38	159 394.89	1	1.8 − 1	3.7+7	D	1°,98*
3239.77	2	2	128 546.38	159 403.91	3				1
3228.887	1	1	128 433.40	159 394.89	5	6.9 − 1	1.5+8	D	1°,98*
3227.945	1	2	128 433.40	159 403.91	4bl				1
3245.589	$3d4d\ ^3G_4$	$3d4f\ ^1H^o_5$	129 252.74	160 054.90	3	1.1 − 1	6.0+6	D	1°,98*
3235.282	$3d4d\ ^1F_3$	$3d4f\ ^3F^o_4$	127 790.57	158 690.85	4				1
3230.047	$3d4d\ ^1F_3$	$3d4f\ ^3G^o_3$	127 790.57	158 740.92	4				1
3200.888	$3d4d\ ^1F_3$	$3d4f\ ^3H^o_4$	127 790.57	159 022.93	3				1

Ti III – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3193.771	$3d4d\ ^3D_3$	$3d4f\ ^3P^o_2$	128 689.67	159 991.54	5	2.9 − 1	3.8+7	D	1°, 98*
3167.828	2	1	128 546.38	160 104.61	4	1.5 − 1	3.4+7	D	1°, 98*
3150.317	1	0	128 433.40	160 167.06	2				1
3190.580	$3d4d\ ^1F_3$	$3d4f\ ^1D^o_2$	127 790.57	159 123.78	3				1
3184.839	$3d4d\ ^1F_3$	$3d4f\ ^1F^o_3$	127 790.57	159 180.24	9				1
3154.518	$3d4d\ ^1F_3$	$3d4f\ ^3D^o_3$	127 790.57	159 481.95	3				1
3066.51^C	$3d4d\ ^1P_1$	$3d4f\ ^1P^o_1$	129 253.41	161 854.24		1.1	2.5+8	D	1°, 98*
3040.513	$4s4p\ ^3P^o_2$	$3d5d\ ^1D_2$	137 961.2	170 840.80					1
2984.747	$3d4s\ ^1D_2$	$3d4p\ ^1D^o_2$	41 704.27	75 198.21	22	1.3	1.9+8	D	1°, 98*
2930.490	$3d4f\ ^1H^o_5$	$3d(^2D_{3/2})6g\ [\frac{9}{2}]_5$	160 054.90	194 168.25	2				1
2888.14	$3d4f\ ^1H^o_5$	$3d(^2D_{5/2})6g\ [\frac{13}{2}]_6$	160 054.90	194 669.10	1				1
2847.26	$3d4f\ ^3D^o_3$	$3d(^2D_{5/2})6g\ [\frac{7}{2}]_4$	159 481.95	194 592.98	1				1
2825.90	$3d4f\ ^1F^o_3$	$3d(^2D_{5/2})6g\ [\frac{9}{2}]_4$	159 180.24	194 556.67					1
2824.45	$3d4f\ ^3H^o_6$	$3d(^2D_{5/2})6g\ [\frac{13}{2}]_7$	159 269.53	194 664.08	3				1
2821.69	$3d4f\ ^3G^o_3$	$3d(^2D_{3/2})6g\ [\frac{9}{2}]_4$	158 740.92	194 169.81					1
2820.78	$3d4f\ ^3H^o_5$	$3d(^2D_{5/2})6g\ [\frac{11}{2}]_6$	159 128.94	194 569.80	1				1
2812.57	4	5	159 022.93	194 567.08					1
2818.992	$3d4s\ ^1D_2$	$3d4p\ ^3D^o_2$	41 704.27	77 167.43	8				1
2798.72	2	3	41 704.27	77 424.45	5				1
2807.20	$3d4f\ ^3F^o_3$	$3d(^2D_{3/2})6g\ [\frac{9}{2}]_4$	158 557.76	194 169.81					1
2803.15	$3d4f\ ^3G^o_5$	$3d(^2D_{5/2})6g\ [\frac{11}{2}]_5$	158 903.55	194 567.08					1
2802.94	5	6	158 903.55	194 569.80					1
2798.910	$3d4s\ ^1D_2$	$3d4p\ ^3F^o_2$	41 704.27	77 421.86	8				1
2773.72	2	3	41 704.27	77 746.44	4				1
2786.01	$3d4f\ ^1G^o_4$	$3d(^2D_{3/2})6g\ [\frac{9}{2}]_5$	158 285.34	194 168.25					1
2718.64	$3d4s\ ^3D_3$	$3d4p\ ^1D^o_2$	38 425.99	75 198.21					1
2701.956	2	2	38 198.95	75 198.21	12				1
2692.158	1	2	38 064.35	75 198.21	10				1
2580.456	$3d4s\ ^3D_3$	$3d4p\ ^3D^o_2$	38 425.99	77 167.43	15				1
2576.470	2	1	38 198.95	77 000.23	15	2.8 − 1	9.2+7	D	1°, 98*
2567.556	1	1	38 064.35	77 000.23	22	6.9 − 1	2.3+8	D	1°, 98*
2565.423	2	2	38 198.95	77 167.43	23				1
2563.436	3	3	38 425.99	77 424.45	24				1
2556.567	1	2	38 064.35	77 167.43	5				1
2548.588	2	3	38 198.95	77 424.45	6				1
2548.765	$3d4s\ ^3D_2$	$3d4p\ ^3F^o_2$	38 198.95	77 421.86	5				1
2542.444	3	3	38 425.99	77 746.44	8				1
2540.057	1	2	38 064.35	77 421.86	23				1
2527.840	2	3	38 198.95	77 746.44	24				1
2516.053	3	4	38 425.99	78 158.61	25	2.9	3.4+8	D	1°, 98*
2548.01	$3d4s\ ^1D_2$	$3d4p\ ^3P^o_1$	41 704.27	80 939.19	4				1
2413.989	$3d4s\ ^1D_2$	$3d4p\ ^1F^o_3$	41 704.27	83 116.93	22	2.4	3.8+8	D	1°, 98*
2374.986	$3d4s\ ^1D_2$	$3d4p\ ^1P^o_1$	41 704.27	83 796.86	18	1.0	4.0+8	D	1°, 98*
2346.786	$3d4s\ ^3D_3$	$3d4p\ ^3P^o_2$	38 425.99	81 024.47	18	1.4	3.3+8	D	1°, 98*
2339.000	2	1	38 198.95	80 939.19	17	7.5 − 1	3.0+8	D	1°, 98*
2334.340	2	2	38 198.95	81 024.47	15	3.2 − 1	7.7+7	D	1°, 98*
2331.66	1	1	38 064.35	80 939.19	15	3.0 − 1	1.2+8	D	1°, 98*
2331.352	1	0	38 064.35	80 944.87	15	3.6 − 1	4.3+8	D	1°, 98*
2327.019	1	2	38 064.35	81 024.47	10				1
2239.62	$3d4p\ ^1P^o_1$	$3d4d\ ^3D_1$	83 796.86	128 433.40	1				1

Ti III – Continued

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2237.773	$3d4p\ ^1F^o_3$	$3d4d\ ^1F_3$	83 116.93	127 790.57	12	1.3	2.4+8	D	1°, 98*
2236.90	$3d4s\ ^3D_3$	$3d4p\ ^1F^o_3$	38 425.99	83 116.93	3				1
2225.59	2	3	38 198.95	83 116.93	4				1
2199.223	$3d4p\ ^1P^o_1$	$3d4d\ ^1P_1$	83 796.86	129 253.41	10	1.2	5.7+8	D	1°, 98*
2193.60	$3d4p\ ^1F^o_3$	$3d4d\ ^3D_3$	83 116.93	128 689.67	2				1
2192.39	$3d4s\ ^3D_2$	$3d4p\ ^1P^o_1$	38 198.95	83 796.86	3				1
2138.90	$4s^2\ ^1S_0$	$3d5p\ ^1P^o_1$	102 665.15	149 403.52	1				1
2129.58	$3d4p\ ^1P^o_1$	$3d4d\ ^3S_1$	83 796.86	130 739.82	1				1
2105.092	$3d4p\ ^3P^o_0$	$3d4d\ ^3D_1$	80 944.87	128 433.40	5	3.4 – 1	1.7+8	D	1°, 98*
2104.857	1	1	80 939.19	128 433.40	4	2.3 – 1	1.1+8	D	1°, 98*
2103.60	2	2	81 024.47	128 546.38	5	1.9 – 1	5.6+7	D	1°, 98*
2099.862	1	2	80 939.19	128 546.38	7	8.4 – 1	2.5+8	D	1°, 98*
2097.299	2	3	81 024.47	128 689.67	9	1.5	3.3+8	D	1°, 98*
2010.800	$3d4p\ ^3P^o_2$	$3d4d\ ^3S_1$	81 024.47	130 739.82	6	1.0	5.4+8	D	1°, 98*
2007.604	0	1	80 944.87	130 739.82	2	2.2 – 1	1.2+8	D	1°, 98*
2007.360	1	1	80 939.19	130 739.82	4	6.3 – 1	3.4+8	D	1°, 98*
1978.981^{C}	$3d4p\ ^3F^o_4$	$3d4d\ ^3D_3$	78 158.61	128 689.67					1
1962.969^{C}	3	3	77 746.44	128 689.67	2				1
1956.009^{C}	2	2	77 421.86	128 546.38	1				1
1970.017^{C}	$3d4p\ ^1P^o_1$	$3d5s\ ^1D_2$	83 796.86	134 557.84	4				1
1965.298^{C}	$3d4p\ ^1F^o_3$	$3d5s\ ^3D_2$	83 116.93	133 999.79					1
1957.172^{C}	$3d4p\ ^3F^o_4$	$3d4d\ ^3G_4$	78 158.61	129 252.74	1				1
1948.909^{C}	4	5	78 158.61	129 469.37	8				1
1947.540^{C}	3	3	77 746.44	129 093.28					1
1941.510^{C}	3	4	77 746.44	129 252.74	7				1
1935.306^{C}	2	3	77 421.86	129 093.28	7				1
1956.108^{C}	$3d4p\ ^3D^o_3$	$3d4d\ ^3D_2$	77 424.45	128 546.38	1				1
1950.640^{C}	3	3	77 424.45	128 689.67	5				1
1950.612^{C}	2	1	77 167.43	128 433.40					1
1946.322^{C}	2	2	77 167.43	128 546.38	3				1
1944.271^{C}	1	1	77 000.23	128 433.40	2				1
1940.909^{C}	2	3	77 167.43	128 689.67	1				1
1940.009^{C}	1	2	77 000.23	128 546.38	1				1
1948.508	$3d^2\ ^1S_0$	$3d4p\ ^1P^o_1$	32 475.5	83 796.86	5	1.2 – 1	7.2+7	D	1°, 98*
1943.978^{C}	$3d4p\ ^1F^o_3$	$3d5s\ ^1D_2$	83 116.93	134 557.84	2				1
1929.448^{C}	$3d4p\ ^3D^o_3$	$3d4d\ ^3G_4$	77 424.45	129 252.74	2				1
1925.823^{C}	2	3	77 167.43	129 093.28	1				1
1901.417^{C}	$3d4p\ ^1D^o_2$	$3d4d\ ^1F_3$	75 198.21	127 790.57	7				1
1884.638^{C}	$3d4p\ ^3P^o_1$	$3d5s\ ^3D_2$	80 939.19	133 999.79					1
1877.911^{C}	2	3	81 024.47	134 275.12	1				1
1878.894^{C}	$3d4p\ ^1F^o_3$	$3d4d\ ^1G_4$	83 116.93	136 339.74	7				1
1849.961^{C}	$3d4p\ ^1D^o_2$	$3d4d\ ^1P_1$	75 198.21	129 253.41	1				1
1833.550^{C}	$4s^2\ ^1S_0$	$4s4p\ ^1P^o_1$	102 665.15	157 204.16					1
1832.274^{C}	$3d4p\ ^3P^o_2$	$3d4d\ ^3P_1$	81 024.47	135 601.47	1				1
1831.426^{C}	1	0	80 939.19	135 541.46					1
1829.605^{C}	0	1	80 944.87	135 601.47					1
1829.415^{C}	1	1	80 939.19	135 601.47					1
1828.252^{C}	2	2	81 024.47	135 721.51	3				1
1825.406^{C}	1	2	80 939.19	135 721.51					1

Ti III – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1811.185^{C}	$3d4p\ ^3F^o_4$	$3d4d\ ^3F_4$	78 158.61	133 371.07	5				1
1803.080^{C}	3	3	77 746.44	133 207.10	1				1
1797.765^{C}	3	4	77 746.44	133 371.07	2				1
1797.159^{C}	2	2	77 421.86	133 065.24	1				1
1792.589^{C}	2	3	77 421.86	133 207.10	1				1
1792.672^{C}	$3d4p\ ^3D^o_3$	$3d4d\ ^3F_3$	77 424.45	133 207.10	1				1
1788.979^{C}	2	2	77 167.43	133 065.24	2				1
1787.418^{C}	3	4	77 424.45	133 371.07	5				1
1784.450^{C}	2	3	77 167.43	133 207.10	4				1
1783.644^{C}	1	2	77 000.23	133 065.24	4				1
1782.007^{C}	$3d4p\ ^3F^o_4$	$3d5s\ ^3D_3$	78 158.61	134 275.12	3				1
1777.672^{C}	3	2	77 746.44	133 999.79	3				1
1770.644^{C}	2	1	77 421.86	133 898.50	2				1
1778.651^{C}	$3d4p\ ^1P^o_1$	$3d4d\ ^1S_0$	83 796.86	140 019.24	1				1
1759.561^{C}	$3d4p\ ^3D^o_2$	$3d5s\ ^3D_2$	77 167.43	133 999.79	1				1
1758.994^{C}	3	3	77 424.45	134 275.12	3				1
1757.523^{C}	1	1	77 000.23	133 898.50					1
1715.352^{C}	$3d4p\ ^3D^o_3$	$3d4d\ ^3P_2$	77 424.45	135 721.51	1				1
1711.331^{C}	2	1	77 167.43	135 601.47					1
1689.501^{C}	$4s^2\ ^1S_0$	$3d4f\ ^1P^o_1$	102 665.15	161 854.24					1
1684.647^{C}	$3d4p\ ^1D^o_2$	$3d5s\ ^1D_2$	75 198.21	134 557.84					1
1660.935^{C}	$3d4p\ ^1D^o_2$	$3d4d\ ^1D_2$	75 198.21	135 405.27	4				1
1652.256^{C}	$3d4p\ ^1D^o_2$	$3d4d\ ^3P_2$	75 198.21	135 721.51					1
1506.084	$3d^2\ ^3P_1$	$3d4p\ ^3D^o_1$	10 603.6	77 000.23	3				1
1504.974	2	2	10 721.2	77 167.43	2				1
1504.621	0	1	10 538.4	77 000.23	3				1
1502.311	1	2	10 603.6	77 167.43	4				1
1499.173	2	3	10 721.2	77 424.45	7	1.2 − 1	4.9+7	D	1°, 98*
1498.697	$3d^2\ ^1D_2$	$3d4p\ ^1D^o_2$	8 473.5	75 198.21	10	4.7 − 1	2.8+8	D	1°, 98*
1496.597	$3d^2\ ^3P_1$	$3d4p\ ^3F^o_2$	10 603.6	77 421.86	2				1
1491.978	2	3	10 721.2	77 746.44	3				1
1455.734	$3d^2\ ^1D_2$	$3d4p\ ^3D^o_2$	8 473.5	77 167.43	1				1
1455.194	$3d^2\ ^1G_4$	$3d4p\ ^1F^o_3$	14 397.6	83 116.93	23	1.4	6.4+8	D	1°, 98*
1450.358	$3d^2\ ^1D_2$	$3d4p\ ^3F^o_2$	8 473.5	77 421.86	3				1
1424.140	$3d^2\ ^3P_2$	$3d4p\ ^3P^o_1$	10 721.2	80 939.19	10	1.5 − 1	1.6+8	D	1°, 98*
1422.405	2	2	10 721.2	81 024.47	12	4.6 − 1	3.0+8	D	1°, 98*
1421.767	1	1	10 603.6	80 939.19	10				1
1421.631	1	0	10 603.6	80 944.87	10	1.2 − 1	4.0+8	D	1°, 98*
1420.440	0	1	10 538.4	80 939.19	10	1.1 − 1	1.2+8	D	1°, 98*
1420.036	1	2	10 603.6	81 024.47	10	1.4 − 1	8.9+7	D	1°, 98*
1379.960	$3d^2\ ^1D_2$	$3d4p\ ^3P^o_1$	8 473.5	80 939.19	2				1
1368.442	$3d^2\ ^3P_2$	$3d4p\ ^1P^o_1$	10 721.2	83 796.86	2				1
1365.021	0	1	10 538.4	83 796.86					1
1339.691	$3d^2\ ^1D_2$	$3d4p\ ^1F^o_3$	8 473.5	83 116.93	5				1
1329.837	$3d^2\ ^3F_2$	$3d4p\ ^1D^o_2$	0.0	75 198.21	4				1
1327.592	$3d^2\ ^1D_2$	$3d4p\ ^1P^o_1$	8 473.5	83 796.86	12	2.6 − 1	3.2+8	D	1°, 98*
1298.970	$3d^2\ ^3F_3$	$3d4p\ ^3D^o_2$	184.9	77 167.43	20	6.2 − 1	4.9+8	D	1°, 98*
1298.659	2	1	0.0	77 000.23	20				1
1298.659	4	3	420.4	77 424.45	20				1
1295.883	2	2	0.0	77 167.43	10				1
1294.698	3	3	184.9	77 424.45	15				1

Ti III – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1294.698	$3d^2\ ^3F_3$	$3d4p\ ^3F^o_2$	184.9	77 421.86	15				1
1293.228	4	3	420.4	77 746.44	10	1.8 − 1	1.0+8	D	1°,98*
1291.622	2	2	0.0	77 421.86	10	3.0 − 1	2.4+8	D	1°,98*
1289.299	3	3	184.9	77 746.44	10	3.8 − 1	2.2+8	D	1°,98*
1286.365	4	4	420.4	78 158.61	15	4.4 − 1	2.0+8	D	1°,98*
1286.228	2	3	0.0	77 746.44	6				1
1282.484	3	4	184.9	78 158.61	6				1
1237.028	$3d^2\ ^3F_3$	$3d4p\ ^3P^o_2$	184.9	81 024.47					1
1235.461	2	1	0.0	80 939.19	2				1
1136.041	$3d4p\ ^1F^o_3$	$3d5d\ ^1G_4$	83 116.93	171 141.93					1
1106.646	$3d4p\ ^3F^o_4$	$3d5d\ ^3G_5$	78 158.61	168 520.52					1
1104.225	3	4	77 746.44	168 307.06					1
1082.896	$3d4p\ ^3D^o_3$	$3d5d\ ^3F_3$	77 424.45	169 769.13					1
1081.204	3	4	77 424.45	169 912.11					1
1077.236	$3d4p\ ^3D^o_3$	$3d6s\ ^3D_3$	77 424.45	170 254.75					1
1008.119	$3d4s\ ^3D_1$	$4s4p\ ^3P^o_0$	38 064.35	137 258.9	2	7.8 − 1	5.1+9	D	1°,98*
1007.163	2	1	38 198.95	137 487.8	4	1.8	3.8+9	D	1°,98*
1005.797	1	1	38 064.35	137 487.8	1	5.7 − 1	1.3+9	D	1°,98*
1004.669	3	2	38 425.99	137 961.2	5	3.2	4.3+9	D	1°,98*
1002.371	2	2	38 198.95	137 961.2	1	6.0 − 1	7.6+8	D	1°,98*
865.79	$3d4s\ ^1D_2$	$4s4p\ ^1P^o_1$	41 704.27	157 204.16		2.3	6.6+9	D	1°,98*
739.327^C	$3d^2\ ^1G_4$	$3d5p\ ^1F^o_3$	14 397.6	149 655.77					1
694.986^C	$3d^2\ ^1G_4$	$3d4f\ ^1G^o_4$	14 397.6	158 285.34					1
686.543^C	$3d^2\ ^1G_4$	$3d4f\ ^1H^o_5$	14 397.6	160 054.90	3				1
677.878^C	$3d^2\ ^3F_4$	$3d5p\ ^3D^o_3$	420.4	147 939.47					1
677.681^C	2	1	0.0	147 562.14					1
677.667^C	3	2	184.9	147 749.89					1
676.013^C	$3d^2\ ^3F_3$	$3d5p\ ^3F^o_3$	184.9	148 111.10					1
675.989^C	2	2	0.0	147 931.47					1
675.722^C	4	4	420.4	148 410.24					1
675.982^C	$3d^2\ ^3P_1$	$3d4f\ ^3F^o_2$	10 603.6	158 536.63					1
672.220^C	$3d^2\ ^3P_2$	$3d4f\ ^3D^o_3$	10 721.2	159 481.95	2				1
672.042^C	1	2	10 603.6	159 403.91	1				1
671.788^C	0	1	10 538.4	159 394.89					1
669.926^C	$3d^2\ ^3P_2$	$3d4f\ ^3P^o_2$	10 721.2	159 991.54	1				1
663.789^C	$3d^2\ ^1D_2$	$3d4f\ ^1D^o_2$	8 473.5	159 123.78					1
663.541^C	$3d^2\ ^1D_2$	$3d4f\ ^1F^o_3$	8 473.5	159 180.24	1				1
632.509^C	$3d^2\ ^3F_3$	$3d4f\ ^1G^o_4$	184.9	158 285.34					1
631.830^C	$3d^2\ ^3F_4$	$3d4f\ ^3F^o_4$	420.4	158 690.85					1
631.421^C	3	3	184.9	158 557.76					1
630.891^C	3	4	184.9	158 690.85	1				1
630.769^C	2	2	0.0	158 536.63					1
630.685^C	2	3	0.0	158 557.76	1				1
631.135^C	$3d^2\ ^3F_4$	$3d4f\ ^3G^o_4$	420.4	158 865.03					1
630.982^C	4	5	420.4	158 903.55	2				1
630.692^C	3	3	184.9	158 740.92	1				1
630.199^C	3	4	184.9	158 865.03					1
629.957^C	2	3	0.0	158 740.92	1				1
630.086^C	$3d^2\ ^3F_4$	$3d4f\ ^3H^o_5$	420.4	159 128.94	1				1
629.572^C	3	4	184.9	159 022.93	1				1

Ti IV

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
7706.85	$3p^6 6h\ ^2H^o$	$3p^6 7i\ ^2I$	300 158.76	313 130.66	8				3
7652.12	$3p^6 6g\ ^2G$	$3p^6 7h\ ^2H^o$	300 046.05	313 110.72	5				3
7494.77	$3p^6 5f\ ^2F^o_{5/2}$	$3p^6 6d\ ^2D_{3/2}$	275 847.01	289 185.99	8				3
7491.37	7/2	5/2	275 861.94	289 206.93	9				3
7483.07	5/2	5/2	275 847.01	289 206.93	1				3
6988.74	$3p^6 6p\ ^2P^o_{3/2}$	$3p^6 6d\ ^2D_{3/2}$	274 881.21	289 185.99	4				3
6978.51	3/2	5/2	274 881.21	289 206.93	15				3
6913.85	1/2	3/2	274 726.29	289 185.99	12				3
6968.54	$3p^5 3d^2\ ^2F^o_{5/2}$	$3p^6 6d\ ^2D_{3/2}$	274 839.82	289 185.99	1				3
6292.41	$3p^6 5d\ ^2D_{3/2}$	$3p^6 6p\ ^2P^o_{1/2}$	258 838.48	274 726.29	15				3
6246.65	5/2	3/2	258 877.08	274 881.21	17				3
6231.62	3/2	3/2	258 838.48	274 881.21	6				3
6262.86	$3p^6 5d\ ^2D_{5/2}$	$3p^5 3d^2\ ^2F^o_{5/2}$	258 877.08	274 839.82	3				3
6247.74	3/2	5/2	258 838.48	274 839.82	11				3
5891.15	$3p^6 5d\ ^2D_{5/2}$	$3p^6 5f\ ^2F^o_{5/2}$	258 877.08	275 847.01	7				3
5885.96	5/2	7/2	258 877.08	275 861.94	15				3
5877.79	3/2	5/2	258 838.48	275 847.01	14				3
5517.72	$3p^6 6p\ ^2P^o_{3/2}$	$3p^6 7s\ ^2S_{1/2}$	274 881.21	292 999.54	10				3
5470.98	1/2	1/2	274 726.29	292 999.54	8				3
5492.51	$3p^6 5s\ ^2S_{1/2}$	$3p^6 5p\ ^2P^o_{1/2}$	212 407.34	230 608.89	18	9.0 − 1	9.9+7	D	3°, 98*
5398.93	1/2	3/2	212 407.34	230 924.38	20	1.8	1.0+8	D	3°, 98*
4677.58	$3p^6 6h\ ^2H^o$	$3p^6 8i\ ^2I$	300 158.76	321 531.3	3				3
4618.114	$3p^6 5g\ ^2G$	$3p^6 6h\ ^2H^o$	278 510.93	300 158.76	15				3
4403.451	$3p^6 4f\ ^2F^o_{5/2}$	$3p^6 5d\ ^2D_{3/2}$	236 135.29	258 838.48	9	9.0 − 1	7.5+7	D	3°, 98*
4397.327	7/2	5/2	236 142.30	258 877.08	10	1.2	7.1+7	D	3°, 98*
4395.92	5/2	5/2	236 135.29	258 877.08	5	6.0 − 2	3.5+6	D	3°, 98*
4133.779	$3p^6 5f\ ^2F^o_{7/2}$	$3p^6 6g\ ^2G_{9/2}$	275 861.94	300 046.2	14				3
4131.215	5/2	7/2	275 847.01	300 045.9	13				3
3966.156	$3p^5 3d^2\ ^2F^o_{5/2}$	$3p^6 6g\ ^2G_{7/2}$	274 839.82	300 045.9	2				3
3581.392	$3p^6 5p\ ^2P^o_{3/2}$	$3p^6 5d\ ^2D_{3/2}$	230 924.38	258 838.48	10	6.0 − 1	7.7+7	D	3°, 98*
3576.438	3/2	5/2	230 924.38	258 877.08	17	5.2	4.6+8	D	3°, 98*
3541.361	1/2	3/2	230 608.89	258 838.48	15	2.8	3.8+8	D	3°, 98*
3272.773	$3p^6 5f\ ^2F^o_{7/2}$	$3p^6 7d\ ^2D_{5/2}$	275 861.94	306 408.30	1				3
3272.50	5/2	3/2	275 847.01	306 395.69					3
3170.955	$3p^6 6p\ ^2P^o_{3/2}$	$3p^6 7d\ ^2D_{5/2}$	274 881.21	306 408.30	2				3
3156.718	1/2	3/2	274 726.29	306 395.69	1				3
2957.306	$3p^6 4d\ ^2D_{3/2}$	$3p^6 5p\ ^2P^o_{1/2}$	196 804.27	230 608.89	12	8.8 − 1	3.3+8	D	3°, 98*
2937.328	5/2	3/2	196 889.96	230 924.38	14	1.6	3.0+8	D	3°, 98*
2929.961	3/2	3/2	196 804.27	230 924.38	6	1.7 − 1	3.4+7	D	3°, 98*
2889.36	$3p^6 5g\ ^2G_{9/2}$	$3p^6 7h\ ^2H^o_{11/2}$	278 511.23	313 110.72	4				3
2862.596	$3p^6 5p\ ^2P^o_{3/2}$	$3p^6 6s\ ^2S_{1/2}$	230 924.38	265 847.42	5	1.0	4.1+8	D	3°, 98*
2836.972	1/2	1/2	230 608.89	265 847.42	3	4.8 − 1	2.0+8	D	3°, 98*
2689.39	$3p^6 5f\ ^2F^o_{7/2}$	$3p^6 7g\ ^2G_{9/2}$	275 861.94	313 034.1	1				3
2688.32	5/2	7/2	275 847.01	313 033.9					3
2547.314	$3p^6 4d\ ^2D_{5/2}$	$3p^6 4f\ ^2F^o_{5/2}$	196 889.96	236 135.29	2	2.9 − 1	4.9+7	D	3°, 98*
2546.880	5/2	7/2	196 889.96	236 142.30	10	5.8	7.4+8	D	3°, 98*
2541.786	3/2	5/2	196 804.27	236 135.29	8	4.0	6.9+8	D	3°, 98*
2359.499	$3p^6 4f\ ^2F^o_{7/2}$	$3p^6 5g\ ^2G_{9/2}$	236 142.30	278 511.23	10				3
2359.142	5/2	7/2	236 135.29	278 510.63	10				3

Ti IV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2103.106	$3p^6 4s\ ^2S_{1/2}$	$3p^6 4p\ ^2P^o_{1/2}$	80 388.92	127 921.36	18	6.6 − 1	5.0+8	D	3°,98*
2067.564	1/2	3/2	80 388.92	128 739.59	20	1.3	5.1+8	D	3°,98*
1564.850^{C}	$3p^6 4f\ ^2F^o_{7/2}$	$3p^6 6g\ ^2G_{9/2}$	236 142.30	300 046.2	2				3
1564.685^{C}	5/2	7/2	236 135.29	300 045.9	1				3
1469.188	$3p^6 4p\ ^2P^o_{3/2}$	$3p^6 4d\ ^2D_{3/2}$	128 739.59	196 804.27	12	4.4 − 1	3.5+8	D	3°,98*
1467.338	3/2	5/2	128 739.59	196 889.96	20	4.0	2.1+9	D	3°,98*
1451.736	1/2	3/2	127 921.36	196 804.27	18	2.2	1.8+9	D	3°,98*
1283.334^{C}	$3p^6 4d\ ^2D_{3/2}$	$3p^6 6p\ ^2P^o_{1/2}$	196 804.27	274 726.29	1				3
1282.195^{C}	5/2	3/2	196 889.96	274 881.21	2				3
1266.272^{C}	$3p^6 4d\ ^2D_{5/2}$	$3p^6 5f\ ^2F^o_{7/2}$	196 889.96	275 861.94	2				3
1265.138^{C}	3/2	5/2	196 804.27	275 847.01	1				3
1195.208	$3p^6 4p\ ^2P^o_{3/2}$	$3p^6 5s\ ^2S_{1/2}$	128 739.59	212 407.34	10	6.0 − 1	1.4+9	D	3°,98*
1183.635	1/2	1/2	127 921.36	212 407.34	8	2.8 − 1	6.9+8	D	3°,98*
781.730	$3p^6 3d\ ^2D_{3/2}$	$3p^6 4p\ ^2P^o_{1/2}$	0.0	127 921.36	16				3
779.074	5/2	3/2	382.1	128 739.59	18				3
776.762	3/2	3/2	0.0	128 739.59	10				3
768.6461^{C}	$3p^6 4p\ ^2P^o_{3/2}$	$3p^6 5d\ ^2D_{3/2}$	128 739.59	258 838.48		8.7 − 3	2.5+7	E	98*
768.4181^{C}	3/2	5/2	128 739.59	258 877.08		7.9 − 2	1.5+8	D−	98*
763.8420^{C}	1/2	3/2	127 921.36	258 838.48		4.8 − 2	1.3+8	D−	98*
729.3529^{C}	$3p^6 4p\ ^2P^o_{3/2}$	$3p^6 6s\ ^2S_{1/2}$	128 739.59	265 847.42	1	9.2 − 2	5.7+8	D−	3°,98*
725.0261^{C}	1/2	1/2	127 921.36	265 847.42		4.6 − 2	2.8+8	D−	3°,98*
665.6905^{C}	$3p^6 4s\ ^2S_{1/2}$	$3p^6 5p\ ^2P^o_{1/2}$	80 388.92	230 608.89	1	1.1 − 2	8.1+7	E	3°,98*
664.2954^{C}	1/2	3/2	80 388.92	230 924.38	2	1.9 − 2	7.0+7	E	3°,98*
433.7599^{C}	$3p^6 3d\ ^2D_{5/2}$	$3p^6 5p\ ^2P^o_{3/2}$	382.1	230 924.38		5.6 − 2	5.0+8	D−	98*
433.6346^{C}	3/2	1/2	0.0	230 608.89		3.1 − 2	5.5+8	E	98*
433.0422^{C}	3/2	3/2	0.0	230 924.38		6.2 − 3	5.5+7	E	98*
424.1724^{C}	$3p^6 3d\ ^2D_{5/2}$	$3p^6 4f\ ^2F^o_{5/2}$	382.1	236 135.29		5.7 − 2	3.6+8	D−	98*
424.1598^{C}	5/2	7/2	382.1	236 142.30		1.2	5.3+9	D	98*
423.4860^{C}	3/2	5/2	0.0	236 135.29		7.9 − 1	4.9+9	D	98*

Ti V

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2384.634	$3s^23p^54s\ ^3P^o_0$	$3s^23p^54p\ ^3S_1$	440 065.2	481 987.7	2				4
2214.740	1	1	436 849.8	481 987.7	5				4
2098.042	2	1	434 339.4	481 987.7	4				4
2091.104	$3s^23p^54s\ ^1P^o_1$	$3s3p^63d\ ^3D_2$	443 752.7	491 558.7	5bl				4
2045.858	$3s^23p^54s\ ^3P^o_0$	$3s3p^63d\ ^3D_1$	440 065.2	488 928.7	4				4
1920.163	1	1	436 849.8	488 928.7	7				4
1831.875	2	1	434 339.4	488 928.7	2				4
1827.899	1	2	436 849.8	491 558.7	6				4
1747.639	2	2	434 339.4	491 558.7	4				4
1717.396	2	3	434 339.4	492 567.1	11				4
2017.614	$3s^23p^54s\ ^1P^o_1$	$3s^23p^54p\ ^3D_1$	443 752.7	493 300.5	1				4
1988.750	$3s^23p^54s\ ^1P^o_1$	$3s^23p^54p\ ^1D_2$	443 752.7	494 035.7	7				4
1946.434	$3s^23p^54s\ ^3P^o_1$	$3s^23p^54p\ ^3D_2$	436 849.8	488 225.7	4				4
1878.458	0	1	440 065.2	493 300.5	2				4
1864.451	2	3	434 339.4	487 974.6	7				4
1855.765	2	2	434 339.4	488 225.7	3				4
1771.452	1	1	436 849.8	493 300.5	7				4
1696.031	2	1	434 339.4	493 300.5	3				4
1881.886	$3s^23p^54s\ ^1P^o_1$	$3s^23p^54p\ ^1P_1$	443 752.7	496 890.7	7				4
1841.490	$3s^23p^54s\ ^1P^o_1$	$3s^23p^54p\ ^3P_2$	443 752.7	498 057.2	10				4
1837.436	1	0	443 752.7	498 176.4	3				4
1799.082	1	1	443 752.7	499 336.2	6				4
1828.292	$3s^23p^54p\ ^1S_0$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{1}{2}]^o_1$	514 608.7	569 304.5	6				4
1759.757	$3s^23p^54s\ ^3P^o_0$	$3s^23p^54p\ ^1P_1$	440 065.2	496 890.7	8				4
1598.697	2	1	434 339.4	496 890.7	1				4
1748.671	$3s^23p^54s\ ^3P^o_1$	$3s^23p^54p\ ^1D_2$	436 849.8	494 035.7	3				4
1675.150	2	2	434 339.4	494 035.7	9				4
1687.165	$3s^23p^54s\ ^3P^o_0$	$3s^23p^54p\ ^3P_1$	440 065.2	499 336.2	8				4
1633.780	1	2	436 849.8	498 057.2	6				4
1630.613	1	0	436 849.8	498 176.4	5				4
1600.353	1	1	436 849.8	499 336.2					4
1569.423	2	2	434 339.4	498 057.2	5				4
1538.546	2	1	434 339.4	499 336.2	5				4
1600.726	$3s^23p^54s\ ^1P^o_1$	$3s3p^63d\ ^1D_2$	443 752.7	506 224.7	5				4
1518.181	$3s3p^63d\ ^1D_2$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{7}{2}]^o_3$	506 224.7	572 093.9					4
1465.683	$3s^23p^54p\ ^1S_0$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_1$	514 608.7	582 836.5	6				4
1460.723	$3s3p^63d\ ^1D_2$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_3$	506 224.7	574 683.8	2				4
1441.713	$3s^23p^54p\ ^3P_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{1}{2}]^o_0$	499 336.2	568 698.5	4				4
1429.222	1	1	499 336.2	569 304.5	2				4
1405.911	0	1	498 176.4	569 304.5	2				4
1403.562	2	1	498 057.2	569 304.5	1				4
1441.426	$3s^23p^54s\ ^3P^o_1$	$3s3p^63d\ ^1D_2$	436 849.8	506 224.7					4
1411.309	$3s^23p^54s\ ^1P^o_1$	$3s^23p^54p\ ^1S_0$	443 752.7	514 608.7	8				4
1403.280	$3s^23p^54p\ ^3P_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_2$	499 336.2	570 597.8					4
1378.552	2	2	498 057.2	570 597.8	6				4
1283.463	1	1	499 336.2	577 249.8					4
1264.659	0	1	498 176.4	577 249.8	5				4
1380.935	$3s^23p^54p\ ^1P_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{1}{2}]^o_1$	496 890.7	569 304.5					4
1367.797	$3s3p^63d\ ^1D_2$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{5}{2}]^o_3$	506 224.7	579 334.6	2				4
1363.148	$3s3p^63d\ ^1D_2$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_2$	506 224.7	579 584.2					4
1356.724	$3s^23p^54p\ ^1P_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_2$	496 890.7	570 597.8					4
1244.405	1	1	496 890.7	577 249.8					4

Ti V – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1328.572	$3s^23p^54p\ ^1D_2$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{1}{2}]^o_1$	494 035.7	569 304.5	4				4
1326.279	$3s^23p^54p\ ^3D_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{1}{2}]^o_0$	493 300.5	568 698.5					4
1315.712	1	1	493 300.5	569 304.5					4
1233.387	2	1	488 225.7	569 304.5					4
1306.108	$3s^23p^54p\ ^1D_2$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_2$	494 035.7	570 597.8	8				4
1305.018	$3s^23p^54p\ ^3P_2$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_3$	498 057.2	574 683.8					4
1293.710	$3s^23p^54p\ ^3D_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_2$	493 300.5	570 597.8	1				4
1214.000	2	2	488 225.7	570 597.8					4
1210.290	3	2	487 974.6	570 597.8					4
1191.195	1	1	493 300.5	577 249.8	5				4
1123.288	2	1	488 225.7	577 249.8	1				4
1286.036	$3s^23p^54s\ ^3P^o_1$	$3s^23p^54p\ ^1S_0$	436 849.8	514 608.7	2				4
1281.541	$3s3p^63d\ ^3D_3$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_2$	492 567.1	570 597.8					4
1224.469	1	2	488 928.7	570 597.8					4
1166.982	2	1	491 558.7	577 249.8					4
1132.237	1	1	488 928.7	577 249.8	5				4
1281.091	$3s^23p^54p\ ^1D_2$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{7}{2}]^o_3$	494 035.7	572 093.9					4
1268.490	$3s3p^63d\ ^3D_3$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{7}{2}]^o_4$	492 567.1	571 401.1	8				4
1257.442	3	3	492 567.1	572 093.9	3				4
1241.671	2	3	491 558.7	572 093.9	10				4
1253.079	$3s^23p^54p\ ^1D_2$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_2$	494 035.7	573 838.3					4
1239.958	2	3	494 035.7	574 683.8	11				4
1246.131	$3s^23p^54p\ ^3P_1$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_2$	499 336.2	579 584.2	7				4
1226.588	2	2	498 057.2	579 584.2					4
1197.598	1	1	499 336.2	582 836.5	4				4
1181.192	0	1	498 176.4	582 836.5	2				4
1179.541	2	1	498 057.2	582 836.5					4
1241.671	$3s^23p^54p\ ^3D_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_2$	493 300.5	573 838.3	10				4
1168.043	2	2	488 225.7	573 838.3	4				4
1164.634	3	2	487 974.6	573 838.3					4
1153.274	3	3	487 974.6	574 683.8	5				4
1239.958	$3s^23p^54p\ ^3P_2$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{5}{2}]^o_2$	498 057.2	578 698.5	11				4
1230.361	2	3	498 057.2	579 334.6	10				4
1222.359	$3s^23p^54p\ ^1P_1$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{5}{2}]^o_2$	496 890.7	578 698.5	9				4
1217.779	$3s3p^63d\ ^3D_3$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_3$	492 567.1	574 683.8	3				4
1215.373	2	2	491 558.7	573 838.3	4				4
1203.011	2	3	491 558.7	574 683.8	4				4
1177.719	1	2	488 928.7	573 838.3	4				4
1198.659	$3s^23p^54p\ ^3D_3$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{7}{2}]^o_4$	487 974.6	571 401.1	9				4
1192.353	2	3	488 225.7	572 093.9	8				4
1188.796	3	3	487 974.6	572 093.9	3				4
1181.192	$3s^23p^54p\ ^1D_2$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{5}{2}]^o_2$	494 035.7	578 698.5	2				4
1172.340	2	3	494 035.7	579 334.6					4
1168.927	$3s^23p^54p\ ^1D_2$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_2$	494 035.7	579 584.2	3				4
1163.520	$3s^23p^54p\ ^1P_1$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_1$	496 890.7	582 836.5	4				4
1153.274	$3s^23p^54p\ ^3S_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{1}{2}]^o_0$	481 987.7	568 698.5	5				4
1145.256	1	1	481 987.7	569 304.5	5				4
1152.509	$3s3p^63d\ ^3D_3$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{5}{2}]^o_3$	492 567.1	579 334.6					4
1147.571	2	2	491 558.7	578 698.5					4
1139.275	2	3	491 558.7	579 334.6	1				4
1113.952	1	2	488 928.7	578 698.5	4				4

Ti v – Continued

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1136.050	$3s3p^63d\ ^3D_2$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_2$	491 558.7	579 584.2	1				4
1128.546	$3s^23p^54p\ ^3S_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_2$	481 987.7	570 597.8	7				4
1097.585	$3s^23p^54p\ ^3D_2$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{5}{2}]^o_3$	488 225.7	579 334.6					4
1094.583	3	3	487 974.6	579 334.6	3				4
1094.583	$3s^23p^54p\ ^3D_2$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_2$	488 225.7	579 584.2	3				4
1039.125	$3s^23p^53d\ ^1P^o_1$	$3s3p^63d\ ^3D_2$	395 320.9	491 558.7					4
984.530	$3s^23p^53d\ ^1P^o_1$	$3s^23p^54p\ ^1P_1$	395 320.9	496 890.7					4
981.585	$3s3p^63d\ ^1D_2$	$3s^23p^5(^2P^o_{3/2})5s\ ^2[\frac{3}{2}]^o_1$	506 224.7	608 100.7					4
973.357	$3s^23p^53d\ ^1P^o_1$	$3s^23p^54p\ ^3P_2$	395 320.9	498 057.2					4
972.188	1	0	395 320.9	498 176.4					4
961.376	1	1	395 320.9	499 336.2					4
931.652	$3s3p^63d\ ^1D_2$	$3s^23p^5(^2P^o_{1/2})5s\ ^2[\frac{1}{2}]^o_1$	506 224.7	613 558.2					4
928.507	$3s^23p^54p\ ^3P_1$	$3s^23p^5(^2P^o_{3/2})5s\ ^2[\frac{3}{2}]^o_2$	499 336.2	607 033.0					4
908.740	2	1	498 057.2	608 100.7					4
901.692	$3s^23p^53d\ ^1P^o_1$	$3s3p^63d\ ^1D_2$	395 320.9	506 224.7	1				4
899.171	$3s^23p^54p\ ^1P_1$	$3s^23p^5(^2P^o_{3/2})5s\ ^2[\frac{3}{2}]^o_1$	496 890.7	608 100.7					4
884.982	$3s^23p^54p\ ^1D_2$	$3s^23p^5(^2P^o_{3/2})5s\ ^2[\frac{3}{2}]^o_2$	494 035.7	607 033.0	1				4
876.686	2	1	494 035.7	608 100.7					4
881.379	$3s^23p^54p\ ^3P_1$	$3s^23p^5(^2P^o_{1/2})5s\ ^2[\frac{1}{2}]^o_0$	499 336.2	612 793.2					4
875.489	1	1	499 336.2	613 558.2					4
866.676	0	1	498 176.4	613 558.2					4
865.806	2	1	498 057.2	613 558.2	1				4
879.268	$3s^23p^54p\ ^3D_1$	$3s^23p^5(^2P^o_{3/2})5s\ ^2[\frac{3}{2}]^o_2$	493 300.5	607 033.0					4
871.085	1	1	493 300.5	608 100.7	1				4
841.691	2	2	488 225.7	607 033.0					4
839.926	3	2	487 974.6	607 033.0	2				4
834.199	2	1	488 225.7	608 100.7	1				4
873.618	$3s3p^63d\ ^3D_3$	$3s^23p^5(^2P^o_{3/2})5s\ ^2[\frac{3}{2}]^o_2$	492 567.1	607 033.0	1				4
858.073	2	1	491 558.7	608 100.7	1				4
862.786	$3s^23p^54p\ ^1P_1$	$3s^23p^5(^2P^o_{1/2})5s\ ^2[\frac{1}{2}]^o_0$	496 890.7	612 793.2					4
857.136	1	1	496 890.7	613 558.2					4
838.315	$3s^23p^53d\ ^1P^o_1$	$3s^23p^54p\ ^1S_0$	395 320.9	514 608.7	3				4
836.656	$3s^23p^54p\ ^1D_2$	$3s^23p^5(^2P^o_{1/2})5s\ ^2[\frac{1}{2}]^o_1$	494 035.7	613 558.2					4
807.347	$3s3p^63d\ ^3D_1$	$3s^23p^5(^2P^o_{1/2})5s\ ^2[\frac{1}{2}]^o_0$	488 928.7	612 793.2					4
799.714	$3s^23p^54p\ ^3S_1$	$3s^23p^5(^2P^o_{3/2})5s\ ^2[\frac{3}{2}]^o_2$	481 987.7	607 033.0	1				4
792.948	1	1	481 987.7	608 100.7					4
579.518	$3s^23p^53d\ ^3D^o_2$	$3s^23p^54p\ ^3S_1$	309 433.1	481 987.7					4
578.905	1	1	309 252.1	481 987.7					4
571.095	$3s^23p^53d\ ^1D^o_2$	$3s^23p^54p\ ^3S_1$	306 874.5	481 987.7	2				4
566.461	$3s^23p^53d\ ^1F^o_3$	$3s^23p^54p\ ^3D_3$	311 433.8	487 974.6					4
565.627	3	2	311 433.8	488 225.7	3				4
560.056	$3s^23p^53d\ ^3D^o_2$	$3s^23p^54p\ ^3D_3$	309 433.1	487 974.6					4
559.323	2	2	309 433.1	488 225.7					4
553.857	3	3	307 429.2	487 974.6					4
553.122	3	2	307 429.2	488 225.7	1				4
543.858	2	1	309 433.1	493 300.5					4
543.339	1	1	309 252.1	493 300.5	7				4

Ti V – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
557.115	$3s^23p^53d\ ^3D^o_2$	$3s3p^63d\ ^3D_1$	309 433.1	488 928.7					4
556.562	1	1	309 252.1	488 928.7					4
549.083	2	2	309 433.1	491 558.7	6				4
548.533	1	2	309 252.1	491 558.7	4				4
546.062	2	3	309 433.1	492 567.1	5				4
543.103	3	2	307 429.2	491 558.7	7				4
540.145	3	3	307 429.2	492 567.1	8				4
555.164	$3s^23p^53d\ ^1F^o_3$	$3s3p^63d\ ^3D_2$	311 433.8	491 558.7	5				4
552.079	3	3	311 433.8	492 567.1					4
552.185	$3s^23p^53d\ ^1D^o_2$	$3s^23p^54p\ ^3D_3$	306 874.5	487 974.6					4
551.410	2	2	306 874.5	488 225.7	1bl				4
536.406	2	1	306 874.5	493 300.5	4				4
547.642	$3s^23p^53d\ ^1F^o_3$	$3s^23p^54p\ ^1D_2$	311 433.8	494 035.7	3				4
541.711	$3s^23p^53d\ ^3D^o_2$	$3s^23p^54p\ ^1D_2$	309 433.1	494 035.7	9				4
541.181	1	2	309 252.1	494 035.7	3				4
535.888	3	2	307 429.2	494 035.7	10				4
541.459	$3s^23p^53d\ ^1D^o_2$	$3s3p^63d\ ^3D_2$	306 874.5	491 558.7	8				4
538.511	2	3	306 874.5	492 567.1					4
535.836	$3s^23p^53d\ ^1F^o_3$	$3s^23p^54p\ ^3P_2$	311 433.8	498 057.2	10				4
534.297	$3s^23p^53d\ ^1D^o_2$	$3s^23p^54p\ ^1D_2$	306 874.5	494 035.7					4
533.457	$3s^23p^53d\ ^3D^o_2$	$3s^23p^54p\ ^1P_1$	309 433.1	496 890.7	1				4
532.935	1	1	309 252.1	496 890.7					4
530.167	$3s^23p^53d\ ^3D^o_2$	$3s^23p^54p\ ^3P_2$	309 433.1	498 057.2	1				4
529.635	1	2	309 252.1	498 057.2					4
529.315	1	0	309 252.1	498 176.4	8				4
526.570	2	1	309 433.1	499 336.2	13				4
526.076	1	1	309 252.1	499 336.2	6				4
524.578	3	2	307 429.2	498 057.2	12				4
526.266	$3s^23p^53d\ ^1D^o_2$	$3s^23p^54p\ ^1P_1$	306 874.5	496 890.7	6				4
523.050	$3s^23p^53d\ ^1D^o_2$	$3s^23p^54p\ ^3P_2$	306 874.5	498 057.2	7				4
519.575	2	1	306 874.5	499 336.2	1				4
513.374	$3s^23p^53d\ ^1F^o_3$	$3s3p^63d\ ^1D_2$	311 433.8	506 224.7	8				4
507.683	$3s^23p^53d\ ^3D^o_1$	$3s3p^63d\ ^1D_2$	309 252.1	506 224.7	6				4
503.031	3	2	307 429.2	506 224.7	3				4
506.468	$3s^23p^53d\ ^3F^o_2$	$3s^23p^54p\ ^3D_2$	290 778.7	488 225.7	7				4
502.711	3	3	289 050.2	487 974.6	7				4
502.077	3	2	289 050.2	488 225.7	14				4
498.260	4	3	287 276.5	487 974.6	15				4
493.783	2	1	290 778.7	493 300.5	6				4
504.665	$3s^23p^53d\ ^3F^o_2$	$3s3p^63d\ ^3D_1$	290 778.7	488 928.7	12				4
498.050	2	2	290 778.7	491 558.7					4
493.783	3	2	289 050.2	491 558.7	6				4
491.358	3	3	289 050.2	492 567.1	1				4
487.115	4	3	287 276.5	492 567.1	4				4
501.631	$3s^23p^53d\ ^1D^o_2$	$3s3p^63d\ ^1D_2$	306 874.5	506 224.7	2				4
491.981	$3s^23p^53d\ ^3F^o_2$	$3s^23p^54p\ ^1D_2$	290 778.7	494 035.7					4
487.845	3	2	289 050.2	494 035.7	4				4
488.582	$3s^23p^53d\ ^3P^o_2$	$3s^23p^54p\ ^3S_1$	277 310.6	481 987.7	10				4
483.992	1	1	275 371.9	481 987.7	8				4
481.818	0	1	274 439.7	481 987.7	5				4
485.175	$3s^23p^53d\ ^3F^o_2$	$3s^23p^54p\ ^1P_1$	290 778.7	496 890.7	3				4
482.447	$3s^23p^53d\ ^3F^o_2$	$3s^23p^54p\ ^3P_2$	290 778.7	498 057.2					4
479.497	2	1	290 778.7	499 336.2					4
478.455	3	2	289 050.2	498 057.2	3				4

Ti V – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
474.690	$3s^23p^53d\ ^3P^o_2$	$3s^23p^54p\ ^3D_3$	277 310.6	487 974.6	8				4
474.124	2	2	277 310.6	488 225.7	2				4
469.808	1	2	275 371.9	488 225.7	6				4
462.982	2	1	277 310.6	493 300.5	3				4
458.861	1	1	275 371.9	493 300.5	2				4
468.257	$3s^23p^53d\ ^3P^o_1$	$3s3p^63d\ ^3D_1$	275 371.9	488 928.7	3				4
466.749	2	2	277 310.6	491 558.7	1				4
466.224	0	1	274 439.7	488 928.7	4				4
464.562	2	3	277 310.6	492 567.1	5				4
462.565	1	2	275 371.9	491 558.7	3				4
464.143	$3s^23p^53d\ ^3F^o_2$	$3s3p^63d\ ^1D_2$	290 778.7	506 224.7					4
461.414	$3s^23p^53d\ ^3P^o_2$	$3s^23p^54p\ ^1D_2$	277 310.6	494 035.7	7				4
457.321	1	2	275 371.9	494 035.7	1				4
455.419	$3s^23p^53d\ ^3P^o_2$	$3s^23p^54p\ ^1P_1$	277 310.6	496 890.7	1				4
451.429	1	1	275 371.9	496 890.7					4
449.541	0	1	274 439.7	496 890.7					4
453.006	$3s^23p^53d\ ^3P^o_2$	$3s^23p^54p\ ^3P_2$	277 310.6	498 057.2	5				4
450.397	2	1	277 310.6	499 336.2	4				4
449.063	1	2	275 371.9	498 057.2	3				4
448.822	1	0	275 371.9	498 176.4	3				4
446.493	1	1	275 371.9	499 336.2	1				4
444.643	0	1	274 439.7	499 336.2	2				4
436.839	$3s^23p^53d\ ^3P^o_2$	$3s3p^63d\ ^1D_2$	277 310.6	506 224.7					4
433.202	1	2	275 371.9	506 224.7					4
363.145	$3s^23p^6\ ^1S_0$	$3s^23p^53d\ ^3P^o_1$	0.0	275 371.9					4
323.365	$3s^23p^6\ ^1S_0$	$3s^23p^53d\ ^3D^o_1$	0.0	309 252.1	7	1.9 – 3	4.0+7	E	4°, 98*
252.958	$3s^23p^6\ ^1S_0$	$3s^23p^53d\ ^1P^o_1$	0.0	395 320.9	17	3.63	1.26+11	C	4°, 98*
228.909	$3s^23p^6\ ^1S_0$	$3s^23p^54s\ ^3P^o_1$	0.0	436 849.8	10	9.7 – 2	4.1+9	E	4°, 98*
225.347	$3s^23p^6\ ^1S_0$	$3s^23p^54s\ ^1P^o_1$	0.0	443 752.7	12	3.3 – 1	1.4+10	E	4°, 98*
164.446	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^o_{3/2})5s\ ^2[\frac{3}{2}]^o_1$	0.0	608 100.7	5				4
162.984	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^o_{1/2})5s\ ^2[\frac{1}{2}]^o_1$	0.0	613 558.2	4				4
146.897	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^o_{3/2})6s\ ^2[\frac{3}{2}]^o_1$	0.0	680 748	1				4
145.79	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^o_{1/2})6s\ ^2[\frac{1}{2}]^o_1$	0.0	685 940					4
145.354	$3s^23p^6\ ^1S_0$	$3s3p^64p\ ^3P^o_1$	0.0	687 980	6				5
144.551	$3s^23p^6\ ^1S_0$	$3s3p^64p\ ^1P^o_1$	0.0	691 797	12				4, 5°
121.138	$3s^23p^6\ ^1S_0$	$3s3p^65p\ ^3P^o_1$	0.0	825 500	2				5
120.824	$3s^23p^6\ ^1S_0$	$3s3p^65p\ ^1P^o_1$	0.0	827 650	12				5
112.896	$3s^23p^6\ ^1S_0$	$3s3p^66p\ ^3P^o_1$	0.0	885 770					5
112.495	$3s^23p^6\ ^1S_0$	$3s3p^66p\ ^1P^o_1$	0.0	888 930	11				5
108.611	$3s^23p^6\ ^1S_0$	$3s3p^67p\ ^3P^o_1$	0.0	920 720					5
108.443	$3s^23p^6\ ^1S_0$	$3s3p^67p\ ^1P^o_1$	0.0	922 140	6				5
106.308	$3s^23p^6\ ^1S_0$	$3s3p^68p\ ^3P^o_1$	0.0	940 660					5
106.154	$3s^23p^6\ ^1S_0$	$3s3p^68p\ ^1P^o_1$	0.0	942 030	3				5
104.732	$3s^23p^6\ ^1S_0$	$3s3p^69p\ ^3P^o_1$	0.0	954 820					5
104.711	$3s^23p^6\ ^1S_0$	$3s3p^69p\ ^1P^o_1$	0.0	955 010					5
103.754	$3s^23p^6\ ^1S_0$	$3s3p^610p\ ^3P^o_1$	0.0	963 820					5
103.733	$3s^23p^6\ ^1S_0$	$3s3p^610p\ ^1P^o_1$	0.0	964 010					5
103.059	$3s^23p^6\ ^1S_0$	$3s3p^611p\ ^1P^o_1$	0.0	970 320					5

Ti VI

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
524.113	$3s^23p^5\ ^2P^o_{1/2}$	$3s3p^6\ ^2S_{1/2}$	5 829	196 628	17	6.90 − 2	8.4+8	C−	7°, 98*
508.575	3/2	1/2	0	196 628	18	1.42 − 1	1.83+9	C−	7°, 98*
353.877	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)3d\ ^2P_{1/2}$	5 829	288 412	2				6
349.574	1/2	3/2	5 829	291 890	2				6
346.728	3/2	1/2	0	288 412					6
342.595	3/2	3/2	0	291 890	5				6
341.109	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)3d\ ^2D_{3/2}$	5 829	298 991	4				6
334.457	3/2	3/2	0	298 991	4				6
330.703	3/2	5/2	0	302 386	6				6
338.309^{C}	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)3d\ ^4P_{1/2}$	5 829	301 417		3.8 − 4	1.2+7	E	98*
331.767	3/2	1/2	0	301 417	2	7.6 − 4	2.5+7	E	6°, 98*
301.913	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^1D)3d\ ^2F_{5/2}$	0	331 221	4	1.5 − 3	1.8+7	E	6°, 98*
288.355	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1S)3d\ ^2D_{3/2}$	5 829	352 625	6	1.4 − 2	2.7+8	E	6°, 98*
283.586	3/2	3/2	0	352 625	4				6
282.215	3/2	5/2	0	354 340		4.0 − 3	5.9+7	E	6°, 98*
267.343	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)3d\ ^2S_{1/2}$	5 829	379 874	9	6.4 − 1	3.0+10	C−	6°, 98*
263.246	3/2	1/2	0	379 874	10	1.52	7.3+10	C−	6°, 98*
259.232	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)3d\ ^2P_{3/2}$	5 829	391 583	10				6
257.855	1/2	1/2	5 829	393 644	10				6
255.375	3/2	3/2	0	391 583	11				6
251.071	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)3d\ ^2D_{3/2}$	5 829	404 123	15	4.28	1.13+11	C	6°, 98*
250.482	3/2	5/2	0	399 231	18	6.8	1.2+11	C	6°, 98*
247.450	3/2	3/2	0	404 123	10	2.6 − 1	7.0+9	D	6°, 98*
235.836^{L}	$3s^23p^4(^3P)3d\ ^4F_{7/2}$	$3s^23p^4(^3P)4f\ ^4G^o_{9/2}$							9
235.408^{L}	9/2	11/2							9
235.066^{L}	5/2	7/2							9
235.310^{L}	$3s^23p^4(^1D)3d\ ^2G_{9/2}$	$3s^23p^4(^1D)4f\ ^2H^o_{11/2}$							9
226.561^{L}	$3s^23p^4(^3P)3d\ ^4D_{7/2}$	$3s^23p^4(^3P)4f\ ^4F^o_{9/2}$							9
203.434	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)4s\ ^4P_{1/2}$	5 829	497 389	1				6
203.200	3/2	5/2	0	492 126	2				6
201.865	3/2	3/2	0	495 380	8				6°, 8
201.311	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)4s\ ^2P_{3/2}$	5 829	502 571	7				6°, 8
199.759	1/2	1/2	5 829	506 432	9				6°, 8
198.977	3/2	3/2	0	502 571	12				6°, 8
197.460	3/2	1/2	0	506 432	9				6°, 8
194.900	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)4s\ ^2D_{3/2}$	5 829	518 914	9				6°, 8
192.754	3/2	5/2	0	518 797	10				6°, 8
192.705	3/2	3/2	0	518 914	1				8
184.106	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1S)4s\ ^2S_{1/2}$	5 829	548 995	5				6°, 8
182.151	3/2	1/2	0	548 995	7				6°, 8
154.768	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)4d\ ^2D_{3/2}$	5 829	651 960	2				6
153.550	3/2	5/2	0	651 255	5				6
153.384	3/2	3/2	0	651 960	1				6
154.161	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)4d\ ^4F_{3/2}$	5 829	654 503					6
152.960	3/2	5/2	0	653 766	3				6
153.255	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)4d\ ^2P_{3/2}$	5 829	658 339	1				6
151.897	3/2	3/2	0	658 339					6
152.338	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^3P)4d\ ^2F_{5/2}$	0	656 437	3				6
150.315	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)4d\ ^2P_{3/2}$	5 829	671 096	1				6
150.213	1/2	1/2	5 829	671 549	1				6
149.010	3/2	3/2	0	671 096	4				6
149.560	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^1D)4d\ ^2S_{1/2}$	0	668 630	3bl				6

Ti VI – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
149.392	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)4d\ ^2D_{3/2}$	5 829	675 207	3				6
148.303	$_{3/2}$	$_{5/2}$	0	674 297	4				6
148.104	$_{3/2}$	$_{3/2}$	0	675 207	1				6
143.176	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1S)4d\ ^2D_{3/2}$	5 829	704 270					6
141.988	$_{3/2}$	$_{5/2}$	0	704 283	1				6
141.113	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^3P)5s\ ^4P_{3/2}$	0	708 652	3				6
141.061	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)5s\ ^2P_{1/2}$	5 829	714 742	1				6
140.443	$_{3/2}$	$_{3/2}$	0	712 034	4bl				6
139.911	$_{3/2}$	$_{1/2}$	0	714 742	1				6
137.813	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)5s\ ^2D_{3/2}$	5 829	731 453	1				6
136.714	$_{3/2}$	$_{5/2}$	0	731 455	2				6
129.249	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^3P)5d\ ^2D_{5/2}$	0	773 702	2				6
129.148	$_{3/2}$	$_{3/2}$	0	774 306	1				6
128.450	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^3P)5d\ ^4F_{5/2}$	0	778 513					6
126.330	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)5d\ ^2D_{3/2}$	5 829	797 406	1				6
125.456	$_{3/2}$	$_{5/2}$	0	797 092	3bl				6
125.689	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^1D)5d\ ^2P_{3/2}$	0	795 615	2				6

Ti VII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
1989.4^{C}	$3s^23p^4\ ^3P_1$	$3s^23p^4\ ^1S_0$	4 534	54 801		M1	9.8+1	E	98*
521.561	$3s^23p^4\ ^3P_1$	$3s3p^5\ ^3P^o_2$	4 534	196 266	10				7
515.008	0	1	5 888	200 059	8				7
511.442	1	1	4 534	200 059	8				7
509.511	2	2	0	196 266	14				7
505.899	1	0	4 534	202 202	8				7
499.853	2	1	0	200 059	8				7
509.127	$3s^23p^4\ ^1S_0$	$3s3p^5\ ^1P^o_1$	54 801	251 214	2				7
440.361	$3s^23p^4\ ^1D_2$	$3s3p^5\ ^1P^o_1$	24 130	251 214	8	2.9 − 1	3.3+9	D	7°, 98*
332.081	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)3d\ ^1D^o_2$	24 130	325 261	2				6
305.730	$3s^23p^4\ ^1S_0$	$3s^23p^3(^2D^o)3d\ ^1P^o_1$	54 801	381 894					6
296.056	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)3d\ ^1F^o_3$	24 130	361 904	5				6
282.898	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2P^o)3d\ ^3P^o_2$	24 130	377 614					6
281.898	2	1	24 130	378 872	9				6
279.516	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)3d\ ^1P^o_1$	24 130	381 894	9				6
270.748	$3s^23p^4\ ^3P_0$	$3s^23p^3(^2D^o)3d\ ^3S^o_1$	5 888	375 235	3				6
269.759	1	1	4 534	375 235	7				6
266.502	2	1	0	375 235	9				6
268.493	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2P^o)3d\ ^3D^o_2$	24 130	396 572					6
268.106	$3s^23p^4\ ^3P_0$	$3s^23p^3(^2P^o)3d\ ^3P^o_1$	5 888	378 872	5				6
268.035	1	2	4 534	377 614	9				6
267.136	1	1	4 534	378 872	6				6
265.059	1	0	4 534	381 808	7				6
264.823	2	2	0	377 614	10				6
263.944	2	1	0	378 872	5				6
265.951	$3s^23p^4\ ^3P_0$	$3s^23p^3(^2D^o)3d\ ^1P^o_1$	5 888	381 894	6				6
264.997	1	1	4 534	381 894	5				6
261.851	2	1	0	381 894	6				6
260.704	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2P^o)3d\ ^1D^o_2$	24 130	407 703	10				6
255.076	$3s^23p^4\ ^3P_1$	$3s^23p^3(^2P^o)3d\ ^3D^o_2$	4 534	396 572	10				6
254.687	0	1	5 888	398 527	9				6
254.022	2	3	0	393 667	16bl				6°, 103
253.811	1	1	4 534	398 527	9				6
252.162	2	2	0	396 572	9				6
250.913	2	1	0	398 527	1bl				6
252.571	$3s^23p^4\ ^1S_0$	$3s^23p^3(^2P^o)3d\ ^1P^o_1$	54 801	450 729	6				6
252.275	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2P^o)3d\ ^1F^o_3$	24 130	420 522	16				6
248.037	$3s^23p^4\ ^3P_1$	$3s^23p^3(^2P^o)3d\ ^1D^o_2$	4 534	407 703	1				6
193.668^{L}	$3s^23p^33d\ ^5D^o_4$	$3s^23p^34f\ ^5F_5$							9
193.585^{L}	3	4							9
193.534^{L}	2	3							9
193.501^{L}	1	2							9
192.474^{L}	$3s^23p^3(^2D^o)3d\ ^3F^o_4$	$3s^23p^3(^2D^o)4f\ ^3G_5$							9
192.272^{L}	3	4							9
192.102^{L}	2	3							9
179.107	$3s^23p^4\ ^3P_0$	$3s^23p^3(^4S^o)4s\ ^3S^o_1$	5 888	564 217	3				6
178.673	1	1	4 534	564 217	4				6
177.238	2	1	0	564 217	6				6
178.572	$3s^23p^4\ ^1S_0$	$3s^23p^3(^2P^o)4s\ ^1P^o_1$	54 801	614 794	3				6
175.812	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)4s\ ^1D^o_2$	24 130	592 918	7				6

Ti VII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
172.353	$3s^23p^4\ ^3P_0$	$3s^23p^3(^2D^o)4s\ ^3D^o_1$	5 888	586 092	2				6
171.952	1	1	4 534	586 092	2				6
171.888	1	2	4 534	586 308	4				6
170.559	2	2	0	586 308	4				6
170.358	2	3	0	586 998	8				6
170.938	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2P^o)4s\ ^3P^o_2$	24 130	609 116	1				6
169.301	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2P^o)4s\ ^1P^o_1$	24 130	614 794	4				6
168.652	$3s^23p^4\ ^3P_2$	$3s^23p^3(^2D^o)4s\ ^1D^o_2$	0	592 918	3bl				6
166.087	$3s^23p^4\ ^3P_0$	$3s^23p^3(^2P^o)4s\ ^3P^o_1$	5 888	607 982	3				6
165.836	1	0	4 534	607 538	1				6
165.716	1	1	4 534	607 982					6
165.403	1	2	4 534	609 116	2				6
164.478	2	1	0	607 982	1				6
164.173	2	2	0	609 116	3				6
138.814	$3s^23p^4\ ^3P_0$	$3s^23p^3(^4S^o)4d\ ^3D^o_1$	5 888	726 277	bl				6
138.548	1	2	4 534	726 303	3bl				6
137.661	2	3	0	726 424	4				6
136.815	$3s^23p^4\ ^1S_0$	$3s^23p^3(^2P^o)4d\ ^1P^o_1$	54 801	785 716	1				6
136.267	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)4d\ ^1D^o_2$	24 130	757 984	2				6
135.801	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)4d\ ^1F^o_3$	24 130	760 504	4				6
133.633	$3s^23p^4\ ^3P_1$	$3s^23p^3(^2D^o)4d\ ^3P^o_2$	4 534	752 850	1				6
132.322	2	1	0	755 732					6
132.982	$3s^23p^4\ ^3P_1$	$3s^23p^3(^2D^o)4d\ ^3S^o_1$	4 534	756 518					6
132.733	$3s^23p^4\ ^3P_2$	$3s^23p^3(^2D^o)4d\ ^3D^o_3$	0	753 393	3				6
132.522	2	2	0	754 591	2				6
132.351	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2P^o)4d\ ^3D^o_3$	24 130	779 699					6
132.149	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2P^o)4d\ ^1D^o_2$	24 130	780 853	1				6
132.093	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2P^o)4d\ ^1F^o_3$	24 130	781 170					6
129.722	$3s^23p^4\ ^3P_1$	$3s^23p^3(^2P^o)4d\ ^3D^o_2$	4 534	775 416	1				6
129.603	1	1	4 534	776 122					6
128.25	2	3	0	779 699					6

Ti VIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4264.4[C]	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^3\ ^2P^o_{3/2}$	32 190.5+x	55 633.6+x		M1	1.7+1	C	98*
1845.4[C]	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^3\ ^2P^o_{1/2}$	0.0	54 189.2+x		M1	1.8+1	E	98*
1797.5[C]	3/2	3/2	0.0	55 633.6+x		M1	3.9+1	D	98*
538.241	$3s^23p^3\ ^2P^o_{3/2}$	$3s3p^4\ ^2D_{5/2}$	55 633.6+x	241 426.0+x		7.2 – 2	2.8+8	D	12°, 98*
535.381	1/2	3/2	54 189.2+x	240 971.6+x		2.8 – 2	1.7+8	D	12°, 98*
514.206	$3s^23p^3\ ^4S^o_{3/2}$	$3s3p^4\ ^4P_{5/2}$	0.0	194 474.6		2.0 – 1	8.2+8	D	12°, 98*
504.801	3/2	3/2	0.0	198 097.9		1.3 – 1	8.7+8	D	12°, 98*
500.116	3/2	1/2	0.0	199 953.6		6.8 – 2	8.9+8	D	12°, 98*
481.428	$3s^23p^3\ ^2D^o_{5/2}$	$3s3p^4\ ^2D_{3/2}$	33 256.4+x	240 971.6+x		1.0 – 2	7.3+7	E	12°, 98*
480.376	5/2	5/2	33 256.4+x	241 426.0+x		3.1 – 1	1.5+9	D	12°, 98*
478.971	3/2	3/2	32 190.5+x	240 971.6+x		2.3 – 1	1.7+9	D	12°, 98*
477.930[C]	3/2	5/2	32 190.5+x	241 426.0+x		8.4 – 3	4.1+7	E	98*
449.633	$3s^23p^3\ ^2P^o_{3/2}$	$3s3p^4\ ^2P_{3/2}$	55 633.6+x	278 037.7+x					12
440.687	1/2	1/2	54 189.2+x	281 108.1+x					12
426.258	$3s^23p^3\ ^2P^o_{3/2}$	$3s3p^4\ ^2S_{1/2}$	55 633.6+x	290 233.6+x					12
423.649	1/2	1/2	54 189.2+x	290 233.6+x					12
408.528	$3s^23p^3\ ^2D^o_{5/2}$	$3s3p^4\ ^2P_{3/2}$	33 256.4+x	278 037.7+x					11, 12°
406.756	3/2	3/2	32 190.5+x	278 037.7+x					12
401.739	3/2	1/2	32 190.5+x	281 108.1+x					11, 12°
324.207	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^3P)3d\ ^2P_{3/2}$	55 633.6+x	364 082+x					11
322.698	1/2	3/2	54 189.2+x	364 082+x					11
319.463	3/2	1/2	55 633.6+x	368 663+x					11
317.992	1/2	1/2	54 189.2+x	368 663+x					11
302.272	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^2P_{3/2}$	33 256.4+x	364 082+x					11
301.297	3/2	3/2	32 190.5+x	364 082+x					11
297.197	3/2	1/2	32 190.5+x	368 663+x					11
296.072[C]	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^4P_{5/2}$	33 256.4+x	371 012		2.3 – 2	3.1+8	E	98*
295.141[C]	3/2	5/2	32 190.5+x	371 012		4.8 – 3	6.5+7	E	98*
290.971	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2D_{5/2}$	55 633.6+x	399 323+x					11
289.375	1/2	3/2	54 189.2+x	399 772+x		1.8 – 1	3.6+9	D	11°, 98*
279.940	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2P_{1/2}$	55 633.6+x	412 858+x					11
278.806	1/2	1/2	54 189.2+x	412 858+x					11
277.813	3/2	3/2	55 633.6+x	415 589+x		1.8	3.8+10	E	11°, 98*
276.701	1/2	3/2	54 189.2+x	415 589+x		4.2 – 1	9.3+9	E	11°, 98*
273.178	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)3d\ ^2D_{5/2}$	33 256.4+x	399 323+x					11
272.843	5/2	3/2	33 256.4+x	399 772+x		2.8 – 1	6.2+9	D	11°, 98*
272.369	3/2	5/2	32 190.5+x	399 323+x					11
272.037	3/2	3/2	32 190.5+x	399 772+x		1.9	4.3+10	D	11°, 98*
271.591	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2S_{1/2}$	55 633.6+x	423 834+x					11
270.530	1/2	1/2	54 189.2+x	423 834+x					11
269.533	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)3d\ ^4P_{5/2}$	0.0	371 012		4.0	6.0+10	D	11°, 98*
268.178	3/2	3/2	0.0	372 887					11
267.401	3/2	1/2	0.0	373 971					11
263.564	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1S)3d\ ^2D_{5/2}$	55 633.6+x	435 049+x					11
262.718	3/2	3/2	55 633.6+x	436 270+x					11
261.725	1/2	3/2	54 189.2+x	436 270+x					11
261.552[C]	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)3d\ ^2P_{3/2}$	33 256.4+x	415 589+x		3.9 – 2	1.0+9	E	98*
260.825[C]	3/2	3/2	32 190.5+x	415 589+x		1.2 – 2	3.1+8	E	98*
258.610	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)3d\ ^2F_{7/2}$	33 256.4+x	419 939+x		6.0	7.5+10	E	11°, 98*
258.610	3/2	5/2	32 190.5+x	418 873+x					11
171.723[L]	$3s^23p^2(^1D)3d\ ^2G_{9/2}$	$3s^23p^24f\ ^2H^o_{11/2}$							9
171.392[L]	7/2	9/2							9

Ti VIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
168.192[L]	$3s^2 3p^2 3d\ ^4F_{9/2}$	$3s^2 3p^2 4f\ ^4G^o_{11/2}$							9
168.162[L]	$_{7/2}$	$_{9/2}$							9
162.401	$3s^2 3p^3\ ^2P^o_{3/2}$	$3s^2 3p^2(^3P)4s\ ^2P_{1/2}$	55 633.6+x	671 405+x					10
162.016	$_{1/2}$	$_{1/2}$	54 189.2+x	671 405+x					10, 11°
161.290	$_{3/2}$	$_{3/2}$	55 633.6+x	675 631+x					10, 11°
160.914	$_{1/2}$	$_{3/2}$	54 189.2+x	675 631+x					10, 11°
157.528	$3s^2 3p^3\ ^2P^o_{3/2}$	$3s^2 3p^2(^1D)4s\ ^2D_{5/2}$	55 633.6+x	690 446+x					10, 11°
157.472	$_{3/2}$	$_{3/2}$	55 633.6+x	690 672+x					10, 11°
157.112	$_{1/2}$	$_{3/2}$	54 189.2+x	690 672+x					10, 11°
156.444	$3s^2 3p^3\ ^2D^o_{3/2}$	$3s^2 3p^2(^3P)4s\ ^2P_{1/2}$	32 190.5+x	671 405+x					10, 11°
155.675	$_{5/2}$	$_{3/2}$	33 256.4+x	675 631+x					10, 11°
152.164	$3s^2 3p^3\ ^2D^o_{5/2}$	$3s^2 3p^2(^1D)4s\ ^2D_{5/2}$	33 256.4+x	690 446+x					10, 11°
151.915	$_{3/2}$	$_{5/2}$	32 190.5+x	690 446+x					10, 11°
151.864	$_{3/2}$	$_{3/2}$	32 190.5+x	690 672+x					10, 11°
151.484	$3s^2 3p^3\ ^4S^o_{3/2}$	$3s^2 3p^2(^3P)4s\ ^4P_{1/2}$	0.0	660 135					10, 11°
150.867	$_{3/2}$	$_{3/2}$	0.0	662 835					10, 11°
150.039	$_{3/2}$	$_{5/2}$	0.0	666 493					10, 11°
149.981	$3s^2 3p^3\ ^2P^o_{3/2}$	$3s^2 3p^2(^1S)4s\ ^2S_{1/2}$	55 633.6+x	722 394+x					11
149.653	$_{1/2}$	$_{1/2}$	54 189.2+x	722 394+x					11

Ti IX

Wavelength (Å)	Classification: Lower	Classification: Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3359.9^{C}	$3s3p^3\ {}^3D^o_3$	$3s3p^3\ {}^3P^o_2$	201 000	230 754		M1	1.1+1	E	98*
3297.7^{C}	1	0	200 209	230 524		M1	1.3+1	E	98*
3284.6^{C}	1	1	200 209	230 645		M1	1.2+1	E	98*
1724.7^{C}	$3s^23p^2\ {}^3P_1$	$3s^23p^2\ {}^1S_0$	3 119	61 100		M1	1.2+2	E	98*
1171.4^{C}	$3s3p^3\ {}^5S^o_2$	$3s3p^3\ {}^3P^o_1$	145 280	230 645		M1	4.3+1	E	98*
1169.9^{C}	2	2	145 280	230 754		M1	7.7+1	E	98*
724.42	$3s^23p^2\ {}^3P_2$	$3s3p^3\ {}^5S^o_2$	7 282	145 280					14
703.68	1	2	3 119	145 280					14
605.79^{C}	$3s3p^3\ {}^3D^o_3$	$3s^23p3d\ {}^3D^o_3$	201 000	366 074		M1	3.1+1	E	98*
579.896	$3s^23p^2\ {}^1D_2$	$3s3p^3\ {}^3D^o_3$	28 555	201 000					12
518.331^{C}	$3s^23p^2\ {}^3P_2$	$3s3p^3\ {}^3D^o_1$	7 282	200 209		9.0 − 4	7.3+6	E	98*
518.100	2	2	7 282	200 293		1.6 − 2	7.9+7	D−	12°, 98*
516.215	2	3	7 282	201 000		2.0 − 1	6.9+8	D	12°, 98*
507.382^{C}	1	1	3 119	200 209		2.8 − 2	2.4+8	D−	98*
507.174	1	2	3 119	200 293		1.3 − 1	6.5+8	D	12°, 98*
499.479	0	1	0	200 209		5.8 − 2	5.2+8	D	12°, 98*
447.701	$3s^23p^2\ {}^3P_2$	$3s3p^3\ {}^3P^o_1$	7 282	230 645		6.0 − 2	6.5+8	D	12°, 98*
447.484	2	2	7 282	230 754		2.5 − 1	1.6+9	D	12°, 98*
439.745	1	0	3 119	230 524		6.0 − 2	2.1+9	C−	12°, 98*
439.513	1	1	3 119	230 645		6.6 − 2	7.5+8	D	12°, 98*
439.302	1	2	3 119	230 754		5.1 − 2	3.6+8	D	12°, 98*
433.567	0	1	0	230 645		5.8 − 2	6.9+8	D	12°, 98*
443.512	$3s^23p^2\ {}^1D_2$	$3s3p^3\ {}^1D^o_2$	28 555	254 028					12
405.272	$3s^23p^2\ {}^3P_2$	$3s3p^3\ {}^1D^o_2$	7 282	254 028					12
400.041	$3s^23p^2\ {}^1S_0$	$3s3p^3\ {}^1P^o_1$	61 100	311 087					11, 12°
368.482	$3s^23p^2\ {}^1D_2$	$3s3p^3\ {}^3S^o_1$	28 555	299 944					12
353.942	$3s^23p^2\ {}^1D_2$	$3s3p^3\ {}^1P^o_1$	28 555	311 087					11, 12°
341.691	$3s^23p^2\ {}^3P_2$	$3s3p^3\ {}^3S^o_1$	7 282	299 944					11, 12°
336.895	1	1	3 119	299 944					11, 12°
333.385	0	1	0	299 944					11, 12°
329.159	$3s^23p^2\ {}^3P_2$	$3s3p^3\ {}^1P^o_1$	7 282	311 087					12
324.712	1	1	3 119	311 087					11, 12°
308.568	$3s^23p^2\ {}^1D_2$	$3s^23p3d\ {}^3P^o_2$	28 555	352 632					11
304.498	2	1	28 555	356 962					11
296.280^{C}	$3s^23p^2\ {}^1D_2$	$3s^23p3d\ {}^3D^o_3$	28 555	366 074		3.7 − 2	4.0+8	E	98*
289.579	$3s^23p^2\ {}^3P_2$	$3s^23p3d\ {}^3P^o_2$	7 282	352 632					11
286.112	1	2	3 119	352 632					11
282.613	1	1	3 119	356 962					11
281.446	1	0	3 119	358 427		3.9 − 1	3.2+10	D	11°, 98*
280.141	0	1	0	356 962					11
285.128	$3s^23p^2\ {}^1S_0$	$3s^23p3d\ {}^1P^o_1$	61 100	411 820		1.5	4.1+10	D	11°, 98*
279.074	$3s^23p^2\ {}^3P_2$	$3s^23p3d\ {}^3D^o_2$	7 282	365 611					11
278.713	2	3	7 282	366 074		3.8	4.7+10	D	11°, 98*
276.785	1	1	3 119	364 414					11
275.867	1	2	3 119	365 611					11
274.411	0	1	0	364 414					11
267.941	$3s^23p^2\ {}^1D_2$	$3s^23p3d\ {}^1F^o_3$	28 555	401 771		3.8	5.1+10	C	11°, 98*
260.916	$3s^23p^2\ {}^1D_2$	$3s^23p3d\ {}^1P^o_1$	28 555	411 820					11
253.492^{C}	$3s^23p^2\ {}^3P_2$	$3s^23p3d\ {}^1F^o_3$	7 282	401 771		3.6 − 2	5.3+8	E	98*
242.825^{C}	$3s^23p^2\ {}^3P_0$	$3s^23p3d\ {}^1P^o_1$	0	411 820		3.6 − 3	1.4+8	E	98*
149.560^{L}	$3s^23p3d\ {}^3F^o_4$	$3s^23p4f\ {}^3G_5$							9

Ti IX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
147.157	$3s^23p^2\ ^1S_0$	$3s^23p4s\ ^1P^\circ_1$	61 100	740 648					11
140.443	$3s^23p^2\ ^1D_2$	$3s^23p4s\ ^1P^\circ_1$	28 555	740 648					11
138.548	$3s^23p^2\ ^3P_2$	$3s^23p4s\ ^3P^\circ_1$	7 282	729 111					11
137.991	1	0	3 119	727 806					11
137.743	1	1	3 119	729 111					11
137.377	2	2	7 282	735 208					11
137.153	0	1	0	729 111					11
136.595	1	2	3 119	735 208					11
111.345	$3s^23p^2\ ^1D_2$	$3s^23p4d\ ^1F^\circ_3$	28 555	926 660					9
110.283	$3s^23p^2\ ^3P_2$	$3s^23p4d\ ^3D^\circ_3$	7 282	914 040					9

Ti x

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
780.2	$3s3p^2\ ^2P_{3/2}$	$3p^3\ ^2D^o_{3/2}$	285 220	413 397					19°, 20
774.2	3/2	5/2	285 220	414 365					19°, 20
755.74	1/2	3/2	281 051	413 397					19°, 20
654.2	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^4P_{1/2}$	7 544	160 409					14
641.7	3/2	3/2	7 544	163 257					14
625.8	3/2	5/2	7 544	167 309					14
623.6	1/2	1/2	0	160 409					14
612.8	1/2	3/2	0	163 257					14
565.221[C]	$3s3p^2\ ^2P_{3/2}$	$3p^3\ ^2P^o_{1/2}$	285 220	462 142		4.8 − 2	4.9+8	D	98*
563.358	3/2	3/2	285 220	462 709		2.9 − 1	1.6+9	D	17°, 19, 20, 98*
552.090	1/2	1/2	281 051	462 142		1.5 − 1	1.8+9	D	17°, 19, 20, 98*
550.485[C]	1/2	3/2	281 051	462 709		1.2 − 2	6.4+7	E	98*
506.824[C]	$3s^23d\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2F^o_{5/2}$	345 859	543 166		3.4 − 2	1.5+8	E	98*
505.431[C]	3/2	5/2	345 315	543 166		2.4 − 1	1.1+9	E	98*
492.0	5/2	7/2	345 859	549 148		3.9 − 1	1.5+9	E	20°, 98*
506.0	$3s3p^2\ ^2S_{1/2}$	$3p^3\ ^2P^o_{1/2}$	264 456	462 142		3.0 − 2	3.9+8	D	19°, 20, 98*
504.19	1/2	3/2	264 456	462 709		1.6 − 1	1.2+9	D	19°, 20, 98*
498.01	$3s3p^2\ ^2D_{5/2}$	$3p^3\ ^2D^o_{3/2}$	212 608	413 397		5.5 − 2	3.7+8	E	19°, 20, 98*
496.647	3/2	3/2	212 053	413 397		2.3 − 1	1.6+9	E	17°, 19, 20, 98*
495.671	5/2	5/2	212 608	414 365		3.8 − 1	1.9+9	E	17°, 19, 20, 98*
494.286[C]	3/2	5/2	212 053	414 365		3.3 − 2	1.7+8	E	98*
497.999	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	$3p^2(^3P)3d\ ^4F_{9/2}$	507 815	708 619	3				21
489.197	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	$3p^2(^3P)3d\ ^4F_{7/2}$	501 474	705 891	2				21
488.971	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2D_{3/2}$	7 544	212 053		1.4 − 2	9.5+7	E	12°, 98*
487.654	3/2	5/2	7 544	212 608		2.3 − 1	1.1+9	D	12°, 98*
471.574	1/2	3/2	0	212 053		1.5 − 1	1.1+9	D	12°, 98*
482.302	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	$3p^2(^3P)3d\ ^2F_{7/2}$	595 023	802 362	1				21
453.641	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	$3p^2(^3P)3d\ ^4D_{7/2}$	501 474	721 913	3				21
424.901	$3s3p(^3P^o)3d\ ^4F^o_{7/2}$	$3p^2(^3P)3d\ ^4F_{5/2}$	468 204	703 548	1				21
421.352	9/2	9/2	471 285	708 619	5				21
421.025	3/2	3/2			2				21
420.82	5/2	5/2	465 910	703 548	2				21
420.737	7/2	7/2	468 204	705 891	4				21
416.69	5/2	7/2	465 910	705 891	1bl				21
415.932	7/2	9/2	468 204	708 619	1				21
410.880	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	$3p^2(^3P)3d\ ^2D_{5/2}$	595 023	838 407	2				21
409.172	5/2	3/2	596 470	840 866	1				21
410.220	$3s3p(^3P^o)3d\ ^2F^o_{7/2}$	$3p^2(^1S)3d\ ^2D_{5/2}$	549 148	792 920	3				21
407.198	5/2	3/2	543 166	788 744	2				21
408.864[C]	$3s^23d\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	345 859	590 439		8.4 − 3	8.2+7	E	98*
407.957[C]	3/2	3/2	345 315	590 439		9.6 − 3	1.0+8	E	98*
403.273	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	$3p^2(^3P)3d\ ^2D_{5/2}$	590 439	838 407	3				21
401.347	$3s^23d\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	345 859	595 023		3.1	1.8+10	E	17°, 19, 20, 98*
399.025[C]	5/2	5/2	345 859	596 470		1.3 − 1	8.7+8	E	98*
398.174	3/2	5/2	345 315	596 470		2.2	1.6+10	E	17°, 20, 98*
400.965	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	$3p^2(^3P)3d\ ^4P_{5/2}$	507 815	757 219	2				21
399.797	$3s3p^2\ ^2D_{5/2}$	$3p^3\ ^2P^o_{3/2}$	212 608	462 709		6.0 − 1	6.4+9	D	17°, 19, 20, 98*
399.797	3/2	1/2	212 053	462 142		3.8 − 1	7.8+9	D	17°, 19, 20, 98*
399.12	3/2	3/2	212 053	462 709		7.6 − 2	7.8+8	D	19°, 20, 98*
398.994	$3s3p(^3P^o)3d\ ^4F^o_{9/2}$	$3p^2(^3P)3d\ ^4D_{7/2}$	471 285	721 913	3				21
397.397	7/2	5/2	468 204	719 846	2				21
394.383	5/2	3/2	465 910	719 471	2				21
393.793	5/2	5/2	465 910	719 846	1				21

Ti x – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
397.093^L	$3s3p(^3P^o)3d\ ^4F^o_{3/2}$	$3p^2(^3P)3d\ ^2P_{1/2}$			1				21
392.012	$3s3p(^3P^o)3d\ ^4P^o_{3/2}$	$3p^2(^3P)3d\ ^4P_{3/2}$	502 940	758 024	1				21
390.016	$3s3p^2\ ^4P_{5/2}$	$3p^3\ ^4S^o_{3/2}$	167 309	423 713		1.0	1.1+10	D	15, 16°, 98*
383.913	$_{3/2}$	$_{3/2}$	163 257	423 713		6.8 – 1	7.7+9	D	15, 16°, 98*
379.780	$_{1/2}$	$_{3/2}$	160 409	423 713		3.6 – 1	4.1+9	D	15, 16°, 98*
389.237	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2S_{1/2}$	7 544	264 456		1.2 – 1	2.7+9	D	12°, 15, 98*
378.135	$_{1/2}$	$_{1/2}$	0	264 456		3.0 – 1	6.9+9	D	12°, 15, 98*
388.414	$3s3p(^3P^o)3d\ ^2F^o_{5/2}$	$3p^2(^3P)3d\ ^2F_{5/2}$	543 166	800 623	2				21
374.031	$3s^23d\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2P^o_{3/2}$	345 859	613 252					17°, 19
374.031	$_{3/2}$	$_{1/2}$	345 315	612 628		8.4 – 1	2.1+10	D	17°, 19, 20, 98*
373.3	$_{3/2}$	$_{3/2}$	345 315	613 252	bl				20
369.038	$3s^23d\ ^2D_{3/2}$	$3s3p(^1P^o)3d\ ^2D^o_{3/2}$	345 315	616 264					17°, 19, 20
368.564	$_{5/2}$	$_{5/2}$	345 859	617 188		1.6	1.3+10	E	17°, 19, 20, 98*
367.819^C	$_{3/2}$	$_{5/2}$	345 315	617 188		6.4 – 2	5.4+8	E	98*
365.628	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2P_{1/2}$	7 544	281 051		4.8 – 1	1.2+10	D	11, 12°, 98*
360.133	$_{3/2}$	$_{3/2}$	7 544	285 220		1.70	2.19+10	C–	11, 12°, 98*
355.815	$_{1/2}$	$_{1/2}$	0	281 051		5.2 – 1	1.3+10	D	11, 12°, 98*
350.610	$_{1/2}$	$_{3/2}$	0	285 220		3.44 – 1	4.68+9	C–	11, 12°, 98*
363.943	$3s3p(^1P^o)3d\ ^2F^o_{5/2}$	$3s3d^2\ ^2G_{7/2}$	596 470	871 238	2				21
361.956	$_{7/2}$	$_{9/2}$	595 023	871 300	3				21
355.119	$3s3p(^3P^o)3d\ ^2D^o_{3/2}$	$3p^2(^3P)3d\ ^2F_{5/2}$	519 034	800 623	1				21
353.026	$_{5/2}$	$_{7/2}$	519 113	802 362	1				21
346.181^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	212 608	501 474		2.3 – 2	2.1+8	E	98*
341.087	$3s3p(^1P^o)3d\ ^2D^o_{3/2}$	$3s3d^2\ ^2F_{5/2}$	616 264	909 444	2				21
338.745^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	212 608	507 815		9.0 – 3	6.5+7	E	98*
334.255	$3p^3\ ^2D^o_{5/2}$	$3p^2(^3P)3d\ ^2P_{3/2}$	414 365	713 538	2				21
333.943^C	$3s3p^2\ ^4P_{3/2}$	$3p^3\ ^2P^o_{3/2}$	163 257	462 709		6.4 – 3	9.4+7	E	98*
330.797^C	$_{1/2}$	$_{3/2}$	160 409	462 709		2.6 – 3	4.1+7	E	98*
327.634^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	285 220	590 439		5.6 – 1	8.5+9	D	98*
324.748^C	$_{3/2}$	$_{1/2}$	285 220	593 151		1.1 – 1	3.6+9	D	98*
323.219^C	$_{1/2}$	$_{3/2}$	281 051	590 439		6.6 – 2	1.1+9	D	98*
320.410^C	$_{1/2}$	$_{1/2}$	281 051	593 151		4.4 – 1	1.5+10	D	98*
326.285	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2D^o_{5/2}$	212 608	519 113					17°, 19, 20
325.743	$_{3/2}$	$_{3/2}$	212 053	519 034					17°, 19, 20
306.758	$3s3p^2\ ^2S_{1/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	264 456	590 439		1.4	2.5+10	D	17°, 19, 20, 98*
304.233	$_{1/2}$	$_{1/2}$	264 456	593 151		4.4 – 1	1.6+10	D	17°, 19, 20, 98*
305.429^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	285 220	612 628		1.54 – 1	5.5+9	C–	98*
304.867	$_{3/2}$	$_{3/2}$	285 220	613 252					17°, 20
301.589^C	$_{1/2}$	$_{1/2}$	281 051	612 628		1.8 – 1	6.7+9	D	98*
301.028	$_{1/2}$	$_{3/2}$	281 051	613 252					17°, 20
302.519^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2F^o_{5/2}$	212 608	543 166		9.6 – 2	1.2+9	E	98*
302.024	$_{3/2}$	$_{5/2}$	212 053	543 166		8.0 – 1	9.6+9	E	17°, 19, 20, 98*
297.138	$_{5/2}$	$_{7/2}$	212 608	549 148		1.1	1.1+10	E	17°, 19, 20, 98*
302.024	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2D^o_{3/2}$	285 220	616 264					17
301.254	$_{3/2}$	$_{5/2}$	285 220	617 188		3.5	4.3+10	E	17°, 19, 20, 98*
298.303	$_{1/2}$	$_{3/2}$	281 051	616 264					17°, 20
299.840	$3p^3\ ^4S^o_{3/2}$	$3p^2(^3P)3d\ ^4P_{5/2}$	423 713	757 219	2				21
299.13	$_{3/2}$	$_{3/2}$	423 713	758 024	2bl				21
298.649	$_{3/2}$	$_{1/2}$	423 713	758 554	1				21

Ti X – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
299.223	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	167 309	501 474		3.4 – 1	4.1+9	D	17°, 98*
297.972	5/2	3/2	167 309	502 940					17
295.668^C	3/2	5/2	163 257	501 474		1.1	1.4+10	D	98*
293.336^C	3/2	1/2	163 257	504 163		4.4 – 1	1.8+10	E	98*
291.938	1/2	3/2	160 409	502 940					17
290.93	1/2	1/2	160 409	504 163		1.9 – 1	7.6+9	E	17, 18°, 98*
296.339	$3p^3\ ^2D^o_{5/2}$	$3p^2(^1D)3d\ ^2D_{5/2}$	414 365	751 816	2				21
294.328	3/2	3/2	413 397	753 154	2bl				21
296.040	$3s^23p\ ^2P^o_{3/2}$	$3s^23d\ ^2D_{3/2}$	7 544	345 315		2.8 – 1	5.3+9	D	17°, 98*
295.556	3/2	5/2	7 544	345 859		2.3	2.9+10	D	11, 17°, 98*, 103
289.576	1/2	3/2	0	345 315		1.3	2.5+10	D	11, 17°, 98*, 103
293.956	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)3d\ ^4D^o_{3/2}$	167 309	507 492					17
293.665	5/2	7/2	167 309	507 815		3.1	2.97+10	C–	11, 17°, 98*
293.643^C	5/2	5/2	167 309	507 859		1.3	1.7+10	D	98*
291.037	3/2	1/2	163 257	506 849		4.0 – 2	1.6+9	E	17, 18°, 98*
290.528	3/2	3/2	163 257	507 492					11, 17°
290.226	3/2	5/2	163 257	507 859		8.4 – 1	1.1+10	D	11, 17°, 98*
288.650^C	1/2	1/2	160 409	506 849		5.8 – 1	2.3+10	E	98*
287.2	$3s3p^2\ ^2S_{1/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	264 456	612 628		2.8 – 1	1.1+10	D	20°, 98*
286.6	1/2	3/2	264 456	613 252	bl				20
261.890^C	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)3d\ ^2F^o_{7/2}$	167 309	549 148		6.6 – 3	7.9+7	E	98*
261.494	$3s3p^2\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	212 608	595 023		1.8	2.3+10	E	17°, 19, 20, 98*
260.510^C	5/2	5/2	212 608	596 470		7.8 – 2	1.3+9	E	98*
260.142	3/2	5/2	212 053	596 470		1.2	2.1+10	E	17°, 19, 20, 98*
249.641^C	$3s3p^2\ ^2D_{3/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	212 053	612 628		3.4 – 3	1.9+8	E	98*
232.542^C	$3s3p^2\ ^4P_{1/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	160 409	590 439		2.4 – 3	7.3+7	E	98*
187.35	$3s^23d\ ^2D_{3/2}$	$3s^24p\ ^2P^o_{1/2}$	345 315	879 100					19
186.96	5/2	3/2	345 859	880 700					19
149.71	$3s3p^2\ ^2D_{5/2}$	$3s^24p\ ^2P^o_{3/2}$	212 608	880 700					19
142.687	$3s^23d\ ^2D_{5/2}$	$3s^24f\ ^2F^o_{7/2}$	345 859	1 046 712					11
142.595	3/2	5/2	345 315	1 046 623					11
126.651	$3s^23p\ ^2P^o_{3/2}$	$3s^24s\ ^2S_{1/2}$	7 544	797 113					11
125.456	1/2	1/2	0	797 113					11
124.391	$3s3p^2\ ^4P_{5/2}$	$3s3p4s\ ^4P^o_{3/2}$	167 309	971 208					11
124.143	3/2	1/2	163 257	968 754					11
123.703	1/2	1/2	160 409	968 754					11
123.657	5/2	5/2	167 309	975 983					11
123.331	1/2	3/2	160 409	971 208					11
123.036	3/2	5/2	163 257	975 983					11
119.891	$3s3p^2\ ^2D_{5/2}$	$3s^24f\ ^2F^o_{7/2}$	212 608	1 046 712					11
119.822	3/2	5/2	212 053	1 046 623					11
104.568	$3s^23d\ ^2D_{5/2}$	$3s^25f\ ^2F^o_{7/2}$	345 859	1 302 204					11
104.516	3/2	5/2	345 315	1 302 125					11
102.106	$3s^23p\ ^2P^o_{3/2}$	$3s^24d\ ^2D_{5/2}$	7 544	986 919					11
101.353	1/2	3/2	0	986 655					11
91.855	$3s^23d\ ^2D_{5/2}$	$3s^26f\ ^2F^o_{7/2}$	345 859	1 434 560					11
91.806	3/2	5/2	345 315	1 434 587					11
85.262	$3s^23p\ ^2P^o_{3/2}$	$3s^25s\ ^2S_{1/2}$	7 544	1 180 390					11
84.711	1/2	1/2	0	1 180 390					11
79.105	$3s^23p\ ^2P^o_{3/2}$	$3s^25d\ ^2D_{5/2}$	7 544	1 271 680					11
78.650	1/2	3/2	0	1 271 460					11
70.625	$3s^23p\ ^2P^o_{3/2}$	$3s^26d\ ^2D_{5/2}$	7 544	1 423 470					11
70.265	1/2	3/2	0	1 423 180					11

Ti XI

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
768.468[C]	$3s3d\ ^1D_2$	$3p3d\ ^1D^o_2$	564 613	694 742		2.0 − 1	4.5+8	D	98*
667.08	$3s3p\ ^1P^o_1$	$3p^2\ ^1D_2$	258 972	408 880		3.3 − 1	9.9+8	D	15, 24°, 98*
618.44	$3s3p\ ^1P^o_1$	$3p^2\ ^3P_2$	258 972	420 667					24
568.98	$3s^2\ ^1S_0$	$3s3p\ ^3P^o_1$	0	175 747		1.3 − 3	8.9+6	E	25°, 98*, 101
545.801[C]	$3s3d\ ^3D_3$	$3p3d\ ^3F^o_2$	500 633	683 850		2.7 − 3	1.2+7	E	98*
544.38	2	2	500 161	683 850		1.2 − 1	5.4+8	D	24°, 98*
543.50	1	2	499 858	683 850		5.1 − 1	2.3+9	D	15, 24°, 98*
534.89	3	3	500 633	687 587		1.5 − 1	4.9+8	C	24°, 98*
533.54	2	3	500 161	687 587		8.5 − 1	2.8+9	C	15, 24°, 98*
522.67	3	4	500 633	691 958		1.30	3.53+9	C	15, 24°, 98*
460.39	$3s3d\ ^1D_2$	$3p3d\ ^1F^o_3$	564 613	781 821		2.7	1.3+10	D	24°, 98*
446.71	$3s3p\ ^1P^o_1$	$3p^2\ ^1S_0$	258 972	482 832		3.6 − 1	1.2+10	C	15, 24°, 98*
446.30	$3s3d\ ^3D_3$	$3p3d\ ^3P^o_2$	500 633	724 697					24
435.042[C]	1	0	499 858	729 721		2.0 − 1	7.0+9	C	98*
433.83	1	1	499 858	730 362					24
443.51	$3s3d\ ^3D_2$	$3p3d\ ^3D^o_1$	500 161	725 636					24
434.90	3	3	500 633	730 567		1.02	5.1+9	C	15, 24°, 98*
434.016[C]	2	3	500 161	730 567		1.8 − 1	9.1+8	C	98*
433.52	2	2	500 161	730 835					24
439.75	$3s3d\ ^1D_2$	$3p3d\ ^1P^o_1$	564 613	791 982		7.5 − 1	8.6+9	D	24°, 98*
439.54	$3s3p\ ^3P^o_2$	$3p^2\ ^1D_2$	181 371	408 880					24
428.94	1	2	175 747	408 880					24
429.62	$3s3p\ ^3P^o_2$	$3p^2\ ^3P_1$	181 371	414 132		4.1 − 1	4.9+9	C	24°, 98*, 100
425.78	1	0	175 747	410 610		3.3 − 1	1.2+10	C	24°, 98*, 100
419.49	1	1	175 747	414 132		2.5 − 1	3.1+9	C	24°, 98*, 100
417.89	2	2	181 371	420 667		1.12	8.6+9	C−	24°, 98*, 100
415.08	0	1	173 216	414 132		3.4 − 1	4.4+9	C	24°, 98*, 100
408.29	1	2	175 747	420 667		3.6 − 1	2.9+9	C−	24°, 98*, 100
417.734	$3p3d\ ^1P^o_1$	$3d^2\ ^1D_2$	791 982	1 031 380					28
399.218	$3p3d\ ^1F^o_3$	$3d^2\ ^1G_4$	781 821	1 032 311		3.08	1.45+10	C−	26°, 27, 28, 98*
386.14	$3s^2\ ^1S_0$	$3s3p\ ^1P^o_1$	0	258 972		9.95 − 1	1.48+10	E	22, 24°, 98*, 100
363.68	$3p^2\ ^1D_2$	$3p3d\ ^3F^o_2$	408 880	683 850					24
359.526	$3p3d\ ^3D^o_2$	$3d^2\ ^3F_3$	730 835	1 008 980					26°, 27, 28
358.386	3	4	730 567	1 009 605					26°, 27, 28
353.484	1	2	725 636	1 008 532					26°, 27, 28
359.511	$3p3d\ ^3P^o_1$	$3d^2\ ^3F_2$	730 362	1 008 532					27, 28°
351.782	2	3	724 697	1 008 980					26
349.82	$3p^2\ ^1D_2$	$3p3d\ ^1D^o_2$	408 880	694 742		1.1	1.1+10	D	15, 24°, 98*
328.92	$3p^2\ ^3P_2$	$3p3d\ ^3P^o_2$	420 667	724 697					24
322.00	1	2	414 132	724 697					24
316.87	1	0	414 132	729 721		2.1 − 1	1.4+10	C	24°, 98*
316.23	1	1	414 132	730 362					24
328.543	$3p3d\ ^3D^o_2$	$3d^2\ ^3P_2$	730 835	1 035 200					28
328.253	3	2	730 567	1 035 200					28
323.571	1	0	725 636	1 034 687					28
328.40	$3p3d\ ^3P^o_1$	$3d^2\ ^3P_1$	730 362	1 034 869					28
328.043	1	2	730 362	1 035 200					28
322.393[T]	2	1	724 697	1 034 869					28
327.18	$3s3p\ ^1P^o_1$	$3s3d\ ^1D_2$	258 972	564 613		2.3	2.9+10	D	15, 22, 24°, 98*
323.47	$3p^2\ ^1S_0$	$3p3d\ ^1P^o_1$	482 832	791 982		8.5 − 1	1.8+10	C	15, 24°, 98*

Ti XI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
322.69	$3p^2\ ^3P_2$	$3p3d\ ^3D^o_3$	420 667	730 567		2.17	1.99+10	C–	15, 24°, 98*
322.40	2	2	420 667	730 835					24
317.43	0	1	410 610	725 636					24
315.75	1	2	414 132	730 835					24
314.805	$3p3d\ ^3F^o_4$	$3d^2\ ^3F_4$	691 958	1 009 605					26°, 27, 28
311.144	3	3	687 587	1 008 980					26°, 27, 28
307.996	2	2	683 850	1 008 532					26°, 27, 28
313.985[C]	$3s3p\ ^3P^o_2$	$3s3d\ ^3D_1$	181 371	499 858		2.0 – 2	4.5+8	D	98*
313.69	2	2	181 371	500 161		2.9 – 1	3.9+9	C	22, 24°, 98*
313.22	2	3	181 371	500 633		1.7	1.6+10	C	15, 22, 24°, 98*
308.53	1	1	175 747	499 858		3.0 – 1	7.0+9	C	22, 24°, 98*
308.24	1	2	175 747	500 161		9.0 – 1	1.3+10	C	15, 22, 24°, 98*
306.14	0	1	173 216	499 858		4.0 – 1	9.5+9	C	22, 24°, 98*
310.85	$3p^2\ ^1D_2$	$3p3d\ ^3D^o_3$	408 880	730 567					24
297.055	$3p3d\ ^1D^o_2$	$3d^2\ ^1D_2$	694 742	1 031 380					26
268.13	$3p^2\ ^1D_2$	$3p3d\ ^1F^o_3$	408 880	781 821		1.3	1.8+10	D	24°, 98*
261.027[C]	$3p^2\ ^1D_2$	$3p3d\ ^1P^o_1$	408 880	791 982		7.5 – 3	2.4+8	E	98*
135.179	$3s3d\ ^1D_2$	$3s4f\ ^1F^o_3$	564 613	1 304 360					22
134.704	$3p3d\ ^1F^o_3$	$3p4f\ ^1G_4$	781 821	1 524 190					30°, 31
129.055	$3p3d\ ^3D^o_3$	$3p4f\ ^3F_4$	730 567	1 505 420					30
127.268	$3p3d\ ^3D^o_2$	$3p4f\ ^3D_2$	730 835	1 516 580					30
126.042	$3s3d\ ^3D_3$	$3s4f\ ^3F^o_4$	500 633	1 294 040					22
125.979	2	3	500 161	1 293 940					22
125.940	1	2	499 858	1 293 870					22
124.138	$3p3d\ ^1D^o_2$	$3p4f\ ^3F_3$	694 742	1 500 290					30
123.946	$3s3p\ ^1P^o_1$	$3s4s\ ^1S_0$	258 972	1 065 780					22
123.070	$3p3d\ ^3F^o_3$	$3p4f\ ^3G_4$	687 587	1 500 130					30
122.905	4	5	691 958	1 505 620					30
117.171	$3p^2\ ^3P_1$	$3p4s\ ^3P^o_0$	414 132	1 267 600					22
116.910	2	2	420 667	1 276 040					22
116.387	0	1	410 610	1 269 840					22
116.028	1	2	414 132	1 276 040					22
115.015	$3s3p\ ^3P^o_2$	$3s4s\ ^3S_1$	181 371	1 050 850					22
114.272	1	1	175 747	1 050 850					22
113.940	0	1	173 216	1 050 850					22
111.664	$3p^2\ ^1D_2$	$3s4f\ ^1F^o_3$	408 880	1 304 360					22
110.019	$3s3d\ ^1D_2$	$3p4d\ ^1F^o_3$	564 613	1 473 630					29
100.835	$3p^2\ ^1S_0$	$3p4d\ ^1P^o_1$	482 832	1 474 550					29
100.591	$3s3p\ ^1P^o_1$	$3s4d\ ^1D_2$	258 972	1 253 100					22
96.731[T]	$3p^2\ ^3P_2$	$3p4d\ ^3D^o_3$	420 667	1 454 460?					29
96.246	1	1	414 132	1 453 090					29
95.929	0	1	410 610	1 453 090					29
96.288	$3s3d\ ^1D_2$	$3s5f\ ^1F^o_3$	564 613	1 603 140					22
94.085	$3s3p\ ^3P^o_2$	$3s4d\ ^3D_2$	181 371	1 244 260					22
94.053	2	3	181 371	1 244 630					22
93.626	1	1	175 747	1 243 920					22
93.589	1	2	175 747	1 244 260					22
93.395	0	1	173 216	1 243 920					22
93.909	$3p^2\ ^1D_2$	$3p4d\ ^1F^o_3$	408 880	1 473 630					29
90.966	$3s3d\ ^3D_3$	$3s5f\ ^3F^o_4$	500 633	1 599 960					22
90.927	2	3	500 161	1 599 940					22
90.908	1	2	499 858	1 599 850					22

Ti XI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
87.725	$3s^2\ ^1S_0$	$3s4p\ ^1P^o_1$	0	1 139 920		2.94 − 1	8.5+10	C	22°, 98*
85.290	$3s3p\ ^3P^o_2$	$3p4p\ ^3D_3$	181 371	1 353 860					22
85.290	1	2	175 747	1 348 220					22
85.290	0	1	173 216	1 345 690					22
85.114	$3s3p\ ^3P^o_2$	$3p4p\ ^3P_1$	181 371	1 356 280					22
84.876	1	0	175 747	1 353 940					22
84.835	2	2	181 371	1 360 140					22
84.525	0	1	173 216	1 356 280					22
84.433	1	2	175 747	1 360 140					22
84.711	$3s3p\ ^3P^o_2$	$3p4p\ ^3S_1$	181 371	1 361 780					22
84.321	1	1	175 747	1 361 780					22
83.732	$3p^2\ ^1D_2$	$3s5f\ ^1F^o_3$	408 880	1 603 140					22
81.119	$3s3p\ ^1P^o_1$	$3s5s\ ^1S_0$	258 972	1 491 740					22
79.076	$3s3d\ ^3D_3$	$3s6f\ ^3F^o_4$	500 633	1 765 260					22
79.027	2	3	500 161	1 765 550					22
79.027	1	2	499 858	1 765 250					22
76.731	$3s3p\ ^3P^o_2$	$3s5s\ ^3S_1$	181 371	1 484 620					22
76.403	1	1	175 747	1 484 620					22
75.415	$3s3p\ ^1P^o_1$	$3s5d\ ^1D_2$	258 972	1 584 970					22
71.603	$3s3p\ ^3P^o_2$	$3s5d\ ^3D_3$	181 371	1 577 980					22
71.603	2	2	181 371	1 577 820					22
71.323	1	2	175 747	1 577 820					22
71.323	1	1	175 747	1 577 670					22
71.201	0	1	173 216	1 577 670					22
65.403	$3s^2\ ^1S_0$	$3s5p\ ^1P^o_1$	0	1 528 980		9.9 − 2	5.1+10	C	22°, 98*
57.891	$3s^2\ ^1S_0$	$3s6p\ ^1P^o_1$	0	1 727 380					22
54.322	$3s^2\ ^1S_0$	$3s7p\ ^1P^o_1$	0	1 840 880					22

Ti XII

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1322.58	$2p^6 7h\ ^2H^o$	$2p^6 8i\ ^2I$	2 028 510	2 104 120					36
1322.58	$2p^6 7i\ ^2I$	$2p^6 8k\ ^2K^o$	2 028 590	2 104 200					36
1321.08	$2p^6 7g\ ^2G$	$2p^6 8h\ ^2H^o$	2 028 360	2 104 060					36
1308.42	$2p^6 7f\ ^2F^o$	$2p^6 8g\ ^2G$	2 027 670	2 104 100					36
1237.4[C]	$2p^6 4s\ ^2S_{1/2}$	$2p^6 4p\ ^2P^o_{1/2}$	1 133 573	1 214 390		4.4 − 1	9.6+8	C	98*
1188.7[C]	1/2	3/2	1 133 573	1 217 700		9.0 − 1	1.1+9	C	98*
964.35	$2p^6 4p\ ^2P^o_{3/2}$	$2p^6 4d\ ^2D_{3/2}$	1 217 700	1 321 400		2.1 − 1	3.7+8	C	36°, 98*
959.945	3/2	5/2	1 217 700	1 321 870		1.9	2.3+9	C	33°, 98*
934.50	1/2	3/2	1 214 390	1 321 400		1.1	2.1+9	C	36°, 98*
961.41	$2p^6 6d\ ^2D$	$2p^6 7p\ ^2P^o$	1 899 530	2 003 550					36
858.43	$2p^6 6h\ ^2H^o$	$2p^6 7i\ ^2I$	1 912 100	2 028 590					36
857.55	$2p^6 6g\ ^2G$	$2p^6 7h\ ^2H^o$	1 911 900	2 028 510					36
849.54	$2p^6 6f\ ^2F^o$	$2p^6 7g\ ^2G$	1 910 650	2 028 360					36
780.37	$2p^6 6d\ ^2D$	$2p^6 7f\ ^2F^o$	1 899 530	2 027 670					36
670.13	$2p^6 6p\ ^2P^o_{3/2}$	$2p^6 7d\ ^2D$	1 871 440	2 020 670					36
576.50	$2p^6 5d\ ^2D_{3/2}$	$2p^6 6p\ ^2P^o_{1/2}$	1 697 110	1 870 570		5.96 − 1	6.0+9	C	36°, 98*
574.85	5/2	3/2	1 697 480	1 871 440		1.07	5.4+9	C	36°, 98*
573.62	3/2	3/2	1 697 110	1 871 440		1.2 − 1	6.2+8	D	36°, 98*
517.26	$2p^6 5g\ ^2G$	$2p^6 6h\ ^2H^o$	1 718 770	1 912 100					36
512.64	$2p^6 5f\ ^2F^o$	$2p^6 6g\ ^2G$	1 716 830	1 911 900					36
496.97	$2p^6 5p\ ^2P^o_{3/2}$	$2p^6 6s\ ^2S_{1/2}$	1 647 440	1 848 660		6.92 − 1	9.3+9	C	36°, 98*
492.80	1/2	1/2	1 645 740	1 848 660		3.4 − 1	4.7+9	C	36°, 98*
479.883[S]	$2p^6 3s\ ^2S_{1/2}$	$2p^6 3p\ ^2P^o_{1/2}$	0	208 384		3.04 − 1	4.40+9	B	33, 35°, 98*
460.746[S]	1/2	3/2	0	217 039		6.40 − 1	5.02+9	B	33, 35°, 98*
469.11[C]	$2p^6 5d\ ^2D_{5/2}$	$2p^6 6f\ ^2F^o_{5/2}$	1 697 480	1 910 650		1.7 − 1	8.8+8	D	98*
469.11[C]	5/2	7/2	1 697 480	1 910 650		3.5	1.3+10	C	98*
468.78			1 697 300	1 910 650					36
468.30[C]	3/2	5/2	1 697 110	1 910 650		2.5	1.2+10	C	98*
396.68[C]	$2p^6 5p\ ^2P^o_{3/2}$	$2p^6 6d\ ^2D_{3/2}$	1 647 440	1 899 530		7.2 − 2	7.5+8	D	98*
396.68[C]	3/2	5/2	1 647 440	1 899 530		6.4 − 1	4.5+9	C	98*
394.03[C]	1/2	3/2	1 645 740	1 899 530		3.54 − 1	3.80+9	C	98*
378.20[C]	$2p^6 5s\ ^2S_{1/2}$	$2p^6 6p\ ^2P^o_{1/2}$	1 606 160	1 870 570		1.3 − 1	3.12+9	C	98*
376.96[C]	1/2	3/2	1 606 160	1 871 440		2.66 − 1	3.13+9	C	98*
351.012[S]	$2p^6 3p\ ^2P^o_{3/2}$	$2p^6 3d\ ^2D_{3/2}$	217 039	501 927		1.45 − 1	1.97+9	B	33, 35°, 98*
349.917[S]	3/2	5/2	217 039	502 821		1.3	1.2+10	B	33, 35°, 98*
340.668[S]	1/2	3/2	208 384	501 927		7.52 − 1	1.08+10	B	33, 35°, 98*
329.12[C]	$2p^6 5f\ ^2F^o_{5/2}$	$2p^6 7d\ ^2D_{3/2}$	1 716 830	2 020 670		5.2 − 2	7.9+8	D	98*
329.12[C]	7/2	5/2	1 716 830	2 020 670		7.4 − 2	7.6+8	D	98*
329.12[C]	5/2	5/2	1 716 830	2 020 670		3.7 − 3	3.8+7	E	98*
326.72[C]	$2p^6 5d\ ^2D_{5/2}$	$2p^6 7p\ ^2P^o_{3/2}$	1 697 480	2 003 550		1.77 − 1	2.76+9	C	98*
326.33[C]	3/2	1/2	1 697 110	2 003 550		9.88 − 2	3.09+9	C	98*
326.33[C]	3/2	3/2	1 697 110	2 003 550		2.0 − 2	3.1+8	D	98*
324.87[L]	$2p^5 3s3p\ ^4D_{7/2}$	$2p^5 3s3d\ ^4F^o_{9/2}$							38
320.94	$2p^6 5f\ ^2F^o$	$2p^6 7g\ ^2G$	1 716 830	2 028 360					36

Ti XII – Continued

Wavelength (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
308.32^{C}	$2p^6 4d\ ^2D_{3/2}$	$2p^6 5p\ ^2P^o_{1/2}$	1 321 400	1 645 740		3.8 − 1	1.31+10	C	98*
307.15^{C}	5/2	3/2	1 321 870	1 647 440		6.6 − 1	1.2+10	C	98*
306.71^{C}	3/2	3/2	1 321 400	1 647 440		7.6 − 2	1.3+9	D	98*
302.86^{C}	$2p^6 5d\ ^2D_{5/2}$	$2p^6 7f\ ^2F^o_{5/2}$	1 697 480	2 027 670		4.9 − 2	6.0+8	D	98*
302.86^{C}	5/2	7/2	1 697 480	2 027 670		9.6 − 1	8.9+9	C	98*
302.52^{C}	3/2	5/2	1 697 110	2 027 670		6.8 − 1	8.3+9	C	98*
296.95^{C}	$2p^6 4f\ ^2F^o_{5/2}$	$2p^6 5d\ ^2D_{3/2}$	1 360 350	1 697 110		1.19 − 1	2.25+9	C	98*
296.75^{C}	7/2	5/2	1 360 500	1 697 480		1.69 − 1	2.13+9	C	98*
296.62^{C}	5/2	5/2	1 360 350	1 697 480		8.4 − 3	1.1+8	D	98*
292.77^{C}	$2p^6 5p\ ^2P^o_{3/2}$	$2p^6 7s\ ^2S_{1/2}$	1 647 440	1 989 000		1.32 − 1	5.1+9	C	98*
291.32^{C}	1/2	1/2	1 645 740	1 989 000		6.6 − 2	2.6+9	C	98*
279.03	$2p^6 4f\ ^2F^o$	$2p^6 5g\ ^2G$	1 360 430	1 718 770					36
267.93^{C}	$2p^6 5p\ ^2P^o_{3/2}$	$2p^6 7d\ ^2D_{3/2}$	1 647 440	2 020 670		2.7 − 2	6.3+8	D	98*
267.93^{C}	3/2	5/2	1 647 440	2 020 670		2.5 − 1	3.9+9	C	98*
266.72^{C}	1/2	3/2	1 645 740	2 020 670		1.4 − 1	3.2+9	C	98*
258.24	$2p^6 5f\ ^2F^o$	$2p^6 8g\ ^2G$	1 716 830	2 104 100					36
257.43^{C}	$2p^6 4p\ ^2P^o_{3/2}$	$2p^6 5s\ ^2S_{1/2}$	1 217 700	1 606 160		4.8 − 1	2.4+10	C	98*
255.25^{C}	1/2	1/2	1 214 390	1 606 160		2.4 − 1	1.3+10	C	98*
256.45^{C}	$2p^6 5d\ ^2D_{5/2}$	$2p^6 8p\ ^2P^o_{3/2}$	1 697 480	2 087 420		6.6 − 2	1.7+9	C	98*
256.21^{C}	3/2	1/2	1 697 110	2 087 420		3.6 − 2	1.8+9	D	98*
256.21^{C}	3/2	3/2	1 697 110	2 087 420		7.2 − 3	1.8+8	D	98*
253.19^{C}	$2p^6 4d\ ^2D_{5/2}$	$2p^6 5f\ ^2F^o_{5/2}$	1 321 870	1 716 830		2.0 − 1	3.5+9	D	98*
253.19^{C}	5/2	7/2	1 321 870	1 716 830		4.0	5.2+10	C	98*
253.07			1 321 640	1 716 830					36
252.89^{C}	3/2	5/2	1 321 400	1 716 830		2.8	4.8+10	C	98*
246.20^{C}	$2p^6 5d\ ^2D_{5/2}$	$2p^6 8f\ ^2F^o_{5/2}$	1 697 480	2 103 660		2.2 − 2	4.1+8	D	98*
246.20^{C}	5/2	7/2	1 697 480	2 103 660		4.3 − 1	5.9+9	C	98*
245.97^{C}	3/2	5/2	1 697 110	2 103 660		3.1 − 1	5.7+9	C	98*
233.62^{C}	$2p^6 4p\ ^2P^o_{3/2}$	$2p^6 5p\ ^2P^o_{1/2}$	1 217 700	1 645 740		E2	2.05+6	C	98*
232.70^{C}	3/2	3/2	1 217 700	1 647 440		E2	1.05+6	C	98*
230.92^{C}	1/2	3/2	1 214 390	1 647 440		E2	1.09+6	C	98*
221.50^{C}	$2p^6 5p\ ^2P^o_{3/2}$	$2p^6 8d\ ^2D_{5/2}$	1 647 440	2 098 900		1.2 − 1	2.8+9	C	98*
221.50^{C}	3/2	3/2	1 647 440	2 098 900		1.4 − 2	4.7+8	D	98*
220.67^{C}	1/2	3/2	1 645 740	2 098 900		6.8 − 2	2.4+9	C	98*
208.59^{C}	$2p^6 4p\ ^2P^o_{3/2}$	$2p^6 5d\ ^2D_{3/2}$	1 217 700	1 697 110		7.6 − 2	3.0+9	D	98*
208.45	3/2	5/2	1 217 700	1 697 480		6.8 − 1	1.8+10	C	36°, 98*
207.16^{C}	1/2	3/2	1 214 390	1 697 110		4.0 − 1	1.5+10	C	98*
200.35^{C}	$2p^6 4p\ ^2P^o_{3/2}$	$2p^6 5f\ ^2F^o_{5/2}$	1 217 700	1 716 830		E2	1.27+6	C−	98*
200.35^{C}	3/2	7/2	1 217 700	1 716 830		E2	5.7+6	C	98*
199.03^{C}	1/2	5/2	1 214 390	1 716 830		E2	4.6+6	C	98*
195.25^{C}	$2p^6 4s\ ^2S_{1/2}$	$2p^6 5p\ ^2P^o_{1/2}$	1 133 573	1 645 740		1.2 − 1	1.1+10	C	98*
194.60^{C}	1/2	3/2	1 133 573	1 647 440		2.52 − 1	1.11+10	C	98*
182.09^{C}	$2p^6 4d\ ^2D_{3/2}$	$2p^6 6p\ ^2P^o_{1/2}$	1 321 400	1 870 570		6.04 − 2	6.1+9	C	98*
181.96^{C}	5/2	3/2	1 321 870	1 871 440		1.1 − 1	5.5+9	C	98*
181.80^{C}	3/2	3/2	1 321 400	1 871 440		1.2 − 2	6.2+8	D	98*
181.28	$2p^6 4f\ ^2F^o$	$2p^6 6g\ ^2G$	1 360 430	1 911 900					36
177.45^{C}	$2p^6 4s\ ^2S_{1/2}$	$2p^6 5d\ ^2D_{3/2}$	1 133 573	1 697 110		E2	2.57+6	C	98*
177.33^{C}	1/2	5/2	1 133 573	1 697 480		E2	2.58+6	C	98*

Ti XII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
169.84[C]	$2p^64d\ ^2D_{5/2}$	$2p^66f\ ^2F^o_{5/2}$	1 321 870	1 910 650		5.0 − 2	1.9+9	D	98*
169.84[C]	$_{5/2}$	$_{7/2}$	1 321 870	1 910 650		1.0	2.9+10	C	98*
169.81			1 321 640	1 910 650					36
169.71[C]	$_{3/2}$	$_{5/2}$	1 321 400	1 910 650		7.2 − 1	2.8+10	C	98*
158.54[C]	$2p^63d\ ^2D_{5/2}$	$2p^64s\ ^2S_{1/2}$	502 821	1 133 573		E2	2.13+6	C	98*
158.32[C]	$_{3/2}$	$_{1/2}$	501 927	1 133 573		E2	1.44+6	C	98*
158.49[C]	$2p^64p\ ^2P^o_{3/2}$	$2p^66s\ ^2S_{1/2}$	1 217 700	1 848 660		9.2 − 2	1.2+10	C	98*
157.66[C]	$_{1/2}$	$_{1/2}$	1 214 390	1 848 660		4.6 − 2	6.2+9	C	98*
153.17[C]	$2p^64p\ ^2P^o_{3/2}$	$2p^66p\ ^2P^o_{1/2}$	1 217 700	1 870 570		E2	1.32+6	C	98*
151.48[C]	$2p^64f\ ^2F^o_{7/2}$	$2p^67d\ ^2D_{5/2}$	1 360 500	2 020 670		9.6 − 3	4.7+8	D	98*
151.44[C]	$_{5/2}$	$_{3/2}$	1 360 350	2 020 670		6.6 − 3	4.8+8	D	98*
151.44[C]	$_{5/2}$	$_{5/2}$	1 360 350	2 020 670		4.8 − 4	2.3+7	E	98*
146.70[C]	$2p^64d\ ^2D_{5/2}$	$2p^67p\ ^2P^o_{3/2}$	1 321 870	2 003 550		4.0 − 2	3.0+9	D	98*
146.60[C]	$_{3/2}$	$_{1/2}$	1 321 400	2 003 550		2.3 − 2	3.5+9	D	98*
146.60[C]	$_{3/2}$	$_{3/2}$	1 321 400	2 003 550		4.4 − 3	3.4+8	E	98*
146.66[C]	$2p^64p\ ^2P^o_{3/2}$	$2p^66d\ ^2D_{3/2}$	1 217 700	1 899 530		2.9 − 2	2.2+9	D	98*
146.66[C]	$_{3/2}$	$_{5/2}$	1 217 700	1 899 530		2.7 − 1	1.4+10	C	98*
145.96[C]	$_{1/2}$	$_{3/2}$	1 214 390	1 899 530		1.5 − 1	1.1+10	C	98*
144.31[C]	$2p^64p\ ^2P^o_{3/2}$	$2p^66f\ ^2F^o_{5/2}$	1 217 700	1 910 650		E2	6.3+5	C−	98*
144.31[C]	$_{3/2}$	$_{7/2}$	1 217 700	1 910 650		E2	2.9+6	C	98*
143.62[C]	$_{1/2}$	$_{5/2}$	1 214 390	1 910 650		E2	2.26+6	C	98*
141.68[C]	$2p^64d\ ^2D_{5/2}$	$2p^67f\ ^2F^o_{5/2}$	1 321 870	2 027 670		2.1 − 2	1.2+9	D	98*
141.68[C]	$_{5/2}$	$_{7/2}$	1 321 870	2 027 670		4.1 − 1	1.7+10	C	98*
141.59[C]	$_{3/2}$	$_{5/2}$	1 321 400	2 027 670		3.0 − 1	1.7+10	C	98*
140.361	$2p^63d\ ^2D_{3/2}$	$2p^64p\ ^2P^o_{1/2}$	501 927	1 214 390		1.7 − 1	2.9+10	C	33°, 98*
139.884	$_{5/2}$	$_{3/2}$	502 821	1 217 700		3.1 − 1	2.6+10	C	33°, 98*
139.71[C]	$_{3/2}$	$_{3/2}$	501 927	1 217 700		3.5 − 2	3.0+9	D	98*
135.69[C]	$2p^64s\ ^2S_{1/2}$	$2p^66p\ ^2P^o_{1/2}$	1 133 573	1 870 570		4.0 − 2	7.3+9	C	98*
135.53[C]	$_{1/2}$	$_{3/2}$	1 133 573	1 871 440		8.2 − 2	7.5+9	C	98*
130.63[C]	$2p^64d\ ^2D_{5/2}$	$2p^68p\ ^2P^o_{3/2}$	1 321 870	2 087 420		2.0 − 2	1.9+9	D	98*
130.54[C]	$_{3/2}$	$_{1/2}$	1 321 400	2 087 420		1.1 − 2	2.1+9	D	98*
130.54[C]	$_{3/2}$	$_{3/2}$	1 321 400	2 087 420		2.2 − 3	2.1+8	E	98*
130.56[C]	$2p^64s\ ^2S_{1/2}$	$2p^66d\ ^2D_{3/2}$	1 133 573	1 899 530		E2	1.98+6	C	98*
130.56[C]	$_{1/2}$	$_{5/2}$	1 133 573	1 899 530		E2	1.98+6	C	98*
129.65[C]	$2p^64p\ ^2P^o_{3/2}$	$2p^67s\ ^2S_{1/2}$	1 217 700	1 989 000		3.5 − 2	7.0+9	D	98*
129.10[C]	$_{1/2}$	$_{1/2}$	1 214 390	1 989 000		1.8 − 2	3.6+9	D	98*
127.91[C]	$2p^64d\ ^2D_{5/2}$	$2p^68f\ ^2F^o_{7/2}$	1 321 870	2 103 660		2.2 − 1	1.1+10	C	98*
127.91[C]	$_{5/2}$	$_{5/2}$	1 321 870	2 103 660		1.1 − 2	7.6+8	D	98*
127.84			1 321 640	2 103 660					36
127.83[C]	$_{3/2}$	$_{5/2}$	1 321 400	2 103 660		1.6 − 1	1.1+10	C	98*
124.54[C]	$2p^64p\ ^2P^o_{3/2}$	$2p^67d\ ^2D_{3/2}$	1 217 700	2 020 670		1.4 − 2	1.5+9	D	98*
124.54[C]	$_{3/2}$	$_{5/2}$	1 217 700	2 020 670		1.3 − 1	9.3+9	C	98*
124.03[C]	$_{1/2}$	$_{3/2}$	1 214 390	2 020 670		7.4 − 2	8.0+9	C	98*
123.46[C]	$2p^64p\ ^2P^o_{3/2}$	$2p^67f\ ^2F^o_{7/2}$	1 217 700	2 027 670		E2	1.45+6	C	98*
122.96[C]	$_{1/2}$	$_{5/2}$	1 214 390	2 027 670		E2	1.15+6	C	98*
122.16[C]	$2p^63d\ ^2D_{5/2}$	$2p^64d\ ^2D_{3/2}$	502 821	1 321 400		E2	1.2+6	D	98*
122.09[C]	$_{5/2}$	$_{5/2}$	502 821	1 321 870		E2	3.20+6	C	98*
122.03[C]	$_{3/2}$	$_{3/2}$	501 927	1 321 400		E2	2.81+6	C	98*
116.61[C]	$2p^63d\ ^2D_{5/2}$	$2p^64f\ ^2F^o_{5/2}$	502 821	1 360 350		2.6 − 1	2.1+10	D	98*
116.594[S]	$_{5/2}$	$_{7/2}$	502 821	1 360 500		5.2	3.2+11	C	33, 35°, 98*
116.493[S]	$_{3/2}$	$_{5/2}$	501 927	1 360 350		3.6	3.0+11	C	33, 35°, 98*

Ti XII – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
113.48^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^68d\ ^2D_{5/2}$	1 217 700	2 098 900		7.52 − 2	6.5+9	C	98*
113.48^{C}	$3/2$	$3/2$	1 217 700	2 098 900		8.4 − 3	1.1+9	D	98*
113.06^{C}	$1/2$	$3/2$	1 214 390	2 098 900		4.18 − 2	5.5+9	C	98*
112.73^{C}	$2p^64s\ ^2S_{1/2}$	$2p^67d\ ^2D_{3/2}$	1 133 573	2 020 670		E2	1.4+6	D	98*
112.73^{C}	$1/2$	$5/2$	1 133 573	2 020 670		E2	1.4+6	D	98*
109.107	$2p^63p\ ^2P^o_{3/2}$	$2p^64s\ ^2S_{1/2}$	217 039	1 133 573					33
108.086	$1/2$	$1/2$	208 384	1 133 573					33
100.266^{C}	$2p^63p\ ^2P^o_{3/2}$	$2p^64p\ ^2P^o_{1/2}$	217 039	1 214 390		E2	1.36+7	C	98*
99.934^{C}	$3/2$	$3/2$	217 039	1 217 700		E2	6.9+6	C	98*
99.077^{C}	$1/2$	$3/2$	208 384	1 217 700		E2	7.2+6	C	98*
90.547	$2p^63p\ ^2P^o_{3/2}$	$2p^64d\ ^2D_{3/2}$	217 039	1 321 400		9.2 − 2	1.9+10	D	33°, 98*
90.512	$3/2$	$5/2$	217 039	1 321 870		8.56 − 1	1.16+11	C	33°, 98*
89.844	$1/2$	$3/2$	208 384	1 321 400		4.8 − 1	9.9+10	C	33°, 98*
87.465^{C}	$2p^63p\ ^2P^o_{3/2}$	$2p^64f\ ^2F^o_{5/2}$	217 039	1 360 350		E2	1.23+7	C−	98*
87.454^{C}	$3/2$	$7/2$	217 039	1 360 500		E2	5.5+7	C	98*
86.808^{C}	$1/2$	$5/2$	208 384	1 360 350		E2	4.5+7	C	98*
87.426	$2p^63d\ ^2D_{3/2}$	$2p^65p\ ^2P^o_{1/2}$	501 927	1 645 740		2.5 − 2	1.1+10	D	33°, 98*
87.364	$5/2$	$3/2$	502 821	1 647 440		4.5 − 2	9.9+9	D	33°, 98*
87.297^{C}	$3/2$	$3/2$	501 927	1 647 440		5.2 − 3	1.1+9	E	98*
83.706^{C}	$2p^63d\ ^2D_{5/2}$	$2p^65d\ ^2D_{5/2}$	502 821	1 697 480		E2	1.5+6	D	98*
83.669^{C}	$3/2$	$3/2$	501 927	1 697 110		E2	1.3+6	D	98*
82.372^{C}	$2p^63d\ ^2D_{5/2}$	$2p^65f\ ^2F^o_{5/2}$	502 821	1 716 830		4.8 − 2	7.9+9	D	98*
82.368	$5/2$	$7/2$	502 821	1 716 830		9.78 − 1	1.2+11	C	33°, 98*
82.307	$3/2$	$5/2$	501 927	1 716 830		6.88 − 1	1.13+11	D	33°, 98*
82.344	$2p^63s\ ^2S_{1/2}$	$2p^64p\ ^2P^o_{1/2}$	0	1 214 390		1.2 − 1	5.8+10	C	33°, 98*
82.121	$1/2$	$3/2$	0	1 217 700		2.4 − 1	5.9+10	C	33°, 98*
75.677^{C}	$2p^63s\ ^2S_{1/2}$	$2p^64d\ ^2D_{3/2}$	0	1 321 400		E2	2.74+7	C	98*
75.650^{C}	$1/2$	$5/2$	0	1 321 870		E2	2.76+7	C	98*
73.066^{C}	$2p^63d\ ^2D_{5/2}$	$2p^66p\ ^2P^o_{3/2}$	502 821	1 871 440		1.7 − 2	5.2+9	D	98*
73.065^{C}	$3/2$	$1/2$	501 927	1 870 570		9.2 − 3	5.7+9	D	98*
73.019^{C}	$3/2$	$3/2$	501 927	1 871 440		1.9 − 3	5.9+8	E	98*
71.987	$2p^63p\ ^2P^o_{3/2}$	$2p^65s\ ^2S_{1/2}$	217 039	1 606 160		5.40 − 2	3.48+10	C	33°, 98*
71.545	$1/2$	$1/2$	208 384	1 606 160		2.8 − 2	1.8+10	C	33°, 98*
71.031^{C}	$2p^63d\ ^2D_{5/2}$	$2p^66f\ ^2F^o_{5/2}$	502 821	1 910 650		1.9 − 2	4.1+9	D	98*
71.031	$5/2$	$7/2$	502 821	1 910 650		3.7 − 1	6.1+10	C	33°, 98*
70.986	$3/2$	$5/2$	501 927	1 910 650		2.6 − 1	5.7+10	C	33°, 98*
69.994^{C}	$2p^63p\ ^2P^o_{3/2}$	$2p^65p\ ^2P^o_{1/2}$	217 039	1 645 740		E2	7.5+6	D	98*
69.910^{C}	$3/2$	$3/2$	217 039	1 647 440		E2	3.8+6	D	98*
69.490^{C}	$1/2$	$3/2$	208 384	1 647 440		E2	3.9+6	D	98*
67.564^{C}	$2p^63p\ ^2P^o_{3/2}$	$2p^65d\ ^2D_{3/2}$	217 039	1 697 110		3.3 − 2	1.2+10	D	98*
67.555	$3/2$	$5/2$	217 039	1 697 480		3.0 − 1	7.2+10	C	33°, 98*
67.171	$1/2$	$3/2$	208 384	1 697 110		1.7 − 1	6.2+10	C	33°, 98*
66.676^{C}	$2p^63p\ ^2P^o_{3/2}$	$2p^65f\ ^2F^o_{5/2}$	217 039	1 716 830		E2	2.8+6	E	98*
66.676^{C}	$3/2$	$7/2$	217 039	1 716 830		E2	1.2+7	D	98*
66.293^{C}	$1/2$	$5/2$	208 384	1 716 830		E2	9.8+6	D	98*
66.634^{C}	$2p^63d\ ^2D_{5/2}$	$2p^67p\ ^2P^o_{3/2}$	502 821	2 003 550		7.8 − 3	2.9+9	D	98*
66.595^{C}	$3/2$	$1/2$	501 927	2 003 550		4.4 − 3	3.3+9	D	98*
66.595^{C}	$3/2$	$3/2$	501 927	2 003 550		8.8 − 4	3.3+8	E	98*
65.580^{C}	$2p^63d\ ^2D_{5/2}$	$2p^67f\ ^2F^o_{5/2}$	502 821	2 027 670		9.0 − 3	2.3+9	D	98*
65.577	$5/2$	$7/2$	502 821	2 027 670		1.8 − 1	3.5+10	C	33°, 98*
65.540	$3/2$	$5/2$	501 927	2 027 670		1.2 − 1	3.2+10	C	33°, 98*

Ti XII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
63.107^{C}	$2p^63d\ ^2D_{5/2}$	$2p^68p\ ^2P^o_{3/2}$	502 821	2 087 420		4.6 – 3	1.9+9	E	98*
63.072^{C}	$_{3/2}$	$_{1/2}$	501 927	2 087 420		2.6 – 3	2.1+9	E	98*
63.072^{C}	$_{3/2}$	$_{3/2}$	501 927	2 087 420		5.2 – 4	2.2+8	E	98*
62.470	$2p^63d\ ^2D_{5/2}$	$2p^68f\ ^2F^o_{7/2}$	502 821	2 103 660		1.04 – 1	2.22+10	C	33°, 98*
62.467^{C}	$_{5/2}$	$_{5/2}$	502 821	2 103 660		5.3 – 3	1.5+9	E	98*
62.433	$_{3/2}$	$_{5/2}$	501 927	2 103 660		7.28 – 2	2.08+10	C	33°, 98*
61.286	$2p^63p\ ^2P^o_{3/2}$	$2p^66s\ ^2S_{1/2}$	217 039	1 848 660		2.1 – 2	1.8+10	D	33°, 98*
60.971	$_{1/2}$	$_{1/2}$	208 384	1 848 660		1.0 – 2	9.4+9	D	33°, 98*
60.762	$2p^63s\ ^2S_{1/2}$	$2p^65p\ ^2P^o_{1/2}$	0	1 645 740		3.8 – 2	3.5+10	C	33°, 98*
60.701	$_{1/2}$	$_{3/2}$	0	1 647 440		7.6 – 2	3.4+10	C	33°, 98*
59.436^{C}	$2p^63p\ ^2P^o_{3/2}$	$2p^66d\ ^2D_{3/2}$	217 039	1 899 530		1.5 – 2	7.2+9	D	98*
59.435	$_{3/2}$	$_{5/2}$	217 039	1 899 530		1.4 – 1	4.41+10	C	33°, 98*
59.133	$_{1/2}$	$_{3/2}$	208 384	1 899 530		7.8 – 2	3.72+10	C	33°, 98*
59.045^{C}	$2p^63p\ ^2P^o_{3/2}$	$2p^66f\ ^2F^o_{7/2}$	217 039	1 910 650		E2	4.1+6	D	98*
58.924^{C}	$2p^63s\ ^2S_{1/2}$	$2p^65d\ ^2D_{3/2}$	0	1 697 110		E2	1.7+7	D	98*
58.911^{C}	$_{1/2}$	$_{5/2}$	0	1 697 480		E2	1.6+7	D	98*
56.431	$2p^63p\ ^2P^o_{3/2}$	$2p^67s\ ^2S_{1/2}$	217 039	1 989 000		1.0 – 2	1.1+10	D	34°, 98*
56.161	$_{1/2}$	$_{1/2}$	208 384	1 989 000		5.2 – 3	5.5+9	D	34°, 98*
55.444^{C}	$2p^63p\ ^2P^o_{3/2}$	$2p^67d\ ^2D_{3/2}$	217 039	2 020 670		8.8 – 3	4.8+9	D	98*
55.443	$_{3/2}$	$_{5/2}$	217 039	2 020 670		7.76 – 2	2.81+10	C	33°, 98*
55.181	$_{1/2}$	$_{3/2}$	208 384	2 020 670		4.4 – 2	2.4+10	C	33°, 98*
53.457	$2p^63s\ ^2S_{1/2}$	$2p^66p\ ^2P^o_{1/2}$	0	1 870 570		1.8 – 2	2.1+10	D	33°, 98*
53.433	$_{1/2}$	$_{3/2}$	0	1 871 440		3.6 – 2	2.1+10	C	33°, 98*
53.140	$2p^63p\ ^2P^o_{3/2}$	$2p^68d\ ^2D_{5/2}$	217 039	2 098 900		4.8 – 2	1.9+10	C	33°, 98*
53.139^{C}	$_{3/2}$	$_{3/2}$	217 039	2 098 900		5.2 – 3	3.2+9	D	98*
52.896	$_{1/2}$	$_{3/2}$	208 384	2 098 900		2.70 – 2	1.61+10	C	33°, 98*
52.645^{C}	$2p^63s\ ^2S_{1/2}$	$2p^66d\ ^2D_{5/2}$	0	1 899 530		E2	9.6+6	D	98*
51.669	$2p^63p\ ^2P^o_{3/2}$	$2p^69d\ ^2D_{5/2}$	217 039	2 152 300					34
51.446	$_{1/2}$	$_{3/2}$	208 384	2 152 300					34
50.674	$2p^63p\ ^2P^o_{3/2}$	$2p^610d\ ^2D_{5/2}$	217 039	2 190 500					34
50.448	$_{1/2}$	$_{3/2}$	208 384	2 190 500					34
49.912	$2p^63s\ ^2S_{1/2}$	$2p^67p\ ^2P^o_{3/2}$	0	2 003 550					34
49.912	$_{1/2}$	$_{1/2}$	0	2 003 550					34
47.906	$2p^63s\ ^2S_{1/2}$	$2p^68p\ ^2P^o_{3/2}$	0	2 087 420					34
47.906	$_{1/2}$	$_{1/2}$	0	2 087 420					34
46.641	$2p^63s\ ^2S_{1/2}$	$2p^69p\ ^2P^o_{3/2}$	0	2 144 000					34
46.641	$_{1/2}$	$_{1/2}$	0	2 144 000					34
45.783	$2p^63s\ ^2S_{1/2}$	$2p^610p\ ^2P^o_{3/2}$	0	2 184 200					34
45.783	$_{1/2}$	$_{1/2}$	0	2 184 200					34
45.167	$2p^63s\ ^2S_{1/2}$	$2p^611p\ ^2P^o_{3/2}$	0	2 214 000					34
45.167	$_{1/2}$	$_{1/2}$	0	2 214 000					34

Ti XIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2774.0^{C}	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_0$	3 709 200	3 745 238		M1	1.37+3	C−	98*
745.12^{C}	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_0$	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	3 745 238	3 879 444		6.5 − 3	2.6+7	E	98*
551.60	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_2$	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	3 698 153	3 879 444	14	2.4 − 1	1.8+9	D	42, 43°, 98*
415.44	1	0	3 709 200	3 949 910	28bl				43
507.64	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_2$	3 709 200	3 906 203	28				42, 43°
480.63	2	2	3 698 153	3 906 203	33bl				43
474.611	2	3	3 698 153	3 908 849	106	8.5 − 1	3.5+9	D	42°, 43△, 98*
506.18	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{3}{2}]_1$	3 753 600	3 951 159	10				43
485.623	0	1	3 745 238	3 951 159	11				42°, 43△
472.088	1	2	3 753 600	3 965 425	36				42°, 43△
496.23	$2s2p^63s\ ^3S_1$	$2s2p^63p\ ^3P^o_0$	4 530 260	4 731 780	15				43
492.51	1	1	4 530 260	4 733 300	6				43
474.45	1	2	4 530 260	4 741 030	106				43
478.70	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_1$	3 709 200	3 918 095	23				43
459.35	1	2	3 709 200	3 926 887	24bl				42, 43°
437.212	2	2	3 698 153	3 926 887	48				42°, 43△
473.381	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{1}{2}]_1$	3 753 600	3 964 847	14bl				42°, 43
455.355	0	1	3 745 238	3 964 847	16				42°, 43△
326.29	1	0	3 753 600	4 060 030	15bl				43△, 44°
457.84^{C}	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_0$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{1}{2}]^o_1$	3 949 910	4 168 326		1.9 − 2	2.0+8	D	98*
351.58	1	0	3 879 444	4 163 874	18bl	1.2 − 1	6.5+9	D	43°, 98*
346.163	1	1	3 879 444	4 168 326	18	3.0 − 1	5.5+9	D	42°, 43△, 98*
399.63	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_2$	3 926 887	4 177 038	23bl				43
386.06	1	2	3 918 095	4 177 038	110bl				43
392.16^{T}	$2s2p^63p\ ^1P^o_1$	$2s2p^63d\ ^1D_2$	4 754 000	5 009 000	39				43
380.23	$2s2p^63p\ ^3P^o_2$	$2s2p^63d\ ^3D_2$	4 741 030	5 004 030					43
379.20	2	3	4 741 030	5 004 740					43
369.96	1	1	4 733 300	5 003 600					43
369.37	1	2	4 733 300	5 004 030	144				43
367.89	0	1	4 731 780	5 003 600	7bl				43
374.85	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_2$	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{1}{2}]_1$	3 698 153	3 964 847	12bl				43
285.08	1	0	3 709 200	4 060 030	9bl				43△, 44°
373.69	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{5}{2}]^o_2$	3 965 425	4 233 020	12bl				43
365.74	2	3	3 965 425	4 238 843	91				43
354.788	1	2	3 951 159	4 233 020	56bl				42°, 43△
372.87^{C}	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_3$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_2$	3 908 849	4 177 038		2.9 − 2	2.7+8	E	98*
369.09	2	2	3 906 203	4 177 038					43
370.52^{C}	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_0$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_1$	3 949 910	4 219 800		2.0 − 1	3.3+9	D	98*
336.029	1	2	3 879 444	4 177 038	32	3.3 − 1	3.7+9	E	42°, 43△, 98*
369.531	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_3$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{7}{2}]^o_4$	3 908 849	4 179 462	144	1.3	6.7+9	D	42°, 43△, 98*
362.86	3	3	3 908 849	4 184 514	49	1.4 − 1	1.0+9	E	43°, 98*
359.311	2	3	3 906 203	4 184 514	109				42°, 43△
367.61	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{3}{2}]^o_2$	3 965 425	4 237 394	7				43
366.910	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{3}{2}]^o_2$	3 964 847	4 237 394	40				42°, 43△
366.569	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{5}{2}]^o_3$	3 926 887	4 199 685	70				42°, 43△
362.518	1	2	3 918 095	4 193 932	49bl				42°, 43△
347.563	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_2$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{5}{2}]^o_2$	3 906 203	4 193 932	32bl				42°, 43△
343.84	3	3	3 908 849	4 199 685	23				43
321.96	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{3}{2}]^o_2$	3 926 887	4 237 394	bl				43

Ti XIII – Continued

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
231.589^C	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_0$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_2$	3 745 238	4 177 038		E2	7.6+3	E	98*
214.721^C	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_2$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{1}{2}]^o_0$	3 698 153	4 163 874		E2	2.4+5	E	98*
210.387^C	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{7}{2}]^o_3$	3 709 200	4 184 514		E2	1.5+5	D−	98*
207.767^C	2	4	3 698 153	4 179 462		E2	2.7+5	D−	98*
128.76^C	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s2p^63s\ ^3S_1$	3 753 600	4 530 260		8.7 − 2	1.2+10	D	98*
120.18^C	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_2$	$2s2p^63s\ ^3S_1$	3 698 153	4 530 260		3.6 − 1	5.4+10	D	98*
120.17^C	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_3$	$2s2p^63p\ ^3P^o_2$	3 908 849	4 741 030		4.8 − 1	4.4+10	D	98*
117.32^C	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	$2s2p^63p\ ^3P^o_0$	3 879 444	4 731 780		5.7 − 2	2.8+10	D	98*
117.12^C	1	1	3 879 444	4 733 300		8.4 − 2	1.3+10	E	98*
104.593	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{3}{2}]^o_1$	$2s^22p^5(^2P^o_{1/2})4f\ ^2[\frac{5}{2}]_2$	4 281 600	5 237 690	2				45
99.834	2	3	4 237 394	5 239 054	15				45°, 47
102.964	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_1$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{5}{2}]_2$	4 219 800	5 191 010	7				45
98.490	2	3	4 177 038	5 192 368	10				45°, 47
100.753	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{5}{2}]^o_3$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_4$	4 199 685	5 192 205	20				45°, 47
100.200	2	3	4 193 932	5 191 932	15				45°, 47
100.133	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{5}{2}]^o_3$	$2s^22p^5(^2P^o_{1/2})4f\ ^2[\frac{7}{2}]_4$	4 238 843	5 237 513	25				45°, 47
99.572	2	3	4 233 020	5 237 320	50				45°, 47
99.572	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{7}{2}]^o_3$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{9}{2}]_4$	4 184 514	5 188 814	50				45°, 47
99.074	4	5	4 179 462	5 188 812	30				45°, 47
98.76	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{7}{2}]^o_4$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_4$	4 179 462	5 192 205	bl				47
97.758	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{1}{2}]^o_1$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{3}{2}]_2$	4 168 326	5 191 256	5				45
97.358	0	1	4 163 874	5 191 014	2				45
96.429	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{3/2})4s\ (\frac{3}{2},\frac{1}{2})^o_2$	3 926 887	4 963 878	1				45
94.788	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_3$	$2s^22p^5(^2P^o_{3/2})4s\ (\frac{3}{2},\frac{1}{2})^o_2$	3 908 849	4 963 878	2				45°, 47
81.611	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_3$	3 926 887	5 152 207	10				45°, 47
81.153	1	2	3 918 095	5 150 335	3				45°, 46
81.322	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_2$	3 964 847	5 194 527	2				45°, 46
81.258	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{1/2})4d\ ^2[\frac{5}{2}]^o_3$	3 965 425	5 196 075	5				45°, 46, 47
80.502	1	2	3 951 159	5 193 359	3				45°, 46, 47
80.927	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_3$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{7}{2}]^o_4$	3 908 849	5 144 529	10				45°, 46, 47
80.610	2	3	3 906 203	5 146 743	3				45°, 47
79.235	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{1}{2}]^o_1$	3 879 444	5 141 514	1				45
79.004	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_2$	3 879 444	5 145 204	1				45
74.74	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})4p\ ^2[\frac{5}{2}]_2$	3 709 200	5 047 200					47
74.108	2	3	3 698 153	5 047 533	2				45°, 47
74.59	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})4p\ ^2[\frac{3}{2}]_1$	3 709 200	5 049 900					47
74.42	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})4p\ ^2[\frac{3}{2}]_2$	3 753 600	5 097 300					47
70.05	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{7}{2}]^o_4$	$2s^22p^5(^2P^o_{3/2})5f\ ^2[\frac{9}{2}]_5$	4 179 462	5 607 000	bl				47
27.0405^C	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_2$	0	3 698 153		M2	2.8+4	D−	98*
26.960	0	1	0	3 709 200		1.00 − 1	3.06+11	C−	40°, 98*
26.641	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	3 753 600		1.30 − 1	4.06+11	C−	40°, 98*
23.991	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{1}{2}]^o_1$	0	4 168 326		8.8 − 3	3.4+10	E	40°, 98*
23.698	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_1$	0	4 219 800		3.0 − 1	1.2+12	D	40°, 98*

Ti XIII – Continued

Wavelength (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
23.356	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{3}{2}]^o_1$	0	4 281 600		2.50	1.02+13	C−	40°, 98*
21.127	$2s^22p^6\ ^1S_0$	$2s2p^63p\ ^3P^o_1$	0	4 733 300	2				41
21.035	$2s^22p^6\ ^1S_0$	$2s2p^63p\ ^1P^o_1$	0	4 754 000	7				41
20.135	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})4s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	4 966 500	1				41
19.943	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})4s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	5 014 300	1				41
19.366	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_1$	0	5 163 700	4				41
19.204	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_1$	0	5 207 200	5				41
17.869	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})5d\ ^2[\frac{3}{2}]^o_1$	0	5 596 300	1				41
17.727	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})5d\ ^2[\frac{3}{2}]^o_1$	0	5 641 100	2				41

Ti XIV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2117.15	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^5\ ^2P^o_{1/2}$	0	47 219		M1	1.89+3	B	25°, 54, 55, 98*
540.12	$2s^22p^4(^3P)3s\ ^4P_{3/2}$	$2s^22p^4(^3P)3p\ ^4P^o_{1/2}$	4 014 945	4 200 090	45				51
533.28	5/2	5/2	3 995 165	4 182 685	135				51
530.04	5/2	3/2	3 995 165	4 183 830	60				51
537.34	$2s^22p^4(^3P)3s\ ^2P_{3/2}$	$2s^22p^4(^3P)3p\ ^2P^o_{1/2}$	4 043 430	4 229 530	45				51
498.56	3/2	3/2	4 043 430	4 244 010	30				51
528.92	$2s^22p^4(^1D)3s\ ^2D_{3/2}$	$2s^22p^4(^1D)3p\ ^2F^o_{5/2}$	4 114 075	4 303 140	60				51
525.1	5/2	5/2	4 112 700	4 303 140	5				51
501.23	5/2	7/2	4 112 700	4 312 210	140				51
511.61	$2s^22p^4(^3P)3s\ ^4P_{3/2}$	$2s^22p^4(^3P)3p\ ^4D^o_{5/2}$	4 014 945	4 210 405	100				51
510.1	1/2	3/2	4 036 120	4 232 160	4				51
496.92	1/2	1/2	4 036 120	4 237 360	40				51
474.5	5/2	7/2	3 995 165	4 205 890	1000bl				51
460.37	3/2	3/2	4 014 945	4 232 160	90				51
504.23	$2s^22p^4(^3P)3s\ ^2P_{1/2}$	$2s^22p^4(^3P)3p\ ^2S^o_{1/2}$	4 065 750	4 264 070	12				51
502.23	$2s^22p^4(^3P)3s\ ^2P_{1/2}$	$2s^22p^4(^3P)3p\ ^2D^o_{3/2}$	4 065 750	4 264 860	45				51
496.32	3/2	5/2	4 043 430	4 244 915	180				51
451.61	3/2	3/2	4 043 430	4 264 860	6				51
471.64	$2s^22p^4(^1S)3s\ ^2S_{1/2}$	$2s^22p^4(^1S)3p\ ^2P^o_{3/2}$	4 221 200	4 433 220	10				51
450.74	1/2	1/2	4 221 200	4 443 060	6				51
467.9	$2s^22p^4(^3P)3s\ ^2P_{3/2}$	$2s^22p^4(^3P)3p\ ^4S^o_{3/2}$	4 043 430	4 257 150	13				51
464.67	$2s^22p^4(^1D)3s\ ^2D_{3/2}$	$2s^22p^4(^1D)3p\ ^2D^o_{3/2}$	4 114 075	4 329 210	35				51
450.00	5/2	5/2	4 112 700	4 334 920	120				51
452.43	$2s^22p^4(^3P)3s\ ^4P_{1/2}$	$2s^22p^4(^3P)3p\ ^4S^o_{3/2}$	4 036 120	4 257 150	50				51
381.7	5/2	3/2	3 995 165	4 257 150	30				51
444.56	$2s^22p^4(^3P)3p\ ^2D^o_{5/2}$	$2s^22p^4(^3P)3d\ ^4F_{7/2}$	4 244 915	4 469 865	9				51
433.49	$2s^22p^4(^3P)3p\ ^4D^o_{5/2}$	$2s^22p^4(^3P)3d\ ^4D_{5/2}$	4 210 405	4 441 100	25				51
427.11	7/2	7/2	4 205 890	4 440 080	70				51
425.16	7/2	5/2	4 205 890	4 441 100	30				51
404.51	$2s^22p^4(^3P)3p\ ^2D^o_{3/2}$	$2s^22p^4(^3P)3d\ ^2F_{5/2}$	4 264 860	4 512 075	30				51
394.87	5/2	7/2	4 244 915	4 498 160	300				51
402.7	$2s^22p^4(^1D)3p\ ^2F^o_{7/2}$	$2s^22p^4(^1D)3d\ ^2G_{7/2}$	4 312 210	4 560 540	9				51
401.07	7/2	9/2	4 312 210	4 561 545	280				51
388.51	5/2	7/2	4 303 140	4 560 540	315bl				51
397.42	$2s^22p^4(^3P)3p\ ^4P^o_{1/2}$	$2s^22p^4(^3P)3d\ ^4D_{1/2}$	4 200 090	4 451 710	25				51
388.70	3/2	5/2	4 183 830	4 441 100	160				51
388.51	5/2	7/2	4 182 685	4 440 080	315bl				51
387.01	5/2	5/2	4 182 685	4 441 100	110				51
382.33	3/2	3/2	4 183 830	4 445 385	130				51
380.70	5/2	3/2	4 182 685	4 445 385	120				51
373.3	3/2	1/2	4 183 830	4 451 710	17				51
392.37	$2s^22p^4(^1D)3p\ ^2D^o_{3/2}$	$2s^22p^4(^1D)3d\ ^2F_{5/2}$	4 329 210	4 584 070	85				51
392.26	5/2	7/2	4 334 920	4 589 870	450bl				51
392.26	$2s^22p^4(^3P)3p\ ^4D^o_{7/2}$	$2s^22p^4(^3P)3d\ ^4F_{9/2}$	4 205 890	4 460 850	450bl				51
389.36	3/2	5/2	4 232 160	4 488 995	45				51
385.42	5/2	7/2	4 210 405	4 469 865	300				51
383.12	1/2	3/2	4 237 360	4 498 376	20				51
376.03	$2s^22p^4(^1D)3s\ ^2D_{5/2}$	$2s^22p^4(^1D)3p\ ^2P^o_{3/2}$	4 112 700	4 378 635	50				51
360.15	$2s^22p^4(^1D)3p\ ^2F^o_{7/2}$	$2s^22p^4(^1D)3d\ ^2F_{7/2}$	4 312 210	4 589 870	165bl				51
347.55	$2s^22p^4(^3P)3p\ ^4D^o_{5/2}$	$2s^22p^4(^3P)3d\ ^2F_{7/2}$	4 210 405	4 498 160	235bl				51
129.440	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^6\ ^2S_{1/2}$	47 219	819 772	8000	1.30 − 1	2.59+10	C+	25, 48, 49°, 98*
121.986	3/2	1/2	0	819 772	10000	2.80 − 1	6.27+10	C+	25, 48, 49°, 98*, 103

Ti XIV – Continued

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
25.260	$2s2p^6\ ^2S_{1/2}$	$2s2p^5(^3P^o)3s\ ^2P^o_{3/2}$	819 772	4 778 600	30				50
25.086	1/2	1/2	819 772	4 806 100	20				50
25.206	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3s\ ^4P_{3/2}$	47 219	4 014 945	6				50
25.071	1/2	1/2	47 219	4 036 120	4				50
25.025	3/2	5/2	0	3 995 165	50	1.0 − 2	1.8+10	E	50°, 98*
24.907	3/2	3/2	0	4 014 945	70				50
25.025	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3s\ ^2P_{3/2}$	47 219	4 043 430	50				50
24.891	1/2	1/2	47 219	4 065 750	60	1.4 − 1	7.5+11	C−	50°, 98*
24.728	3/2	3/2	0	4 043 430	70				50
24.592	3/2	1/2	0	4 065 750	75	1.10 − 1	6.1+11	C−	50°, 98*
24.592	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3s\ ^2D_{3/2}$	47 219	4 114 075	75	2.0 − 1	5.5+11	D	50°, 98*
24.315	3/2	5/2	0	4 112 700	60	2.7 − 1	5.0+11	D	50°, 98*
23.960	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1S)3s\ ^2S_{1/2}$	47 219	4 221 200	20	6.4 − 2	3.7+11	D	50°, 98*
23.690	3/2	1/2	0	4 221 200	90bl	3.6 − 2	2.1+11	E	50°, 98*
22.518	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3d\ ^4P_{3/2}$	47 219	4 488 500	20				50
22.328	3/2	1/2	0	4 479 363	30	8.8 − 2	5.9+11	E	50°, 98*
22.279	3/2	3/2	0	4 488 500	40				50
22.215	3/2	5/2	0	4 501 500	30				50
22.486	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3d\ ^2P_{1/2}$	47 219	4 494 800	15				50
22.328	1/2	3/2	47 219	4 525 100	30				50
22.248	3/2	1/2	0	4 494 800	10				50
22.099	3/2	3/2	0	4 525 100	20				50
22.426	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3d\ ^2D_{3/2}$	47 219	4 506 500	40				50
22.190	3/2	3/2	0	4 506 500	30				50
22.066	3/2	5/2	0	4 531 900	60				50
22.279	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^4F_{5/2}$	0	4 488 995	40				50
22.162	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^2F_{5/2}$	0	4 512 075	30				50
22.047^C	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2S_{1/2}$	47 219	4 583 000		2.0 − 1	1.4+12	D	98*
21.82	3/2	1/2	0	4 583 000	60	9.2 − 1	6.4+12	D	50°, 98*
21.958	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2P_{3/2}$	47 219	4 600 413	50	3.6 − 1	1.2+12	D	50°, 98*
21.737^C	3/2	3/2	0	4 600 413		2.5	8.8+12	D	98*
21.883	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2D_{3/2}$	47 219	4 617 400	70	2.0	7.0+12	D	50°, 98*
21.732	3/2	5/2	0	4 603 263	70				50
21.657	3/2	3/2	0	4 617 400	70	3.5 − 1	1.3+12	D	50°, 98*
21.815^C	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^1D)3d\ ^2F_{5/2}$	0	4 584 070		1.9 − 1	4.5+11	E	98*
21.522	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1S)3d\ ^2D_{3/2}$	47 219	4 694 000	50	1.2	4.5+12	D	50°, 98*
21.341	3/2	5/2	0	4 685 800	40	4.0 − 1	9.8+11	D	50°, 98*
21.304	3/2	3/2	0	4 694 000	6	2.6 − 2	9.6+10	E	50°, 98*

Ti XV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
5212.6^C	$2s2p^5\ ^3P^o_1$	$2s2p^5\ ^3P^o_0$	742 877	762 056		M1	3.77+2	C	98*
3267.1^C	2	1	712 278	742 877		M1	6.4+2	C	98*
2545.08	$2s^22p^4\ ^3P_2$	$2s^22p^4\ ^3P_1$	0	39 288		M1	1.29+3	C+	25, 54°, 55, 98*
1440.2	$2s^22p^4\ ^3P_1$	$2s^22p^4\ ^1D_2$	39 288	108 730		M1	2.2+2	D	56°, 98*
919.73	2	2	0	108 730		M1	2.4+3	D	25°, 98*
567.408^C	$2s^22p^4\ ^3P_1$	$2s^22p^4\ ^1S_0$	39 288	215 528		M1	2.5+4	D	98*
463.004^C	$2s2p^5\ ^3P^o_0$	$2s2p^5\ ^1P^o_1$	762 056	978 037		M1	1.6+3	D−	98*
425.242^C	1	1	742 877	978 037		M1	1.5+3	D−	98*
376.281^C	2	1	712 278	978 037		M1	3.7+3	D−	98*
189.628^C	$2s^22p^4\ ^1S_0$	$2s2p^5\ ^3P^o_1$	215 528	742 877		4.3−3	2.7+8	E	98*
165.690	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^3P^o_2$	108 730	712 278		1.8−2	8.5+8	E	49°, 98*
148.588	$2s^22p^4\ ^3P_1$	$2s2p^5\ ^3P^o_2$	39 288	712 278		1.36−1	8.2+9	C	25, 48, 49°, 98*
142.750	0	1	42 345	742 877		1.08−1	1.18+10	C	25, 48, 49°, 98*
142.130	1	1	39 288	742 877		8.46−2	9.3+9	C	25, 48, 49°, 98*
140.395	2	2	0	712 278		4.1−1	2.8+10	C	25, 48, 49°, 98*
138.357	1	0	39 288	762 056		1.18−1	4.1+10	C	25, 48, 49°, 98*
134.609	2	1	0	742 877		1.56−1	1.91+10	C	25, 48, 49°, 98*
147.436	$2s2p^5\ ^1P^o_1$	$2p^6\ ^1S_0$	978 037	1 656 300		3.9−1	1.2+11	C	49°, 98*
131.146	$2s^22p^4\ ^1S_0$	$2s2p^5\ ^1P^o_1$	215 528	978 037		6.5−2	8.4+9	C	49°, 98*
115.031	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^1P^o_1$	108 730	978 037		6.85−1	1.15+11	C	25, 48, 49°, 98*
109.48^C	$2s2p^5\ ^3P^o_1$	$2p^6\ ^1S_0$	742 877	1 656 300		4.8−3	2.7+9	E	98*
106.874	$2s^22p^4\ ^3P_0$	$2s2p^5\ ^1P^o_1$	42 345	978 037		2.6−3	5.1+8	E	49°, 98*
106.525^C	1	1	39 288	978 037		1.1−3	2.2+8	E	98*
102.247	2	1	0	978 037		2.4−2	5.1+9	E	49°, 98*
23.193	$2s^22p^4\ ^3P_0$	$2s^22p^3(^4S^o)3s\ ^3S^o_1$	42 345	4 354 100		4.9−2	2.0+11	C−	59, 60°, 98*
23.177	1	1	39 288	4 354 100		1.13−1	4.68+11	C−	59, 60°, 98*
22.966	2	1	0	4 354 100		2.7−1	1.1+12	C−	59, 60°, 98*
23.034	$2s^22p^4\ ^1S_0$	$2s^22p^3(^2P^o)3s\ ^1P^o_1$	215 528	4 557 300		1.5−1	6.3+11	D	59, 60°, 98*
22.936	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3s\ ^1D^o_2$	108 730	4 469 100		4.5−1	1.1+12	C−	59, 60°, 98*
22.739	$2s^22p^4\ ^3P_0$	$2s^22p^3(^2D^o)3s\ ^3D^o_1$	42 345	4 440 200		3.4−2	1.5+11	C−	59, 60°, 98*
22.724	1	1	39 288	4 440 200		9.0−2	3.9+11	C−	60°, 98*
22.722^C	1	2	39 288	4 440 400		6.9−2	1.8+11	D	98*
22.518	2	2	0	4 440 400		1.4−1	3.7+11	D	59, 60°, 98*
22.464	2	3	0	4 451 600		2.8−1	5.2+11	C−	59, 60°, 98*
22.654^C	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3s\ ^3P^o_2$	108 730	4 523 000		9.5−2	2.5+11	E	98*
22.574^C	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2D^o)3s\ ^1D^o_2$	39 288	4 469 100		3.3−2	8.6+10	E	98*
22.376^C	2	2	0	4 469 100		2.4−2	6.4+10	E	98*
22.482	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3s\ ^1P^o_1$	108 730	4 557 300		1.5−1	6.4+11	D	59, 60°, 98*
22.303^C	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2P^o)3s\ ^3P^o_2$	39 288	4 523 000		1.0−1	2.8+11	D	98*
22.109	2	2	0	4 523 000		4.5−2	1.2+11	D−	59°, 98*
21.094	$2s^22p^4\ ^3P_1$	$2s^22p^3(^4S^o)3d\ ^3D^o_2$	39 288	4 780 000		4.5−1	1.3+12	D	59, 61°, 98*
20.92^C	2	2	0	4 780 000		2.8−1	8.4+11	D	98*
20.897	2	3	0	4 785 000		1.31	2.85+12	C−	59, 61°, 98*
21.05^C	$2s^22p^4\ ^1S_0$	$2s^22p^3(^2P^o)3d\ ^3P^o_1$	215 528	4 965 000		2.5−2	1.3+11	E	98*
20.97^C	$2s^22p^4\ ^1S_0$	$2s^22p^3(^2P^o)3d\ ^3D^o_1$	215 528	4 984 000		3.2−2	1.6+11	E	98*
20.88^C	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3d\ ^3D^o_3$	108 730	4 898 000		4.4−2	9.6+10	E	98*
20.823	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3d\ ^1D^o_2$	108 730	4 911 000					59, 61°
20.701	$2s^22p^4\ ^1S_0$	$2s^22p^3(^2P^o)3d\ ^1P^o_1$	215 528	5 046 000		2.2	1.1+13	D	62°, 98*

Ti XV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
20.70	$2s^22p^4\ ^3P_0$	$2s^22p^3(^2D^\circ)3d\ ^3D^\circ_1$	42 345	4 873 000					61
20.611	1	2	39 288	4 891 000					61
20.418	2	3	0	4 898 000		3.5	8.0+12	C−	61°, 98*
20.700	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^\circ)3d\ ^1F^\circ_3$	108 730	4 940 000		2.0	4.3+12	D	59, 61°, 98*
20.59^{C}	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^\circ)3d\ ^3P^\circ_1$	108 730	4 965 000		5.5 − 2	2.9+11	E	98*
20.55^{C}	$2s^22p^4\ ^3P_0$	$2s^22p^3(^2D^\circ)3d\ ^3P^\circ_1$	42 345	4 908 000		2.4 − 1	1.3+12	D	98*
20.538	1	1	39 288	4 908 000		7.2 − 1	3.8+12	D	62°, 98*
20.389	2	2	0	4 905 000					59, 62°
20.37^{C}	2	1	0	4 908 000		4.4 − 2	2.4+11	D−	98*
20.418	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^\circ)3d\ ^1F^\circ_3$	108 730	5 006 000					61, 62°
20.364	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2P^\circ)3d\ ^3P^\circ_2$	39 288	4 950 000					61
20.313	0	1	42 345	4 965 000		6.3 − 1	3.4+12	D	62°, 98*
20.30^{C}	1	1	39 288	4 965 000		2.0 − 1	1.1+12	D	98*
20.312	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2P^\circ)3d\ ^1D^\circ_2$	39 288	4 962 000					62
20.24^{C}	$2s^22p^4\ ^3P_2$	$2s^22p^3(^2D^\circ)3d\ ^1F^\circ_3$	0	4 940 000		8.0 − 1	1.9+12	E	98*
20.23	$2s^22p^4\ ^3P_0$	$2s^22p^3(^2P^\circ)3d\ ^3D^\circ_1$	42 345	4 984 000		7.8 − 1	4.2+12	C−	61°, 98*
20.23	1	1	39 288	4 984 000		9.03 − 1	4.90+12	C−	62°, 98*
20.133	1	2	39 288	5 006 000					61
20.06^{C}	2	1	0	4 984 000		2.1 − 2	1.2+11	D	98*
20.051	2	3	0	4 987 000					59, 61°
19.97^{C}	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2P^\circ)3d\ ^1P^\circ_1$	39 288	5 046 000		2.4 − 2	1.3+11	E	98*

Ti XVI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
7579^C	$2s2p^4\ ^4P_{3/2}$	$2s2p^4\ ^4P_{1/2}$	620 470	633 660		M1	1.01+2	C	98*
3191^C	5/2	3/2	589 140	620 470		M1	7.4+2	C	98*
6805^C	$2s^22p^3\ ^2D^o_{3/2}$	$2s^22p^3\ ^2D^o_{5/2}$	116 030	130 720		M1	2.81+1	C	98*
4639^C	$2s^22p^3\ ^2P^o_{1/2}$	$2s^22p^3\ ^2P^o_{3/2}$	197 700	219 250		M1	7.2+1	C	98*
2722^C	$2s2p^4\ ^2S_{1/2}$	$2s2p^4\ ^2P_{3/2}$	939 920	976 650		M1	5.3+1	D	98*
1241^C	1/2	1/2	939 920	1 020 500		M1	2.0+3	D	98*
2280^C	$2s2p^4\ ^2P_{3/2}$	$2s2p^4\ ^2P_{1/2}$	976 650	1 020 500		M1	1.4+3	C	98*
1993^C	$2p^5\ ^2P^o_{3/2}$	$2p^5\ ^2P^o_{1/2}$	1 537 660	1 587 830		M1	2.27+3	C	98*
1224.1	$2s^22p^3\ ^2D^o_{3/2}$	$2s^22p^3\ ^2P^o_{1/2}$	116 030	197 700		M1	1.6+3	D	56°, 98*
1129.2	5/2	3/2	130 720	219 250		M1	2.0+3	D	56°, 98*
968.80^C	3/2	3/2	116 030	219 250		M1	5.2+3	D	98*
861.85^C	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^3\ ^2D^o_{3/2}$	*0*	*116 030*		M1	2.0+3	D	98*
627.20^C	$2s2p^4\ ^2D_{5/2}$	$2s2p^4\ ^2P_{3/2}$	817 210	976 650		M1	1.0+3	D−	98*
611.36^C	3/2	3/2	813 080	976 650		M1	2.1+3	D−	98*
482.11^C	3/2	1/2	813 080	1 020 500		M1	2.5+3	D−	98*
557.35^C	$2s2p^4\ ^4P_{1/2}$	$2s2p^4\ ^2D_{3/2}$	633 660	813 080		M1	3.4+2	D−	98*
519.18^C	3/2	3/2	620 470	813 080		M1	1.8+3	D	98*
508.29^C	3/2	5/2	620 470	817 210		M1	4.4+2	D	98*
438.46^C	5/2	5/2	589 140	817 210		M1	4.7+3	D	98*
505.82^C	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^3\ ^2P^o_{1/2}$	0	197 700		M1	4.9+3	D−	98*
456.10^C	3/2	3/2	0	219 250		M1	7.8+3	D	98*
313.04^C	$2s2p^4\ ^4P_{3/2}$	$2s2p^4\ ^2S_{1/2}$	620 470	939 920		M1	2.1+4	D	98*
270.35^C	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^4P_{5/2}$	219 250	589 140		1.1 − 3	1.7+7	E	98*
249.24^C	3/2	3/2	219 250	620 470		2.4 − 3	6.3+7	E	98*
229.38^C	1/2	1/2	197 700	633 660		6.4 − 4	4.1+7	E	98*
218.14^C	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^4P_{5/2}$	130 720	589 140		3.1 − 3	7.3+7	E	98*
211.37^C	3/2	5/2	116 030	589 140		3.8 − 3	9.6+7	E	98*
193.19^C	3/2	1/2	116 030	633 660		4.8 − 4	4.3+7	E	98*
193.36^C	$2s2p^4\ ^2P_{1/2}$	$2p^5\ ^2P^o_{3/2}$	1 020 500	1 537 660		5.10 − 2	2.27+9	C	98*
178.240	3/2	3/2	976 650	1 537 660		4.80 − 1	2.52+10	C	61, 63°, 64, 98*
176.267	1/2	1/2	1 020 500	1 587 830		2.28 − 1	2.45+10	C	63°, 98*
163.610	3/2	1/2	976 650	1 587 830		1.54 − 1	1.92+10	C	63°, 98*
169.740	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^4P_{5/2}$	0	589 140		2.6 − 1	1.0+10	C	25, 48, 63°, 64, 98*, 103
161.168	3/2	3/2	0	620 470		1.88 − 1	1.20+10	C	25, 48, 63°, 64, 98*
157.812	3/2	1/2	0	633 660		9.84 − 2	1.32+10	C	25, 48, 63°, 64, 98*
168.40^C	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^2D_{3/2}$	219 250	813 080		7.2 − 3	4.2+8	D	98*
167.242	3/2	5/2	219 250	817 210		1.17 − 1	4.64+9	C	25, 48, 63°, 64, 98*
162.503	1/2	3/2	197 700	813 080		4.14 − 2	2.61+9	C	63°, 64, 98*
167.297	$2s2p^4\ ^2S_{1/2}$	$2p^5\ ^2P^o_{3/2}$	939 920	1 537 660		9.20 − 2	5.5+9	C	63°, 64, 98*
154.34^C	1/2	1/2	939 920	1 587 830		1.3 − 3	1.8+8	E	98*
146.57	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^2D_{3/2}$	130 720	813 080		7.8 − 3	6.1+8	D	64°, 98*
145.665	5/2	5/2	130 720	817 210		4.4 − 1	2.3+10	C	25, 48, 63°, 64, 98*
143.459	3/2	3/2	116 030	813 080		3.4 − 1	2.8+10	C	25, 48, 63°, 64, 98*
142.57	3/2	5/2	116 030	817 210		4.8 − 4	2.6+7	E	64°, 98*
138.800	$2s2p^4\ ^2D_{5/2}$	$2p^5\ ^2P^o_{3/2}$	817 210	1 537 660		4.0 − 1	3.5+10	C	61, 63°, 64, 98*
138.020	3/2	3/2	813 080	1 537 660		1.00 − 1	8.8+9	C	63°, 98*
129.075	3/2	1/2	813 080	1 587 830		1.90 − 1	3.81+10	C	61, 63°, 64, 98*
138.760	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^2S_{1/2}$	219 250	939 920		4.84 − 2	8.4+9	C	63°, 64, 98*
134.724	1/2	1/2	197 700	939 920		1.4 − 1	2.6+10	C	25, 48, 63°, 64, 98*

Ti XVI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
132.022	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^2P_{3/2}$	219 250	976 650		9.12 − 2	8.7+9	C	63°, 64, 98*
128.373	1/2	3/2	197 700	976 650		5.38 − 2	5.4+9	C	25, 48, 63°, 64, 98*
124.805	3/2	1/2	219 250	1 020 500		2.8 − 1	6.1+10	C	25, 48, 63°, 64, 98*
121.538	1/2	1/2	197 700	1 020 500		2.46 − 2	5.6+9	C	63°, 64, 98*
121.382	$2s^22p^3\ ^2D^o_{3/2}$	$2s2p^4\ ^2S_{1/2}$	116 030	939 920		1.0 − 1	2.4+10	E	25, 48, 63°, 64, 98*
118.215	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^2P_{3/2}$	130 720	976 650		6.24 − 1	7.40+10	C	25, 48, 63°, 64, 98*
116.198	3/2	3/2	116 030	976 650		1.18 − 1	1.45+10	C	25, 48, 63°, 64, 98*
110.561	3/2	1/2	116 030	1 020 500		1.23 − 1	3.36+10	C	63°, 64, 98*
110.62[C]	$2s2p^4\ ^4P_{1/2}$	$2p^5\ ^2P^o_{3/2}$	633 660	1 537 660		7.8 − 4	1.1+8	E	98*
109.03[C]	3/2	3/2	620 470	1 537 660		2.3 − 3	3.3+8	E	98*
105.43[C]	5/2	3/2	589 140	1 537 660		5.8 − 3	8.7+8	E	98*
104.80[C]	1/2	1/2	633 660	1 587 830		9.6 − 4	2.9+8	E	98*
102.393	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^2P_{3/2}$	0	976 650		7.6 − 3	1.2+9	E	63°, 98*
97.991[C]	3/2	1/2	0	1 020 500		4.4 − 4	1.5+8	E	98*
20.101	$2s^22p^3\ ^2P^o_{3/2}$	$2s^22p^2(^3P)3d\ ^2P_{3/2}$	219 250	5 194 100					61
19.71	$2s^22p^3\ ^2P^o_{3/2}$	$2s^22p^2(^3P)3d\ ^2D_{5/2}$	219 250	5 293 300					61
19.65	1/2	3/2	197 700	5 287 000					65
19.551	$2s^22p^3\ ^2D^o_{5/2}$	$2s^22p^2(^3P)3d\ ^2F_{7/2}$	130 720	5 245 500					61
19.45	$2s^22p^3\ ^2P^o_{3/2}$	$2s^22p^2(^1D)3d\ ^2P_{3/2}$	219 250	5 361 000					65
19.370	$2s^22p^3\ ^2D^o_{5/2}$	$2s^22p^2(^3P)3d\ ^2D_{5/2}$	130 720	5 293 300					61
19.210	$2s^22p^3\ ^2D^o_{5/2}$	$2s^22p^2(^1D)3d\ ^2F_{7/2}$	130 720	5 336 300					61
19.110	3/2	5/2	116 030	5 348 100					61
19.112	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^2(^3P)3d\ ^4P_{5/2}$	0	5 232 300					61
19.089	3/2	3/2	0	5 238 600					61

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Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3834.4	$2s^22p^2\ ^3P_1$	$2s^22p^2\ ^3P_2$	29 658	55 730		M1	2.15+2	C+	25, 54, 55°, 98*
3370.8	0	1	0	29 658		M1	4.4+2	C+	25, 54, 55°, 98*
470.54^{C}	$2s^22p^2\ ^3P_1$	$2s^22p^2\ ^1S_0$	29 658	242 180		M1	2.6+4	D	98*
359.8	$2s^22p^2\ ^3P_2$	$2s(^2S)2p^3(^4S^o)\ ^5S^o_2$	55 730	333 660					69
304.990^{C}	$2s(^2S)2p^3(^2P^o)\ ^1P^o_1$	$2p^4\ ^3P_2$	943 500	1 271 380		4.2 − 3	6.0+7	E	98*
270.431^{C}	1	1	943 500	1 313 280		8.7 − 3	2.6+8	E	98*
295.92^{C}	$2s^22p^2\ ^1S_0$	$2s(^2S)2p^3(^2D^o)\ ^3D^o_1$	242 180	580 110		8.8 − 4	2.2+7	E	98*
283.19^{C}	$2s(^2S)2p^3(^4S^o)\ ^5S^o_2$	$2s(^2S)2p^3(^2P^o)\ ^3P^o_2$	333 660	686 780		M1	1.5+4	D−	98*
274.27^{C}	$2s(^2S)2p^3(^2D^o)\ ^3D^o_2$	$2s(^2S)2p^3(^2P^o)\ ^1P^o_1$	578 890	943 500		M1	1.2+4	D−	98*
234.610^{C}	$2s(^2S)2p^3(^2D^o)\ ^1D^o_2$	$2p^4\ ^3P_2$	845 140	1 271 380		1.7 − 2	4.0+8	E	98*
213.611^{C}	2	1	845 140	1 313 280		1.2 − 3	5.6+7	E	98*
230.926^{C}	$2s(^2S)2p^3(^4S^o)\ ^3S^o_1$	$2p^4\ ^3P_2$	838 340	1 271 380		2.3 − 1	5.6+9	C	67, 98*
210.553^{C}	1	1	838 340	1 313 280		1.7 − 1	8.7+9	C	98*
207.727^{C}	1	0	838 340	1 319 740		6.93 − 2	1.07+10	C	98*
228.943^{C}	$2s(^2S)2p^3(^2P^o)\ ^1P^o_1$	$2p^4\ ^1D_2$	943 500	1 380 290		1.35 − 1	3.43+9	C	98*
228.19^{C}	$2s^22p^2\ ^1D_2$	$2s(^2S)2p^3(^2D^o)\ ^3D^o_2$	140 660	578 890		1.0 − 3	2.6+7	E	98*
227.56^{C}	2	1	140 660	580 110		1.5 − 3	6.2+7	E	98*
224.16^{C}	2	3	140 660	586 760		1.7 − 2	3.2+8	E	98*
227.93^{C}	$2s^22p^2\ ^1S_0$	$2s(^2S)2p^3(^2P^o)\ ^3P^o_1$	242 180	680 910		1.6 − 3	6.8+7	E	98*
191.15^{C}	$2s^22p^2\ ^3P_2$	$2s(^2S)2p^3(^2D^o)\ ^3D^o_2$	55 730	578 890		2.4 − 3	8.8+7	E	98*
190.70^{C}	2	1	55 730	580 110		2.5 − 4	1.5+7	E	98*
188.312	2	3	55 730	586 760		1.95 − 1	5.2+9	C	25, 48, 61, 64, 66, 68°, 98*
182.072	1	2	29 658	578 890		1.7 − 1	6.6+9	C	25, 48, 61, 66, 68°, 98*
181.67^{C}	1	1	29 658	580 110		1.9 − 2	1.3+9	D	98*
172.380	0	1	0	580 110		8.6 − 2	6.4+9	C	25, 48, 61, 64, 66, 67, 68°, 98*
186.863	$2s(^2S)2p^3(^2D^o)\ ^1D^o_2$	$2p^4\ ^1D_2$	845 140	1 380 290		6.95 − 1	2.6+10	C	67, 68°, 98*
185.10^{C}	$2s^22p^2\ ^1D_2$	$2s(^2S)2p^3(^2P^o)\ ^3P^o_1$	140 660	680 910		3.0 − 3	1.9+8	E	98*
183.11^{C}	2	2	140 660	686 780		2.8 − 3	1.1+8	E	98*
171.057^{C}	$2s(^2S)2p^3(^2P^o)\ ^3P^o_2$	$2p^4\ ^3P_2$	686 780	1 271 380		7.70 − 2	3.51+9	C	67, 98*
169.357^{C}	1	2	680 910	1 271 380		5.91 − 2	2.75+9	C	67, 98*
159.617^{C}	2	1	686 780	1 313 280		1.18 − 1	1.03+10	C	67, 98*
158.135^{C}	1	1	680 910	1 313 280		1.6 − 3	1.4+8	E	98*
157.522^{C}	0	1	678 450	1 313 280		3.78 − 2	3.39+9	C	98*
156.536^{C}	1	0	680 910	1 319 740		5.28 − 2	1.44+10	C	67, 98*
167.74^{C}	$2s^22p^2\ ^1S_0$	$2s(^2S)2p^3(^4S^o)\ ^3S^o_1$	242 180	838 340		2.8 − 3	2.2+8	E	98*
163.049	$2s(^2S)2p^3(^2P^o)\ ^1P^o_1$	$2p^4\ ^1S_0$	943 500	1 556 810		2.5 − 1	6.2+10	C	67, 68°, 98*
159.955	$2s^22p^2\ ^3P_2$	$2s(^2S)2p^3(^2P^o)\ ^3P^o_1$	55 730	680 910		4.3 − 2	3.7+9	D	25, 48, 64, 67, 68°, 98*
158.469	2	2	55 730	686 780		2.6 − 1	1.4+10	C	25, 48, 61, 64, 66, 67, 68°, 98*
154.133	1	0	29 658	678 450		5.82 − 2	1.63+10	C	25, 48, 66, 67, 68°, 98*, 103
153.554	1	1	29 658	680 910		9.0 − 2	8.5+9	C	25, 48, 64, 66, 67, 68°, 98*
152.174	1	2	29 658	686 780		1.8 − 2	1.0+9	D	25, 48, 66, 67, 68°, 98*
146.856	0	1	0	680 910		3.68 − 2	3.79+9	C	25, 48, 67, 68°, 98*
146.067	$2s(^2S)2p^3(^2D^o)\ ^3D^o_3$	$2p^4\ ^3P_2$	586 760	1 271 380		4.1 − 1	2.6+10	C	61, 68°, 98*
144.661^{C}	1	2	580 110	1 271 380		2.3 − 2	1.5+9	D	98*
144.405	2	2	578 890	1 271 380		1.48 − 1	9.4+9	C	68°, 98*
136.393	1	1	580 110	1 313 280		9.51 − 2	1.14+10	C	61, 68°, 98*
136.160	2	1	578 890	1 313 280		1.63 − 1	1.95+10	C	61, 68°, 98*
135.202	1	0	580 110	1 319 740		8.04 − 2	2.93+10	C	68°, 98*
144.194^{C}	$2s(^2S)2p^3(^2P^o)\ ^3P^o_2$	$2p^4\ ^1D_2$	686 780	1 380 290		5.5 − 3	3.5+8	E	98*
142.984^{C}	1	2	680 910	1 380 290		5.1 − 3	3.3+8	E	98*
142.589	$2s^22p^2\ ^1S_0$	$2s(^2S)2p^3(^2P^o)\ ^1P^o_1$	242 180	943 500		1.23 − 1	1.35+10	C	25, 48, 61, 64, 66, 68°, 98*
141.948	$2s^22p^2\ ^1D_2$	$2s(^2S)2p^3(^2D^o)\ ^1D^o_2$	140 660	845 140		5.85 − 1	3.87+10	C	25, 48, 61, 64, 66, 68°, 98*

Ti XVII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
139.185^{C}	$2s(^2S)2p^3(^4S^\circ)\ ^3S^\circ_1$	$2p^4\ ^1S_0$	838 340	1 556 810		8.7 – 3	3.0+9	E	98*
127.782	$2s^22p^2\ ^3P_2$	$2s(^2S)2p^3(^4S^\circ)\ ^3S^\circ_1$	55 730	838 340		3.4 – 1	4.6+10	C	25, 48, 61, 64, 66, 68°, 98*
123.654	1	1	29 658	838 340		1.6 – 1	2.3+10	C	25, 48, 61, 64, 66, 68°, 98*
119.284	0	1	0	838 340		5.1 – 2	8.0+9	C	25, 48, 61, 64, 66, 68°, 98*
126.676	$2s^22p^2\ ^3P_2$	$2s(^2S)2p^3(^2D^\circ)\ ^1D^\circ_2$	55 730	845 140		3.6 – 2	3.0+9	E	25, 48, 68°, 98*
122.63^{C}	1	2	29 658	845 140		1.5 – 3	1.3+8	E	98*
126.004	$2s(^2S)2p^3(^2D^\circ)\ ^3D^\circ_3$	$2p^4\ ^1D_2$	586 760	1 380 290		2.5 – 2	2.1+9	E	68°, 98*
124.782^{C}	2	2	578 890	1 380 290		4.1 – 3	3.5+8	E	98*
124.553	$2s^22p^2\ ^1D_2$	$2s(^2S)2p^3(^2P^\circ)\ ^1P^\circ_1$	140 660	943 500		3.6 – 1	5.2+10	C	25, 48, 61, 64, 66, 68°, 98*
114.168^{C}	$2s(^2S)2p^3(^2P^\circ)\ ^3P^\circ_1$	$2p^4\ ^1S_0$	680 910	1 556 810		2.4 – 3	1.2+9	E	98*
109.432	$2s^22p^2\ ^3P_1$	$2s(^2S)2p^3(^2P^\circ)\ ^1P^\circ_1$	29 658	943 500		1.2 – 2	2.2+9	E	68°, 98*
20.183	$2s^22p^2\ ^1S_0$	$2s^22p3s\ ^1P^\circ_1$	242 180	5 204 000					70
19.718	$2s^22p^2\ ^1D_2$	$2s^22p3s\ ^1P^\circ_1$	140 660	5 204 000					70
19.651	$2s^22p^2\ ^3P_2$	$2s^22p3s\ ^3P^\circ_1$	55 730	5 144 000					70
19.459	2	2	55 730	5 193 000					70
19.369	1	2	29 658	5 193 000					70
19.501	$2s(^2S)2p^3(^2D^\circ)\ ^3D^\circ_2$	$2s2p^2(^2D)3s\ ^3D_2$	578 890	5 707 000					70
19.415	$2s(^2S)2p^3(^4S^\circ)\ ^5S^\circ_2$	$2s2p^2(^4P)3s\ ^5P_3$	333 660	5 484 300					70
18.939	$2s(^2S)2p^3(^2D^\circ)\ ^3D^\circ_2$	$2s2p^2(^4P)3d\ ^3F_3$	578 890	5 859 000					70
18.757	$2s^22p^2\ ^1D_2$	$2s^22p3d\ ^3F^\circ_2$	140 660	5 472 000					71
18.651	$2s^22p^2\ ^1D_2$	$2s^22p3d\ ^1D^\circ_2$	140 660	5 502 000					71
18.623	$2s^22p^2\ ^1S_0$	$2s^22p3d\ ^1P^\circ_1$	242 180	5 612 000					70, 71°
18.387	$2s(^2S)2p^3(^2D^\circ)\ ^3D^\circ_3$	$2s2p^2(^2D)3d\ ^3F_4$	586 760	6 025 000					70
18.350	$2s^22p^2\ ^3P_2$	$2s^22p3d\ ^1D^\circ_2$	55 730	5 502 000					71
18.269	$2s^22p^2\ ^1D_2$	$2s^22p3d\ ^1F^\circ_3$	140 660	5 614 000					61, 70, 71°
18.218	$2s^22p^2\ ^3P_1$	$2s^22p3d\ ^3D^\circ_1$	29 658	5 519 000					71
18.176	2	3	55 730	5 557 000		3.2	9.2+12	E	61, 70, 71°, 98*
18.141	1	2	29 658	5 542 000					70, 71°
18.12^{C}	0	1	0	5 519 000		1.2	8.1+12	D	98*
18.154	$2s(^2S)2p^3(^4S^\circ)\ ^5S^\circ_2$	$2s2p^2(^4P)3d\ ^5P_3$	333 660	5 842 100					70
18.141	$2s^22p^2\ ^3P_2$	$2s^22p3d\ ^3P^\circ_2$	55 730	5 568 000					61, 71°

Ti XVIII

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
9898^C	$2p^3\ ^2D^o_{3/2}$	$2p^3\ ^2D^o_{5/2}$	1 078 800	1 088 900		M1	1.02+1	C	98*
7505^C	$2s2p^2\ ^2P_{1/2}$	$2s2p^2\ ^2P_{3/2}$	733 750	747 070		M1	1.3+1	C−	98*
5290^C	$2p^3\ ^2P^o_{1/2}$	$2p^3\ ^2P^o_{3/2}$	1 208 800	1 227 700		M1	5.5+1	C	98*
4311^C	$2s2p^2\ ^4P_{1/2}$	$2s2p^2\ ^4P_{3/2}$	309 980	333 170		M1	2.76+2	C	98*
3597^C	$_{3/2}$	$_{5/2}$	333 170	360 960		M1	3.43+2	C	98*
1778.1	$2s^22p\ ^2P^o_{1/2}$	$2s^22p\ ^2P^o_{3/2}$	0	56 240		M1	1.6+3	B	25, 54, 55°, 56, 98*
1665^C	$2s2p^2\ ^2S_{1/2}$	$2s2p^2\ ^2P_{1/2}$	673 680	733 750		M1	1.9+3	C−	98*
1363^C	$_{1/2}$	$_{3/2}$	673 680	747 070		M1	1.4+3	C−	98*
769.2^C	$2p^3\ ^2D^o_{3/2}$	$2p^3\ ^2P^o_{1/2}$	1 078 800	1 208 800		M1	3.0+3	D	98*
720.5^C	$_{5/2}$	$_{3/2}$	1 088 900	1 227 700		M1	3.6+3	D	98*
671.6^C	$_{3/2}$	$_{3/2}$	1 078 800	1 227 700		M1	7.8+3	D	98*
465.1^C	$2s2p^2\ ^2P_{3/2}$	$2p^3\ ^4S^o_{3/2}$	747 070	962 100		1.4 − 3	1.1+7	E	98*
361.1	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^4P_{3/2}$	56 240	333 170					69
322.6	$_{1/2}$	$_{1/2}$	0	309 980					69
301.4^C	$2s2p^2\ ^2P_{3/2}$	$2p^3\ ^2D^o_{3/2}$	747 070	1 078 800		4.4 − 3	8.1+7	D	98*
292.5^C	$_{3/2}$	$_{5/2}$	747 070	1 088 900		2.0 − 1	2.6+9	C	98*
246.2^C	$2s2p^2\ ^2D_{3/2}$	$2p^3\ ^4S^o_{3/2}$	555 860	962 100		4.4 − 4	1.2+7	E	98*
216.6^C	$2s2p^2\ ^2P_{3/2}$	$2p^3\ ^2P^o_{1/2}$	747 070	1 208 800		3.3 − 2	2.3+9	D	98*
210.51	$_{1/2}$	$_{1/2}$	733 750	1 208 800					67
208.07	$_{3/2}$	$_{3/2}$	747 070	1 227 700		3.2 − 1	1.2+10	C	67°, 98*
200.15^C	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^2D_{3/2}$	56 240	555 860		4.8 − 3	2.0+8	D	98*
197.838	$_{3/2}$	$_{5/2}$	56 240	561 700		1.60 − 1	4.56+9	C	25, 48, 61, 72°, 98*, 103
179.902	$_{1/2}$	$_{3/2}$	0	555 860		1.2 − 1	6.3+9	C	25, 48, 61, 64, 72°, 98*, 103
193.4^C	$2s2p^2\ ^2D_{5/2}$	$2p^3\ ^2D^o_{3/2}$	561 700	1 078 800		6.84 − 2	3.05+9	C	98*
191.23	$_{3/2}$	$_{3/2}$	555 860	1 078 800		1.45 − 1	6.6+9	C	67°, 98*
189.66	$_{5/2}$	$_{5/2}$	561 700	1 088 900		3.1 − 1	9.6+9	C	67°, 72, 98*
187.55	$_{3/2}$	$_{5/2}$	555 860	1 088 900		5.2 − 2	1.64+9	C	67°, 98*
180.52	$2s2p^2\ ^2S_{1/2}$	$2p^3\ ^2P^o_{3/2}$	673 680	1 227 700					67
166.35	$2s2p^2\ ^4P_{5/2}$	$2p^3\ ^4S^o_{3/2}$	360 960	962 100		2.56 − 1	1.54+10	C	61, 64°, 72, 98*
159.00	$_{3/2}$	$_{3/2}$	333 170	962 100		1.76 − 1	1.16+10	C	61, 64°, 98*
153.346^C	$_{1/2}$	$_{3/2}$	309 980	962 100		9.4 − 2	6.7+9	C	98*
153.15	$2s2p^2\ ^2D_{3/2}$	$2p^3\ ^2P^o_{1/2}$	555 860	1 208 800		1.38 − 1	1.97+10	C	67°, 98*
150.15	$_{5/2}$	$_{3/2}$	561 700	1 227 700		1.55 − 1	1.15+10	C	67°, 98*
148.83	$_{3/2}$	$_{3/2}$	555 860	1 227 700		4.52 − 2	3.4+9	C	67°, 98*
148.438	$2s^22p\ ^2P^o_{1/2}$	$2s2p^2\ ^2S_{1/2}$	0	673 680					25, 48, 61, 64, 72°, 103
147.607	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^2P_{1/2}$	56 240	733 750					25, 48, 61, 64, 72°, 103
144.759	$_{3/2}$	$_{3/2}$	56 240	747 070		4.0 − 1	3.2+10	C	25, 48, 61, 64, 72°, 98*, 103
136.280	$_{1/2}$	$_{1/2}$	0	733 750					25, 48, 61, 72°
133.852	$_{1/2}$	$_{3/2}$	0	747 070		5.54 − 2	5.2+9	C	25, 48, 61, 64, 72°, 98*
137.37^C	$2s2p^2\ ^4P_{5/2}$	$2p^3\ ^2D^o_{5/2}$	360 960	1 088 900		7.8 − 3	4.6+8	E	98*
134.11^C	$_{3/2}$	$_{3/2}$	333 170	1 078 800		4.0 − 3	3.7+8	E	98*
111.79^C	$2s2p^2\ ^4P_{3/2}$	$2p^3\ ^2P^o_{3/2}$	333 170	1 227 700		9.2 − 4	1.2+8	E	98*
111.26^C	$_{1/2}$	$_{1/2}$	309 980	1 208 800		3.2 − 4	8.7+7	E	98*
17.920	$2s2p^2\ ^2D_{5/2}$	$2s2p(^3P^o)3d\ ^2D^o_{5/2}$	561 700	6 142 000					61
17.715	$2s2p^2\ ^2D_{3/2}$	$2s2p(^3P^o)3d\ ^2F^o_{5/2}$	555 860	6 201 000					61
17.630	$_{5/2}$	$_{7/2}$	561 700	6 234 000					61
17.587	$2s2p^2\ ^2P_{3/2}$	$2s2p(^1P^o)3d\ ^2D^o_{5/2}$	747 070	6 433 000					61

Ti XVIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
17.39^C	$2s^22p\ ^2P^o_{3/2}$	$2s^23d\ ^2D_{3/2}$	56 240	5 807 000		2.6 − 1	1.4+12	D	98*
17.365	$_{3/2}$	$_{5/2}$	56 240	5 815 000		2.3	8.6+12	D	61°, 98*
17.22	$_{1/2}$	$_{3/2}$	0	5 807 000		1.3	7.3+12	D	61°, 98*
17.30	$2s2p^2\ ^4P_{5/2}$	$2s2p(^3P^o)3d\ ^4D^o_{7/2}$	360 960	6 143 000					61
17.28	$2s2p^2\ ^4P_{5/2}$	$2s2p(^3P^o)3d\ ^4P^o_{5/2}$	360 960	6 148 000					61
17.150	$2s2p^2\ ^2D_{5/2}$	$2s2p(^1P^o)3d\ ^2F^o_{7/2}$	561 700	6 393 000					61
16.939	$2s^22p\ ^2P^o_{3/2}$	$2s2p(^3P^o)3p\ ^2P_{3/2}$	56 240	5 960 000					61
16.90	$_{1/2}$	$_{1/2}$	0	5 917 000					61
16.624	$2s^22p\ ^2P^o_{3/2}$	$2s2p(^3P^o)3p\ ^2D_{5/2}$	56 240	6 072 000					61
16.561	$_{1/2}$	$_{3/2}$	0	6 038 000					61

Ti XIX

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
6085^C	$2s2p\ ^3P^o_0$	$2s2p\ ^3P^o_1$	288 190	304 620		M1	7.81+1	C+	98*
2344.6	1	2	304 620	347 260		M1	1.04+3	C+	25, 54°, 98*
3633^C	$2p^2\ ^3P_1$	$2p^2\ ^3P_2$	804 890	832 410		M1	2.77+2	C	98*
3438^C	0	1	775 810	804 890		M1	4.19+2	C	98*
1174.1^C	$2p^2\ ^3P_2$	$2p^2\ ^1D_2$	832 410	917 580		M1	2.5+3	D+	98*
887.39^C	1	2	804 890	917 580		M1	2.1+3	D	98*
537.29^C	$2s2p\ ^1P^o_1$	$2p^2\ ^3P_0$	589 692	775 810		5.7 − 4	1.3+7	E	98*
464.69^C	1	1	589 692	804 890		2.0 − 4	2.0+6	E	98*
412.00^C	1	2	589 692	832 410		1.3 − 2	1.0+8	D	98*
412.49^C	$2s2p\ ^3P^o_2$	$2s2p\ ^1P^o_1$	347 260	589 692		M1	2.9+3	D−	98*
350.79^C	1	1	304 620	589 692		M1	2.8+3	D−	98*
331.67^C	0	1	288 190	589 692		M1	4.5+3	D−	98*
334.14^C	$2p^2\ ^3P_1$	$2p^2\ ^1S_0$	804 890	1 104 170		M1	3.8+4	D	98*
328.278	$2s^2\ ^1S_0$	$2s2p\ ^3P^o_1$	0	304 620		6.6 − 4	1.4+7	D	25, 48°, 69, 98*, 103
305.01	$2s2p\ ^1P^o_1$	$2p^2\ ^1D_2$	589 692	917 580		2.03 − 1	2.92+9	B	67°, 98*
218.50	$2s2p\ ^3P^o_2$	$2p^2\ ^3P_1$	347 260	804 890		7.75 − 2	3.61+9	B	67°, 98*
212.22	1	0	304 620	775 810		6.48 − 2	9.6+9	B	67°, 98*
206.10	2	2	347 260	832 410		2.21 − 1	6.94+9	B	67°, 98*
199.89	1	1	304 620	804 890		5.07 − 2	2.82+9	B	67°, 98*
193.54	0	1	288 190	804 890		7.09 − 2	4.21+9	B	67°, 98*
189.47	1	2	304 620	832 410		9.18 − 2	3.41+9	B	67°, 98*
194.37	$2s2p\ ^1P^o_1$	$2p^2\ ^1S_0$	589 692	1 104 170		1.28 − 1	2.27+10	B	67°, 98*
175.33	$2s2p\ ^3P^o_2$	$2p^2\ ^1D_2$	347 260	917 580		3.4 − 2	1.5+9	C	67°, 98*
163.14^C	1	2	304 620	917 580		2.3 − 3	1.2+8	D	98*
169.580	$2s^2\ ^1S_0$	$2s2p\ ^1P^o_1$	0	589 692		1.75 − 1	1.35+10	B	25, 48°, 61, 98*, 103
124.24^C	$2s^2\ ^1S_0$	$2p^2\ ^3P_1$	0	804 890		M1	2.2+3	E	98*
17.356^C	$2p^2\ ^1S_0$	$2p3d\ ^1P^o_1$	1 104 170	6 866 000		1.29	9.5+12	C−	98*
17.201^C	$2s2p\ ^3P^o_2$	$2s3s\ ^3S_1$	347 260	6 160 800		1.4 − 1	1.1+12	D	98*
17.076	1	1	304 620	6 160 800		8.4 − 2	6.4+11	D	73, 74°, 98*
17.028^C	0	1	288 190	6 160 800		2.8 − 2	2.1+11	D	98*
17.181	$2p^2\ ^1D_2$	$2p3d\ ^1D^o_2$	917 580	6 738 000		3.7 − 1	1.7+12	C−	73, 74°, 98*
17.076	$2s2p\ ^1P^o_1$	$2s3d\ ^1D_2$	589 692	6 445 900		1.8	8.3+12	C−	73, 74°, 98*
16.960^C	$2p^2\ ^1D_2$	$2p3d\ ^3P^o_2$	917 580	6 813 700		3.7 − 1	1.7+12	C−	98*
16.933^C	$2p^2\ ^3P_2$	$2p3d\ ^1D^o_2$	832 410	6 738 000		9.0 − 2	4.2+11	C−	98*
16.855^C	1	2	804 890	6 738 000		9.3 − 1	4.4+12	D	98*
16.876^C	$2p^2\ ^3P_2$	$2p3d\ ^3D^o_1$	832 410	6 758 000		4.4 − 3	3.4+10	D	98*
16.795	1	1	804 890	6 758 000		3.3 − 1	2.6+12	C−	74°, 98*
16.788^C	2	2	832 410	6 789 100		1.1 − 1	5.2+11	D	98*
16.736	2	3	832 410	6 807 600		3.6	1.2+13	C−	61°, 98*
16.719	0	1	775 810	6 758 000		1.28	1.02+13	C−	73, 74°, 98*
16.70	1	2	804 890	6 789 100		1.5	7.3+12	C−	61°, 98*
16.811	$2p^2\ ^1D_2$	$2p3d\ ^1P^o_1$	917 580	6 866 000		8.0 − 2	6.3+11	D	73, 74°, 98*
16.795	$2p^2\ ^1D_2$	$2p3d\ ^1F^o_3$	917 580	6 871 700		5.35	1.81+13	C−	61°, 73, 74°, 98*
16.719	$2p^2\ ^3P_2$	$2p3d\ ^3P^o_2$	832 410	6 813 700		1.52	7.3+12	C−	73, 74°, 98*
16.719	2	1	832 410	6 813 700		4.1 − 1	3.3+12	C−	73, 74°, 98*
16.642^C	1	1	804 890	6 813 700		6.6 − 1	5.3+12	C−	98*
16.642^C	1	2	804 890	6 813 700		1.3 − 1	6.2+11	D	98*
16.562^C	0	1	775 810	6 813 700		1.1 − 2	8.9+10	D	98*

Ti XIX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
16.575[C]	$2s2p\ ^3P^o_2$	$2s3d\ ^3D_1$	347 260	6 380 600		3.6 − 2	2.9+11	C−	98*
16.551[C]	2	2	347 260	6 389 200		5.5 − 1	2.7+12	C−	98*
16.514	2	3	347 260	6 402 700		3.0	1.0+13	C−	61°, 98*
16.458[C]	1	1	304 620	6 380 600		5.4 − 1	4.4+12	C−	98*
16.440	1	2	304 620	6 389 200		1.7	8.2+12	C−	61, 73, 74°, 98*
16.414	0	1	288 190	6 380 600		7.4 − 1	6.1+12	C−	73, 74°, 98*
16.482[C]	$2s2p\ ^1P^o_1$	$2p3p\ ^1P_1$	589 692	6 657 000		1.7 − 1	1.4+12	D	98*
16.178	$2s2p\ ^1P^o_1$	$2p3p\ ^1D_2$	589 692	6 770 900		7.5 − 1	3.8+12	C−	73, 74°, 98*
15.866	$2s^2\ ^1S_0$	$2s3p\ ^3P^o_1$	0	6 303 200		3.3 − 1	2.9+12	C−	61, 73, 74°, 98*
15.849[C]	$2s2p\ ^3P^o_2$	$2p3p\ ^3D_2$	347 260	6 657 000		3.7 − 2	2.0+11	D	98*
15.742	1	2	304 620	6 657 000		4.5 − 1	2.4+12	C−	73°, 98*
15.742	2	3	347 260	6 699 700		7.0 − 1	2.7+12	C−	61, 73°, 98*
15.742	$2s2p\ ^3P^o_1$	$2p3p\ ^1P_1$	304 620	6 657 000					73, 74°
15.738	$2s2p\ ^3P^o_2$	$2p3p\ ^3S_1$	347 260	6 701 300					73, 74°
15.671	$2s2p\ ^3P^o_1$	$2p3p\ ^3P_0$	304 620	6 685 800		1.2 − 1	3.3+12	D	73, 74°, 98*
12.726	$2p^2\ ^1D_2$	$2p4d\ ^1F^o_3$	917 580	8 775 500					75
12.688	$2p^2\ ^3P_1$	$2p4d\ ^3P^o_2$	804 890	8 720 700					75
12.622	2	2	832 410	8 720 700					75
12.592	$2p^2\ ^3P_1$	$2p4d\ ^1D^o_2$	804 890	8 746 400					75
12.480	$2s2p\ ^3P^o_2$	$2s4d\ ^3D_3$	347 260	8 360 100					75
12.410	1	2	304 620	8 362 600					75
12.379	0	1	288 190	8 366 400					75
12.010	$2s^2\ ^1S_0$	$2s4p\ ^1P^o_1$	0	8 326 400		1.6 − 1	2.5+12	D	75°, 98*
11.958	$2s2p\ ^3P^o_2$	$2p4p\ ^3D_3$	347 260	8 709 800					75

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Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1609.1^C	$1s^22p\ ^2P^o_{1/2}$	$1s^22p\ ^2P^o_{3/2}$	323 521	385 666		M1	2.15+3	B	98*
309.099^S	$1s^22s\ ^2S_{1/2}$	$1s^22p\ ^2P^o_{1/2}$	0	323 521		4.24 − 2	1.48+9	B+	25, 48, 76, 77°, 98*, 103
259.292^S	$_{1/2}$	$_{3/2}$	0	385 666		1.02 − 1	2.52+9	B+	25, 48, 76, 77°, 98*, 103
102.19^C	$1s^24d\ ^2D_{3/2}$	$1s^25p\ ^2P^o_{1/2}$	[8 746 800]	[9 725 400]		1.04 − 1	3.32+10	C	98*
102.03^C	$_{5/2}$	$_{3/2}$	[8 749 240]	[9 729 370]		1.9 − 1	3.0+10	C	98*
101.77^C	$_{3/2}$	$_{3/2}$	[8 746 800]	[9 729 370]		2.1 − 2	3.4+9	D	98*
99.574^C	$1s^24p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	[8 732 440]	[9 736 720]		2.3 − 1	3.9+10	D	98*
99.450^C	$_{3/2}$	$_{5/2}$	[8 732 440]	[9 737 970]		2.10	2.35+11	C+	98*
98.809^C	$_{1/2}$	$_{3/2}$	[8 724 670]	[9 736 720]		1.17	2.00+11	C+	98*
64.7^C	$1s^24p\ ^2P^o_{3/2}$	$1s^26d\ ^2D_{5/2}$	[8 732 440]	10 278 000		5.08 − 1	1.35+11	C+	98*
64.7^C	$_{3/2}$	$_{3/2}$	[8 732 440]	10 278 000		5.6 − 2	2.2+10	D	98*
64.4^C	$_{1/2}$	$_{3/2}$	[8 724 670]	10 278 000		2.82 − 1	1.12+11	C+	98*
53.5^C	$1s^24p\ ^2P^o_{3/2}$	$1s^27d\ ^2D_{5/2}$	[8 732 440]	10 601 000		2.21 − 1	8.59+10	C+	98*
53.5^C	$_{3/2}$	$_{3/2}$	[8 732 440]	10 601 000		2.4 − 2	1.4+10	D	98*
53.3^C	$_{1/2}$	$_{3/2}$	[8 724 670]	10 601 000		1.24 − 1	7.26+10	C+	98*
48.09^C	$1s^24p\ ^2P^o_{3/2}$	$1s^28d\ ^2D_{5/2}$	[8 732 440]	10 812 000		1.19 − 1	5.68+10	C	98*
48.09^C	$_{3/2}$	$_{3/2}$	[8 732 440]	10 812 000		1.3 − 2	9.6+9	D	98*
47.91^C	$_{1/2}$	$_{3/2}$	[8 724 670]	10 812 000		6.56 − 2	4.79+10	C	98*
47.3265^C	$1s^23p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	[6 574 040]	[8 687 020]					
46.9175^C	$_{1/2}$	$_{1/2}$	[6 555 620]	[8 687 020]					
47.2467^C	$1s^23d\ ^2D_{3/2}$	$1s^24p\ ^2P^o_{1/2}$	[6 608 120]	[8 724 670]		4.0 − 2	6.0+10	C	98*
47.2028^C	$_{5/2}$	$_{3/2}$	[6 613 920]	[8 732 440]		7.44 − 2	5.6+10	C	98*
47.0739^C	$_{3/2}$	$_{3/2}$	[6 608 120]	[8 732 440]		8.4 − 3	6.3+9	D	98*
46.79	$1s^23d\ ^2D_{5/2}$	$1s^24f\ ^2F^o_{7/2}$	[6 613 920]	[8 751 000]					78
46.69	$_{3/2}$	$_{5/2}$	[6 608 120]	[8 750 000]					78
46.0244^C	$1s^23p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	[6 574 040]	[8 746 800]		2.3 − 1	1.8+11	C+	98*
45.9728^C	$_{3/2}$	$_{5/2}$	[6 574 040]	[8 749 240]		2.1	1.1+12	B	98*
45.6375^C	$_{1/2}$	$_{3/2}$	[6 555 620]	[8 746 800]		1.2	9.6+11	B	98*
44.2736^C	$1s^23s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	[6 465 990]	[8 724 670]					
44.1219^C	$_{1/2}$	$_{3/2}$	[6 465 990]	[8 732 440]					
32.0981^C	$1s^23d\ ^2D_{5/2}$	$1s^25p\ ^2P^o_{3/2}$	[6 613 920]	[9 729 370]		1.5 − 2	2.4+10	D	98*
32.0792^C	$_{3/2}$	$_{1/2}$	[6 608 120]	[9 725 400]		8.4 − 3	2.7+10	D	98*
32.0384^C	$_{3/2}$	$_{3/2}$	[6 608 120]	[9 729 370]		1.6 − 3	2.6+9	E	98*
31.9272^C	$1s^23p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	[6 574 040]	[9 706 170]					
31.7405^C	$_{1/2}$	$_{1/2}$	[6 555 620]	[9 706 170]					
31.6188^C	$1s^23p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	[6 574 040]	[9 736 720]		5.6 − 2	9.2+10	D	98*
31.6063^C	$_{3/2}$	$_{5/2}$	[6 574 040]	[9 737 970]		4.92 − 1	5.49+11	C+	98*
31.4357^C	$_{1/2}$	$_{3/2}$	[6 555 620]	[9 736 720]		2.74 − 1	4.64+11	C+	98*
27.32^C	$1s^23d\ ^2D_{5/2}$	$1s^26p\ ^2P^o_{3/2}$	[6 613 920]	10 274 000		5.5 − 3	1.2+10	D	98*
27.28^C	$_{3/2}$	$_{1/2}$	[6 608 120]	10 274 000		3.1 − 3	1.4+10	D	98*
27.28^C	$_{3/2}$	$_{3/2}$	[6 608 120]	10 274 000		6.4 − 4	1.4+9	E	98*
27.00^C	$1s^23p\ ^2P^o_{3/2}$	$1s^26d\ ^2D_{5/2}$	[6 574 040]	10 278 000		2.00 − 1	3.05+11	C+	98*
27.00^C	$_{3/2}$	$_{3/2}$	[6 574 040]	10 278 000		2.2 − 2	5.1+10	D	98*
26.86^C	$_{1/2}$	$_{3/2}$	[6 555 620]	10 278 000		1.12 − 1	2.58+11	C+	98*
24.83^C	$1s^23p\ ^2P^o_{3/2}$	$1s^27d\ ^2D_{5/2}$	[6 574 040]	10 601 000		1.04 − 1	1.89+11	C+	98*
24.83^C	$_{3/2}$	$_{3/2}$	[6 574 040]	10 601 000		1.2 − 2	3.1+10	D	98*
24.72^C	$_{1/2}$	$_{3/2}$	[6 555 620]	10 601 000		5.80 − 2	1.57+11	C+	98*
23.60^C	$1s^23p\ ^2P^o_{3/2}$	$1s^28d\ ^2D_{5/2}$	[6 574 040]	10 812 000		6.4 − 2	1.2+11	C	98*
23.60^C	$_{3/2}$	$_{3/2}$	[6 574 040]	10 812 000		6.8 − 3	2.0+10	D	98*
23.49^C	$_{1/2}$	$_{3/2}$	[6 555 620]	10 812 000		3.4 − 2	1.1+11	C	98*

Ti XX – Continued

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
16.4465^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^23s\ ^2S_{1/2}$	385 666	[6 465 990]					80,81
16.2801^{C}	1/2	1/2	323 521	[6 465 990]					80,81
16.0708^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^23d\ ^2D_{3/2}$	385 666	[6 608 120]		2.7 − 1	1.8+12	B	80, 81, 98*
16.0559^{C}	3/2	5/2	385 666	[6 613 920]		2.4	1.05+13	B	80, 81, 98*
15.9119^{C}	1/2	3/2	323 521	[6 608 120]		1.34	8.84+12	B	80, 81, 98*
15.2541^{C}	$1s^22s\ ^2S_{1/2}$	$1s^23p\ ^2P^o_{1/2}$	0	[6 555 620]		2.50 − 1	3.58+12	B	80, 98*
15.2113^{C}	1/2	3/2	0	[6 574 040]		4.86 − 1	3.50+12	B	80, 98*
12.0462^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	385 666	[8 687 020]					81
11.9567^{C}	1/2	1/2	323 521	[8 687 020]					81
11.9601^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	385 666	[8 746 800]		4.8 − 2	5.6+11	C+	80, 81, 98*
11.9566^{C}	3/2	5/2	385 666	[8 749 240]		4.4 − 1	3.4+12	B	80, 81, 98*
11.8719^{C}	1/2	3/2	323 521	[8 746 800]		2.4 − 1	2.8+12	B	80, 81, 98*
11.4618^{C}	$1s^22s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	0	[8 724 670]					80,81
11.4516^{C}	1/2	3/2	0	[8 732 440]					80,81
10.7290^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	385 666	[9 706 170]					81
10.6580^{C}	1/2	1/2	323 521	[9 706 170]					81
10.6940^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	385 666	[9 736 720]		1.8 − 2	2.6+11	D	80, 81, 98*
10.6926^{C}	3/2	5/2	385 666	[9 737 970]		1.62 − 1	1.58+12	C+	80, 81, 98*
10.6234^{C}	1/2	3/2	323 521	[9 736 720]		9.06 − 2	1.34+12	C+	80, 81, 98*
10.2824^{C}	$1s^22s\ ^2S_{1/2}$	$1s^25p\ ^2P^o_{1/2}$	0	[9 725 400]					80,81
10.2782^{C}	1/2	3/2	0	[9 729 370]					80,81
10.109	$1s^22p\ ^2P^o_{3/2}$	$1s^26d\ ^2D_{5/2}$	385 666	10 278 000		7.92 − 2	8.6+11	C+	80°, 98*
10.109	3/2	3/2	385 666	10 278 000		8.8 − 3	1.4+11	D	80°, 98*
10.046	1/2	3/2	323 521	10 278 000		4.42 − 2	7.29+11	C+	80°, 98*
9.788	$1s^22p\ ^2P^o_{3/2}$	$1s^27d\ ^2D_{5/2}$	385 666	10 601 000		4.52 − 2	5.26+11	C+	80°, 98*
9.788	3/2	3/2	385 666	10 601 000		4.8 − 3	8.4+10	D	80°, 98*
9.733	1/2	3/2	323 521	10 601 000		2.52 − 2	4.45+11	C+	80°, 98*
9.733	$1s^22s\ ^2S_{1/2}$	$1s^26p\ ^2P^o_{3/2}$	0	10 274 000					80
9.733	1/2	1/2	0	10 274 000					80
9.591	$1s^22p\ ^2P^o_{3/2}$	$1s^28d\ ^2D_{5/2}$	385 666	10 812 000		2.8 − 2	3.4+11	D	80°, 98*
9.591	3/2	3/2	385 666	10 812 000		3.2 − 3	5.7+10	E	80°, 98*
9.534	1/2	3/2	323 521	10 812 000		1.6 − 2	2.9+11	D	80°, 98*
9.434	$1s^22s\ ^2S_{1/2}$	$1s^27p\ ^2P^o_{3/2}$	0	10 600 000					80
9.434	1/2	1/2	0	10 600 000					80
9.246	$1s^22s\ ^2S_{1/2}$	$1s^28p\ ^2P^o_{3/2}$	0	10 815 000					80
9.246	1/2	1/2	0	10 815 000					80
9.128	$1s^22s\ ^2S_{1/2}$	$1s^29p\ ^2P^o_{3/2}$	0	10 955 000					80
9.128	1/2	1/2	0	10 955 000					80
2.6816^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s2s^2\ ^2S_{1/2}$	385 666	[37 676 000]					81
2.6772^{C}	1/2	1/2	323 521	[37 676 000]					81
2.6497^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^4P_{1/2}$	385 666	[38 125 000]					81
2.6477^{C}	3/2	3/2	385 666	[38 154 000]					81
2.6458^{C}	3/2	5/2	385 666	[38 181 000]					81
2.6454^{C}	1/2	1/2	323 521	[38 125 000]					81
2.6434^{C}	1/2	3/2	323 521	[38 154 000]					81
2.6484^{C}	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^4P^o_{1/2}$	0	[37 759 000]					79,81
2.6473^{C}	1/2	3/2	0	[37 774 000]					79,81
2.6363^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1D)\ ^2D_{3/2}$	385 666	[38 318 000]					81
2.6354^{C}	3/2	5/2	385 666	[38 330 000]					81
2.6320^{C}	1/2	3/2	323 521	[38 318 000]					81

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Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2.6348^C	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^2P_{1/2}$	385 666	[38 338 000]					81
2.6306^C	1/2	1/2	323 521	[38 338 000]					81
2.6302^C	3/2	3/2	385 666	[38 405 000]					81
2.6260^C	1/2	3/2	323 521	[38 405 000]					81
2.6302^C	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^2P^o_{1/2}$	0	[38 020 000]		1.3 − 1	6.1+13	C	79, 81, 98*, 102
2.6279^C	1/2	3/2	0	[38 053 000]		2.0 − 2	4.9+12	D	81, 98*
2.6213^C	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^1P^o)\ ^2P^o_{1/2}$	0	[38 149 000]					79,81
2.6204^C	1/2	3/2	0	[38 162 000]					79,81,102
2.6202^C	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1S)\ ^2S_{1/2}$	385 666	[38 550 000]					79,81,102
2.6160^C	1/2	1/2	323 521	[38 550 000]					81
2.255	$1s^22p\ ^2P^o_{3/2}$	$1s2p3p\ ^2D_{5/2}$	385 666	44 730 000					82
2.243	$1s^23s\ ^2S_{1/2}$	$1s2s3p\ ^2P^o_{1/2}$	[6 465 990]	51 050 000					82
2.243	1/2	3/2	[6 465 990]	51 050 000					82
2.243	$1s^23s\ ^2S_{1/2}$	$1s2p3s\ ^2P^o_{1/2}$	[6 465 990]	51 050 000					82
2.151	$1s^22p\ ^2P^o_{3/2}$	$1s2p4p\ ^2D_{5/2}$	385 666	46 880 000					82
2.105	$1s^22p\ ^2P^o_{3/2}$	$1s2p5p\ ^2D_{5/2}$	385 666	47 890 000					82

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Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
9000^C	$1s5s\ ^1S_0$	$1s5p\ ^1P^o_1$	[48 452 600]	[48 463 700]		1.0 − 1	2.7+6	E	98*
8400^C	$1s5s\ ^3S_1$	$1s5p\ ^3P^o_1$	[48 440 800]	[48 452 700]		1.0 − 1	3.2+6	E	98*
6400^C	1	2	[48 440 800]	[48 456 300]					
8300^C	$1s4p\ ^3P^o_2$	$1s4d\ ^3D_2$	[47 358 900]	[47 371 000]					
6700^C	2	3	[47 358 900]	[47 373 800]					
5200^C	1	2	[47 351 900]	[47 371 000]					
5200^C	1	1	[47 351 900]	[47 371 100]					
4880^C	0	1	[47 350 600]	[47 371 100]					
4560^C	$1s4s\ ^1S_0$	$1s4p\ ^1P^o_1$	[47 351 600]	[47 373 500]		8.1 − 2	8.6+6	E	98*
4270^C	$1s4s\ ^3S_1$	$1s4p\ ^3P^o_1$	[47 328 500]	[47 351 900]		8.1 − 2	9.9+6	E	98*
3290^C	1	2	[47 328 500]	[47 358 900]					
1930^C	$1s3s\ ^1S_0$	$1s3p\ ^1P^o_1$	[44 966 970]	[45 018 670]		5.8 − 2	3.5+7	D	98*
1800^C	$1s3s\ ^3S_1$	$1s3p\ ^3P^o_1$	[44 911 910]	[44 967 630]		5.7 − 2	3.9+7	E	98*
565.9^C	$1s2s\ ^1S_0$	$1s2p\ ^1P^o_1$	[38 131 640]	[38 308 340]		3.29 − 2	2.28+8	B	98*
523.9^C	$1s2s\ ^3S_1$	$1s2p\ ^3P^o_0$	[37 923 880]	[38 114 760]		1.20 − 2	2.93+8	B	98*
496.57^C	1	1	[37 923 880]	[38 125 260]		3.66 − 2	3.31+8	B	98*
389.50^C	1	2	[37 923 880]	[38 180 620]		8.11 − 2	7.13+8	B	88, 98*
260.11^C	$1s2s\ ^3S_1$	$1s2p\ ^1P^o_1$	[37 923 880]	[38 308 340]		3.12 − 3	1.02+8	B	98*
92.67^C	$1s4p\ ^1P^o_1$	$1s5s\ ^1S_0$	[47 373 500]	[48 452 600]		1.7 − 1	1.3+11	C	98*
92.43^C	$1s4p\ ^3P^o_2$	$1s5s\ ^3S_1$	[47 358 900]	[48 440 800]					
91.84^C	1	1	[47 351 900]	[48 440 800]		1.7 − 1	4.4+10	D	98*
89.92^C	$1s4s\ ^1S_0$	$1s5p\ ^1P^o_1$	[47 351 600]	[48 463 700]		4.6 − 1	1.3+11	D	98*
88.95^C	$1s4s\ ^3S_1$	$1s5p\ ^3P^o_1$	[47 328 500]	[48 452 700]		4.56 − 1	1.28+11	C	98*
42.865^C	$1s3p\ ^1P^o_1$	$1s4s\ ^1S_0$	[45 018 670]	[47 351 600]		1.1 − 1	3.8+11	C	98*
42.782^C	$1s3d\ ^3D_1$	$1s4p\ ^3P^o_0$	[45 013 170]	[47 350 600]					
42.758^C	1	1	[45 013 170]	[47 351 900]					
42.754^C	2	1	[45 012 940]	[47 351 900]					
42.745^C	3	2	[45 019 460]	[47 358 900]					
42.626^C	2	2	[45 012 940]	[47 358 900]					
42.656^C	$1s3p\ ^3P^o_2$	$1s4s\ ^3S_1$	[44 984 160]	[47 328 500]					
42.357^C	1	1	[44 967 630]	[47 328 500]		1.0 − 1	1.3+11	C−	98*
42.511^C	$1s3d\ ^1D_2$	$1s4p\ ^1P^o_1$	[45 021 140]	[47 373 500]		5.5 − 2	6.8+10	C	98*
42.448^C	$1s3p\ ^1P^o_1$	$1s4d\ ^1D_2$	[45 018 670]	[47 374 500]		1.9	1.4+12	C	98*
41.896^C	$1s3p\ ^3P^o_2$	$1s4d\ ^3D_2$	[44 984 160]	[47 371 000]					
41.847^C	2	3	[44 984 160]	[47 373 800]					
41.608^C	1	2	[44 967 630]	[47 371 000]					
41.607^C	1	1	[44 967 630]	[47 371 100]					
41.553^C	0	1	[44 964 560]	[47 371 100]					
41.554^C	$1s3s\ ^1S_0$	$1s4p\ ^1P^o_1$	[44 966 970]	[47 373 500]		4.10 − 1	5.3+11	C	98*
40.984^C	$1s3s\ ^3S_1$	$1s4p\ ^3P^o_1$	[44 911 910]	[47 351 900]		4.08 − 1	5.4+11	C	98*
40.867^C	1	2	[44 911 910]	[47 358 900]					
29.121^C	$1s3p\ ^1P^o_1$	$1s5s\ ^1S_0$	[45 018 670]	[48 452 600]		2.3 − 2	1.8+11	C	98*
28.930^C	$1s3p\ ^3P^o_2$	$1s5s\ ^3S_1$	[44 984 160]	[48 440 800]					
28.792^C	1	1	[44 967 630]	[48 440 800]		2.3 − 2	6.2+10	D	98*
28.598^C	$1s3s\ ^1S_0$	$1s5p\ ^1P^o_1$	[44 966 970]	[48 463 700]		1.06 − 1	2.88+11	C+	98*
28.242^C	$1s3s\ ^3S_1$	$1s5p\ ^3P^o_1$	[44 911 910]	[48 452 700]		1.1 − 1	2.9+11	C	98*
28.214^C	1	2	[44 911 910]	[48 456 300]					
15.018^C	$1s2p\ ^1P^o_1$	$1s3s\ ^1S_0$	[38 308 340]	[44 966 970]		4.5 − 2	1.3+12	C+	98*

Ti XXI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
14.897[C]	$1s2p\ ^1P^o_1$	$1s3d\ ^1D_2$	[38 308 340]	[45 021 140]		2.1	1.3+13	C+	75, 98*
14.856[C]	$1s2p\ ^3P^o_2$	$1s3s\ ^3S_1$	[38 180 620]	[44 911 910]					
14.735[C]	1	1	[38 125 260]	[44 911 910]		4.5 − 2	4.6+11	C−	98*
14.636[C]	$1s2p\ ^3P^o_2$	$1s3d\ ^3D_2$	[38 180 620]	[45 012 940]					
14.622[C]	2	3	[38 180 620]	[45 019 460]					75
14.519[C]	1	2	[38 125 260]	[45 012 940]					75
14.518[C]	1	1	[38 125 260]	[45 013 170]					
14.496[C]	0	1	[38 114 760]	[45 013 170]					
14.520[C]	$1s2s\ ^1S_0$	$1s3p\ ^1P^o_1$	[38 131 640]	[45 018 670]		3.73 − 1	3.93+12	C	98*
14.197[C]	$1s2s\ ^3S_1$	$1s3p\ ^3P^o_1$	[37 923 880]	[44 967 630]		3.72 − 1	4.10+12	C	75, 98*
14.164[C]	1	2	[37 923 880]	[44 984 160]					75
11.058[C]	$1s2p\ ^1P^o_1$	$1s4s\ ^1S_0$	[38 308 340]	[47 351 600]		9.6 − 3	5.2+11	C	98*
11.030[C]	$1s2p\ ^1P^o_1$	$1s4d\ ^1D_2$	[38 308 340]	[47 374 500]		3.6 − 1	4.0+12	C	98*
10.931[C]	$1s2p\ ^3P^o_2$	$1s4s\ ^3S_1$	[38 180 620]	[47 328 500]					
10.866[C]	1	1	[38 125 260]	[47 328 500]		9.6 − 3	1.8+11	D	98*
10.881[C]	$1s2p\ ^3P^o_2$	$1s4d\ ^3D_2$	[38 180 620]	[47 371 000]					
10.878[C]	2	3	[38 180 620]	[47 373 800]					
10.816[C]	1	2	[38 125 260]	[47 371 000]					
10.816[C]	1	1	[38 125 260]	[47 371 100]					
10.803[C]	0	1	[38 114 760]	[47 371 100]					
10.820[C]	$1s2s\ ^1S_0$	$1s4p\ ^1P^o_1$	[38 131 640]	[47 373 500]		9.0 − 2	1.7+12	C+	98*
10.607[C]	$1s2s\ ^3S_1$	$1s4p\ ^3P^o_1$	[37 923 880]	[47 351 900]		9.0 − 2	1.8+12	C+	98*
10.599[C]	1	2	[37 923 880]	[47 358 900]					
9.8578[C]	$1s2p\ ^1P^o_1$	$1s5s\ ^1S_0$	[38 308 340]	[48 452 600]		3.9 − 3	2.7+11	C	98*
9.7464[C]	$1s2p\ ^3P^o_2$	$1s5s\ ^3S_1$	[38 180 620]	[48 440 800]					
9.6941[C]	1	1	[38 125 260]	[48 440 800]		3.9 − 3	9.2+10	D	98*
9.6786[C]	$1s2s\ ^1S_0$	$1s5p\ ^1P^o_1$	[38 131 640]	[48 463 700]		3.7 − 2	8.8+11	C+	98*
9.4977[C]	$1s2s\ ^3S_1$	$1s5p\ ^3P^o_1$	[37 923 880]	[48 452 700]		3.6 − 2	8.7+11	C+	98*
9.4945[C]	1	2	[37 923 880]	[48 456 300]					
2.636861[C]	$1s^2\ ^1S_0$	$1s2s\ ^3S_1$	0	[37 923 880]		M1	3.85+7	B	98*
2.622933[C]	$1s^2\ ^1S_0$	$1s2p\ ^3P^o_1$	0	[38 125 260]		3.46 − 2	1.12+13	B	74, 79, 83, 98*
2.619130[C]	0	2	0	[38 180 620]		M2	1.69+9	B	83, 98*
2.610398[C]	$1s^2\ ^1S_0$	$1s2p\ ^1P^o_1$	0	[38 308 340]		7.35 − 1	2.40+14	B	74, 79, 83, 84, 85, 86, 87, 98*
2.5396[C]	$1s2p\ ^1P^o_1$	$2s^2\ ^1S_0$	[38 308 340]	[77 684 000]		3.9 − 2	4.1+13	D	81, 98*
2.5279[C]	$1s2p\ ^3P^o_1$	$2s^2\ ^1S_0$	[38 125 260]	[77 684 000]		1.1 − 2	1.2+13	D	81, 98*
2.5249[C]	$1s2p\ ^1P^o_1$	$2p^2\ ^3P_0$	[38 308 340]	[77 913 000]					81
2.5227[C]	1	1	[38 308 340]	[77 948 000]					81
2.5204[C]	1	2	[38 308 340]	[77 984 000]		1.2 − 1	2.6+13	D	81, 89, 98*
2.5248[C]	$1s2s\ ^1S_0$	$2s2p\ ^3P^o_1$	[38 131 640]	[77 739 000]					81
2.5146[C]	$1s2p\ ^3P^o_2$	$2p^2\ ^3P_1$	[38 180 620]	[77 948 000]		3.4 − 1	1.2+14	C	81, 98*
2.5134[C]	1	0	[38 125 260]	[77 913 000]		2.6 − 1	2.7+14	C	81, 98*
2.5124[C]	2	2	[38 180 620]	[77 984 000]		8.5 − 1	1.8+14	C	81, 89, 98*
2.5111[C]	1	1	[38 125 260]	[77 948 000]		2.0 − 1	6.9+13	C	81, 98*
2.5105[C]	0	1	[38 114 760]	[77 948 000]		2.7 − 1	9.6+13	C	81, 98*
2.5089[C]	1	2	[38 125 260]	[77 984 000]		3.6 − 1	7.9+13	D	81, 89, 98*
2.5140[C]	$1s2p\ ^1P^o_1$	$2p^2\ ^1D_2$	[38 308 340]	[78 085 000]		1.1	2.4+14	C	81, 83, 89, 98*
2.5130[C]	$1s2s\ ^3S_1$	$2s2p\ ^3P^o_0$	[37 923 880]	[77 717 000]		1.3 − 1	1.4+14	C	81, 98*
2.5116[C]	1	1	[37 923 880]	[77 739 000]		3.9 − 1	1.4+14	C	81, 98*
2.5079[C]	1	2	[37 923 880]	[77 798 000]		6.6 − 1	1.4+14	C	81, 83, 89, 98*

Ti XXI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2.5060[C]	$1s2p\ ^3P^o_2$	$2p^2\ ^1D_2$	[38 180 620]	[78 085 000]		1.7 – 1	3.5+13	D	81, 98*
2.5026[C]	$_1$	$_2$	[38 125 260]	[78 085 000]					81
2.5053[C]	$1s2s\ ^1S_0$	$2s2p\ ^1P^o_1$	[38 131 640]	[78 046 000]		4.0 – 1	1.4+14	C	81, 89, 98*
2.4981[C]	$1s2p\ ^1P^o_1$	$2p^2\ ^1S_0$	[38 308 340]	[78 338 000]		2.3 – 1	2.4+14	C	81, 98*
2.4924[C]	$1s2s\ ^3S_1$	$2s2p\ ^1P^o_1$	[37 923 880]	[78 046 000]					81
2.4868[C]	$1s2p\ ^3P^o_1$	$2p^2\ ^1S_0$	[38 125 260]	[78 338 000]					81
2.22658[C]	$1s^2\ ^1S_0$	$1s3s\ ^3S_1$	0	[44 911 910]		M1	1.50+7	C	98*
2.22382[C]	$1s^2\ ^1S_0$	$1s3p\ ^3P^o_1$	0	[44 967 630]		8.4 – 3	3.8+12	E	82, 98*
2.22130[C]	$1s^2\ ^1S_0$	$1s3p\ ^1P^o_1$	0	[45 018 670]		1.41 – 1	6.35+13	C+	82, 85, 98*
2.11289[C]	$1s^2\ ^1S_0$	$1s4s\ ^3S_1$	0	[47 328 500]		M1	6.76+6	C	98*
2.11185[C]	$1s^2\ ^1S_0$	$1s4p\ ^3P^o_1$	0	[47 351 900]		3.1 – 3	1.5+12	E	82, 98*
2.11088[C]	$1s^2\ ^1S_0$	$1s4p\ ^1P^o_1$	0	[47 373 500]		5.22 – 2	2.60+13	C+	82, 85, 87, 98*
2.06387[C]	$1s^2\ ^1S_0$	$1s5p\ ^3P^o_1$	0	[48 452 700]		1.6 – 3	8.4+11	E	82, 98*
2.06340[C]	$1s^2\ ^1S_0$	$1s5p\ ^1P^o_1$	0	[48 463 700]		2.52 – 2	1.32+13	C+	82, 85, 87, 98*
2.041	$1s^2\ ^1S_0$	$1s6p\ ^1P^o_1$	0	49 000 000					82°, 85
2.041	$1s^2\ ^1S_0$	$1s6p\ ^3P^o_1$	0	49 000 000					82
2.026	$1s^2\ ^1S_0$	$1s7p\ ^1P^o_1$	0	49 360 000					82°, 85
2.026	$1s^2\ ^1S_0$	$1s7p\ ^3P^o_1$	0	49 360 000					82
2.015	$1s^2\ ^1S_0$	$1s8p\ ^1P^o_1$	0	49 630 000					82°, 85
2.015	$1s^2\ ^1S_0$	$1s8p\ ^3P^o_1$	0	49 630 000					82

Ti XXII

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3991[C]	$3s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[47 501 650]	[47 526 700]		3.40 − 2	3.55+6	A	97*
3876[C]	$3p\ ^2P^o_{1/2}$	$3d\ ^2D_{3/2}$	[47 500 860]	[47 526 650]		2.18 − 2	2.42+6	A	97*
1182[C]	$2s\ ^2S_{1/2}$	$2p\ ^2P^o_{3/2}$	[40 056 750]	[40 141 340]		1.91 − 2	2.28+7	A	97*
38.6888[C]	$3d\ ^2D_{5/2}$	$4f\ ^2F^o_{7/2}$	[47 535 160]	[50 119 890]		5.82	3.24+12	A	97*
38.5892[C]	$3p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[47 526 700]	[50 118 100]		2.23	1.67+12	A	97*
38.2719[C]	$3s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[47 501 650]	[50 114 530]		6.54 − 1	7.45+11	A	97*
26.4550[C]	$3d\ ^2D_{5/2}$	$5f\ ^2F^o_{7/2}$	[47 535 160]	[51 315 160]		8.94 − 1	1.07+12	A	97*
26.4024[C]	$3p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[47 526 700]	[51 314 240]		5.04 − 1	8.01+11	A	97*
26.2415[C]	$3s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[47 501 650]	[51 312 410]		1.63 − 1	3.94+11	A	97*
13.5248[C]	$2p\ ^2P^o_{3/2}$	$3d\ ^2D_{5/2}$	[40 141 340]	[47 535 160]		2.51	1.53+13	A	97*
13.3870[C]	$2s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[40 056 750]	[47 526 700]		5.88 − 1	5.47+12	A	97*
10.0233[C]	$2p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[40 141 340]	[50 118 100]		4.40 − 1	4.86+12	A	97*
9.94255[C]	$2s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[40 056 750]	[50 114 530]		1.38 − 1	2.33+12	A	97*
8.95023[C]	$2p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[40 141 340]	[51 314 240]		1.60 − 1	2.22+12	A	97*
8.88442[C]	$2s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[40 056 750]	[51 312 410]		5.64 − 2	1.19+12	A	97*
2.496618[C]	$1s\ ^2S_{1/2}$	$2p\ ^2P^o_{1/2}$	0	[40 054 190]		2.80 − 1	1.49+14	A	83, 90, 93, 97*
2.491197[C]	$1/2$	$3/2$	0	[40 141 340]		5.60 − 1	1.50+14	A	83, 90, 93, 97*
2.105225[C]	$1s\ ^2S_{1/2}$	$3p\ ^2P^o_{1/2}$	0	[47 500 860]		5.30 − 2	3.99+13	A	97*
2.104080[C]	$1/2$	$3/2$	0	[47 526 700]		1.06 − 1	4.00+13	A	97*
1.995429[C]	$1s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	0	[50 114 530]		3.90 − 2	1.63+13	A	97*
1.948846[C]	$1s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	0	[51 312 410]		1.87 − 2	8.21+12	A	97*

2.2.3. References for Comments and Tables for Ti Ions

[1] B. Edlén and J. W. Swensson, Phys. Scr. **12**, 21 (1975).
[2] H. N. Russell and R. J. Lang, Astrophys. J. **66**, 13 (1927).
[3] J. W. Swensson and B. Edlén, Phys. Scr. **9**, 335 (1974).
[4] L. A. Svensson, Phys. Scr. **13**, 235 (1976).
[5] S. O. Kastner, A. M. Crooker, W. E. Behring, and L. Cohen, Phys. Rev. A **16**, 577 (1977).
[6] L. A. Svensson and J. O. Ekberg, Ark. Fys. **37**, 65 (1968).
[7] L. A. Svensson, Phys. Scr. **4**, 111 (1971).
[8] B. Edlén, Z. Phys. **104**, 407 (1937).
[9] B. C. Fawcett, R. D. Cowan, and R. W. Hayes, J. Phys. B **5**, 2143 (1972).
[10] P. G. Kruger and H. S. Pattin, Phys. Rev. **52**, 621 (1937).
[11] J. O. Ekberg and L. A. Svensson, Phys. Scr. **2**, 283 (1970).
[12] R. Smitt, L. A. Svensson, and M. Outred, Phys. Scr. **13**, 293 (1976).
[13] W. Lotz, J. Opt. Soc. Am **57**, 873 (1967).
[14] E. Träbert, P. H. Heckmann, R. Hutton, and I. Martinson, J. Opt. Soc. Am. B **5**, 2173 (1988).
[15] B. C. Fawcett, J. Phys. B **3**, 1732 (1970).
[16] U. Litzén and A. Redfors, Phys. Lett. A**127**, 88 (1988).
[17] A. Redfors and U. Litzén, J. Opt. Soc. Am. B **6**, 1447 (1989).
[18] V. E. Levashov, A. N. Ryabtsev, and S. S. Churilov, Opt. Spectrosc. **69**, 20 (1990).
[19] E. H. Pinnington, W. Ansbacher, E. Träbert, P. H. Heckmann, H. M. Hellmann, and G. Möller, Z. Phys. D **6**, 241 (1987).
[20] E. H. Pinnington, W. Ansbacher, A. Tauheed, E. Träbert, P. H. Heckmann, G. Möller, and J. H. Blanke, Z. Phys. D **17**, 5 (1990).
[21] S. S. Churilov and V. E. Levashov, Phys. Scr. **48**, 425 (1993).
[22] J. O. Ekberg, Phys. Scr. **4**, 101 (1971).
[23] L. A. Svensson and J. O. Ekberg, Ark. Fys. **40**, 145 (1969).
[24] U. Litzén and A. Redfors, Phys. Scr. **36**, 895 (1987).
[25] N. J. Peacock, M. F. Stamp, and J. D. Silver, Phys. Scr. **T8**, 10 (1984).
[26] A. Redfors, Phys. Scr. **38**, 702 (1988).
[27] V. E. Levashov and S. S. Churilov, Opt. Spectrosc. **65**, 143 (1988).
[28] S. S. Churilov, V. E. Levashov, and J. F. Wyart, Phys. Scr. **40**, 625 (1989).
[29] S. O. Kastner, M. Swartz, A. K. Bhatia, and J. Lapides, J. Opt. Soc. Am. **68**, 1558 (1978).
[30] B. C. Fawcett, J. Opt. Soc. Am. **66**, 632 (1976).
[31] S. Bashkin, E. Träbert, P. H. Heckmann, H. v. Buttlar, and K. Brand, Phys. Scr. **28**, 193 (1983).
[32] J. Sugar and C. Corliss, J. Phys. Chem. Ref. Data **14**, Suppl. 2 (1985).
[33] J. O. Ekberg and L. A. Svensson, Phys. Scr. **12**, 116 (1975).
[34] L. Cohen and W. E. Behring, J. Opt. Soc. Am. **66**, 899 (1976).
[35] J. Reader, V. Kaufman, J. Sugar, J. O. Ekberg, U. Feldman, C. M. Brown, J. F. Seely, and W. L. Rowan, J. Opt. Soc. Am. B **4**, 1821 (1987).
[36] M. Westerlind, Phys. Rev. A **42**, 3996 (1990).
[37] P. G. Burkhalter, L. Cohen, R. D. Cowan, and U. Feldman, J. Opt. Soc. Am. **69**, 1133 (1979).
[38] C. Jupén, L. Engström, R. Hutton, and E. Träbert, J. Phys. B **21**, L347 (1988).
[39] B. Edlén, Phys. Scr. **17**, 565 (1978).
[40] B. Edlén and F. Tyrén, Z. Phys. **101**, 206 (1936).
[41] U. Feldman and L. Cohen, Astrophys. J. **149**, 265 (1967).
[42] C. Jupén and U. Litzén, Phys. Scr. **30**, 112 (1984).
[43] E. Träbert, Z. Phys. A **319**, 25 (1984).
[44] E. Träbert and C. Jupén, Phys. Scr. **36**, 586 (1987).
[45] C. Jupén, U. Litzén, V. Kaufman, and J. Sugar, Phys. Rev. A **35**, 116 (1987).
[46] S. O. Kastner, W. E. Behring, and L. Cohen, Astrophys. J. **199**, 777 (1975).
[47] B. C. Fawcett, G. E. Bromage, and R. W. Hayes, Mon. Not. Roy. Astron. Soc. **186**, 113 (1979).
[48] M. F. Stamp and N. J. Peacock, J. Phys. B **15**, L703 (1982).
[49] V. Kaufman, J. Sugar, and D. Cooper, Phys. Scr. **25**, 623 (1982).
[50] U. Feldman, G. A. Doschek, R. D. Cowan, and L. Cohen, J. Opt. Soc. Am. **63**, 1445 (1973).
[51] C. Jupén, N. Reistad, E. Träbert, J. H. Blanke, P. H. Heckmann, H. Hellmann, and R. Hucke, Phys. Scr. **32**, 527 (1985).
[52] K. T. Cheng, unpublished material (1981).
[53] W. C. Martin, unpublished material (1982).
[54] K. D. Lawson, N. J. Peacock, and M. F. Stamp, J. Phys. B **14**, 1929 (1981).
[55] S. Suckewer, R. Fonck, and E. Hinnov, Phys. Rev. A **22**, 2278 (1980).
[56] M. Finkenthal, R. E. Bell, H. W. Moos, and TFR Group, J. Appl. Phys. **56**, 2012 (1984).
[57] B. C. Fawcett, J. Phys. B **4**, 981, (1971).
[58] G. A. Doschek, U. Feldman, R. D. Cowan, and L. Cohen, Astrophys. J. **188**, 417, (1974).
[59] S. Goldsmith, U. Feldman, and L. Cohen, J. Opt. Soc. Am. **61**, 615 (1971).
[60] G. A. Doschek, U. Feldman, and L. Cohen, J. Opt. Soc. Am. **63**, 1463 (1973).
[61] B. C. Fawcett and R. W. Hayes, Mon. Not. Roy. Astron. Soc. **170**, 185 (1975).
[62] G. E. Bromage and B. C. Fawcett, Mon. Not. Roy. Astron. Soc. **178**, 591 (1977).
[63] V. Kaufman, J. Sugar, and D. Cooper, Phys. Scr. **26**, 163 (1982).
[64] Y. S. Kasyanov, E. Y. Kononov, V. V. Korobkin, K. N. Koshelev, A. N. Ryabtsev, R. V. Serov, and E. V. Skokan, Opt. Spectrosc. **36**, 4 (1974).
[65] G. E. Bromage and B. C. Fawcett, Mon. Not. Roy. Astron. Soc. **179**, 683 (1977).
[66] B. C. Fawcett, M. Galanti, and N. J. Peacok, J. Phys. B **7**, 1149 (1974).
[67] B. C. Fawcett, A. Ridgeley, and T. Hatter, J. Opt. Soc. Am. **70**, 1349 (1980).
[68] J. Sugar, V. Kaufman, and D. Cooper, Phys. Scr. **26**, 189 (1982).
[69] B. Denne and E. Hinnov, Phys. Rev. A **29**, 3442 (1984).
[70] S. Goldsmith, U. Feldman, A. Crooker, and L. Cohen, J. Opt. Soc. Am. **62**, 260 (1972).
[71] G. E. Bromage and B. C. Fawcett, Mon. Not. Roy. Astron. Soc. **178**, 605 (1977).
[72] J. Sugar, V. Kaufman, and D. Cooper, Phys. Scr. **26**, 293 (1982).
[73] V. A. Boiko, S. A. Pikuz, U. I. Safronova, and A. Ya. Faenov, J. Phys. B **10**, 1253 (1977).
[74] V. A. Boiko, A. Ya. Faenov, and S. A. Pikuz, J. Quant. Spectrosc. Radiat. Transfer **19**, 11 (1978).
[75] J. C. Moreno, S. Goldsmith, H. R. Griem, L. Cohen, and M. C. Richardson, J. Opt. Soc. Am. B **4**, 1931 (1987).
[76] E. Hinnov, the TFTR Operating Team, B. Denne, and the JET Operating Team, Phys. Rev. A **40**, 4357 (1989).
[77] Y. -K. Kim, D. H. Baik, P. Indelicato, and J. P. Desclaux, Phys. Rev. A **44**, 148 (1991).
[78] B. C. Fawcett and A. Ridgely, J. Phys. B **14**, 203 (1981).
[79] E. V. Aglitskii, V. A. Boiko, S. M. Zakharov, S. A. Pikuz, and A. Ya. Faenov, Sov. J. Quant. Electron. **4**, 500 (1974).
[80] E. V. Aglitskii, V. A. Boiko, S. A. Pikuz, and A. Ya. Faenov, Sov. J. Quant. Electronics **4**, 956 (1975).
[81] L. A. Vainshtein and U. I. Safronova, Reprint No. 2, Acad. Nauk USSR, Inst. Spectrosc. Moscow (1985).
[82] E. V. Aglitskii and A. M. Panin, Opt. Spectrosc. **58**, 453 (1985).
[83] J. J. Turechek and H. J. Kunze, Z. Phys. A **273**, 111 (1975).
[84] S. Morita, J. Phys. Soc. Jpn. **52**, 2673 (1983).
[85] L. A. Vainshtein, M. A. Mazing, and A. P. Shevel'ko, Sov. Phys. Lebedev Institute Reports, 39 (1983).

[86] S. Morita and J. Fujita, Nucl. Instrum. Meth. B **9**, 713 (1985).
[87] P. Beiersdorfer, M. Bitter, S. von Goeler, and K. W. Hill, Phys. Rev. A **40**, 150 (1989).
[88] E. J. Galvez, A. E. Livingston, A. J. Mazure, H. G. Berry, L. Engström, J. E. Hardis, L. P. Somerville, and D. Zei, Phys. Rev. A **33**, 3667 (1986).
[89] K. T. Cheng, M. H. Chen, W. R. Johnson, and J. Sapirstein, Phys. Rev. A **50**, 247 (1994).
[90] K. T. Cheng, unpublished material (1996).
[91] W. R. Johnson and G. Soff, At. Data Nucl. Data Tables **33**, 405 (1985).
[92] G. W. F. Drake, *Calculated transition frequencies for helium-like ions*, unpublished (1985).
[93] M. Bitter, S. von Goeler, S. Cohen, K. W. Hill, S. Sesnic, F. Tenney, J. Timberlake, U. I. Safronova, L. A. Vainshtein, J. Dubau, M. Loulergue, F. Bely-Dubau, and L. Steenman-Clark, Phys. Rev. A **29**, 661 (1984).
[94] T. N. Lie and R. C. Elton, Phys. Rev. A **3**, 865 (1971).
[95] P. J. Mohr, At. Data Nucl. Data Tables **29**, 453 (1983).
[96] G. W. Erickson, J. Phys. Chem. Ref. Data **6**, 831 (1977).
[97] W. L. Wiese, M. W. Smith, and B. M. Glennon, Natl. Stand. Ref. Data Ser., Natl. Bur. Stand. (U.S.) **4**, Vol. I, U.S. Govt. Print. Office, Washington, D.C. (1966).
[98] G. A. Martin, J. R. Fuhr, and W. L. Wiese, J. Phys. Chem. Ref. Data 17, Suppl. No. 3 (1988).
[99] S. M. Younger and A. W. Weiss, J. Res. Natl. Bur. Stand. **79A**, 629 (1975).
[100] B. C. Fawcett and N. J. Peacock, Proc. Phys. Soc. **91**, 973 (1967).
[101] M. Finkenthal, R. E. Bell, H. W. Moos, Phys. Lett. **88A**, 165 (1982).
[102] M. A. Mazing, A. M. Panin, and A. P. Shevelko, Opt. Spectrosc. **59**, 579 (1985).
[103] J. H. Davé, U. Feldman, J. F. Seely, A. Wouters, S. Suckewer, E. Hinnov, and J. L. Schwob, J. Opt. Soc. Am. B **4**, 635 (1987).

2.3. Vanadium

2.3.1. Brief Comments on Each Vanadium Ion

V IV

Ca I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^2\ \ ^3\mathrm{F}_2$

Ionization energy 376 730 ± 40 cm^{-1}
(46.709 ± 0.005 eV)

An extensive study was reported by Iglesias [1], who identified 340 lines in the region 675 − 5940 Å comprising transitions among the $3d^2$, $3d4s$, $3d4p$, $3d4d$, $3d4f$, $3d5s$, $3d5p$, $3d5d$, $3d5g$, and $3d6s$ configurations. Wavelengths were observed with an uncertainty of ±0.01 Å by using as light sources a condensed spark and a hollow cathode discharge. Classification of the lines at 2413.256 Å and 5227.89 Å has been changed to $3d4f\ ^1\mathrm{F}^\circ_3 - 3d5g\ ^2[\frac{7}{2}]_4$ and $3d5s\ ^3\mathrm{D}_2 - 3d5p\ ^3\mathrm{D}^\circ_3$, respectively. Both classifications in Ref. [1] contain misprints. The $3d5p\ ^3\mathrm{P}^\circ_2 - 3d5d\ ^3\mathrm{P}_1$ line at 3229.92 Å should be $3d5p\ ^3\mathrm{P}^\circ_1 - 3d5d\ ^3\mathrm{P}_2$. In a further correction we have removed the $3d4f\ ^3\mathrm{G}^\circ_3 - 3d5d\ ^3\mathrm{F}_2$ line at 4966.38 Å because the calculated wavelength does not fit this value.

Wyart [2] provided a calculation of eigenvectors for the mixed configurations $3d4f + 3d5p$ in a private communication, which are reported by Sugar and Corliss [3]. He also reported calculations of percentage compositions for the $3d4d, 3d5s, 3d5d$, and $3d6s$ configurations.

Nineteen $3d^2 - 3d4f$ and three $3d^2 - 3d5p$ transitions were identified by Shalimoff and Conway [4] in the range of 378−402 Å observed with a vacuum sliding-spark. The uncertainty of wavelengths is estimated to be ±0.001 Å.

The value for the ionization energy was derived by Iglesias [1] from the 3-member $3dns$ series.

V V

K I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d\ \ ^2\mathrm{D}_{3/2}$

Ionization energy 526 532 ± 1.4 cm^{-1}
(65.2817 ± 0.0002 eV)

The $3p^63d\ ^2\mathrm{D} - 3p^5(^2\mathrm{P}^\circ)3d^2\ \ ^2\mathrm{D}^\circ$ and $^2\mathrm{F}^\circ$ transitions were first identified by Gabriel *et al.* [5]. The most extensive observation, surpassing the earlier observations of Gabriel *et al.*, Van Deurzen *et al.* [6], Ekberg [7], and Iglesias [1], was carried out by Van Deurzen [8] with a vacuum sliding-spark discharge. He identified 139 lines in the extended range of 199−7600 Å with an uncertainty of ±0.008 Å.

Additional $n = 6 - 7$, $6 - 8$, and $7 - 9$ transitions between high J states were identified by Berry [9] using the beam-foil technique, although no J-values were assigned. Average level values are used for such high J states. He also found the $3p^64d\ ^2\mathrm{D}_{5/2} - 3p^53d^2(^1\mathrm{D})\ ^2\mathrm{F}^\circ_{7/2}$ line at 2620.5 Å. The uncertainty of the wavelengths is estimated to be ±1 Å.

In an erratum Van Deurzen [10] slightly altered the values of five wavelengths to read 484.5108 Å, 483.0098 Å, 481.5564 Å, 286.8395 Å, and 285.9791 Å. He also changed the uncertainty estimates to be ±0.004 Å for $\lambda < 222$ Å, ±0.002 Å for 222 Å$< \lambda <$2100 Å, and ±0.008 Å for $\lambda >$2100 Å.

Van Deurzen [10] calculated the ionization energy with the ng, nh, and ni series by means of a polarization formula.

V VI

Ar I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^6\ \ ^1\mathrm{S}_0$

Ionization energy 1 033 400 ± 200 cm^{-1}
(128.13 ±0.02 eV)

The resonance transitions $3p^6\ ^1\mathrm{S}_0 - 3p^5nl$ with $nl = 4s, 5s$ were observed by Kruger and Weissberg (1935) [11] in the range of 128 − 182 Å, by Alexander *et al.* [12] for $nl = 4d$ at 139.553 Å and 138.261 Å, and by Feldman *et al.* [13] and Gabriel *et al.* [14] for $nl = 3d$ at 224.50 Å. Wagner and House [15] classified the $3p^53d - 3p^54f$ transitions, comprising 12 lines in the range of 213 − 227 Å. Extensive observations were carried out by Ekberg [16] in the wavelength range of 117 − 1630 Å using a vacuum spark discharge. He identified 170 lines as transitions among 56 levels of the $3s^23p^6$, $3s^23p^53d$, $4s$, $4p$, $4d$, $4f$, $5s$, $5d$, and $3s3p^63d$ configurations. We quoted Ekberg's results.

Kastner *et al.* [17] identified seven lines of the inner-shell transitions $3s^23p^6\ ^1\mathrm{S}_0 - 3s3p^6np\ ^3\mathrm{P}^\circ_1\ (n = 4, 5)$ and $3s^23p^6\ \ ^1\mathrm{S}_0 - 3s3p^6np\ ^1\mathrm{P}^\circ_1\ (n = 4 - 8)$ in the range of 85 − 119 Å with an uncertainty of ±0.005 Å.

It should be noted that the lines classified as $3p^6\ ^1\mathrm{S}_0 - 3p^5(^2\mathrm{P}^\circ_{3/2,1/2})5d$ at 118.7 Å and 117.7 Å in Fawcett *et al.* [18] and Ref. [16] were revised as the $3s^23p^6\ ^1\mathrm{S}_0 - 3s3p^64p\ ^{3,1}\mathrm{P}^\circ_1$ transitions in Ref. [17]. Also, the remaining $3s^23p^6\ ^1\mathrm{S}_0 - 3s^23p^5(^2\mathrm{P}^\circ_{3/2})5d\ ^2[\frac{1}{2}]^\circ_1$ line at 119.3 Å in Ref. [18] has been deleted because this line was not observed by Ekberg [16].

The value for the ionization energy was derived from the $3s3p^6np$ series ($n = 4 - 8$) by Kastner *et al.* [17].

V VII

Cl I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^5\ \ ^2\mathrm{P}^\circ_{3/2}$

Ionization energy 1 215 000 cm^{-1} (150.6 eV)

Weissberg and Kruger [19] identified the $3s^23p^5\ ^2P^\circ_{1/2,3/2} - 3s3p^6\ ^2S_{1/2}$ transitions. Subsequently, Smitt *et al.* [20] measured these wavelengths as 472.828 ± 0.008 Å and 456.284 ± 0.008 Å in a vacuum spark.

Gabriel *et al.* [5, 14] identified the transitions $3p^5\ ^2P^\circ_{3/2}-3p^43d\ ^2P_{3/2}$ and $^2P^\circ_{1/2,3/2}-{}^2D_{3/2,5/2}$. Fawcett and Gabriel [21] reobserved these three lines at 229.38 Å, 225.79 Å and 225.16 Å using vacuum sparks, and also identified six new lines in the range of 221 – 242 Å as the $3p^5\ ^2P^\circ - 3p^4(^1D)3d\ ^2S$, $(^3P)^2P$, $(^3P)^2D$ array. The parent states of the $3p^43d$ configuration have been taken from the calculation by Bromage [22].

The $3p^5\ ^2P^\circ - 3p^44s\ ^2P$ doublet was first observed by Weissberg and Kruger [19] in the range of 159 – 163 Å. Edlén [23] reobserved the spectrum in the extended range of 148 – 165 Å with a vacuum spark and identified the additional $^2P^\circ - {}^2D, {}^2S$ doublets and the $^2P^\circ - {}^4P$ spin-forbidden transitions.

Fawcett *et al.* [18] identified six lines as the $3p^5 - 3p^44d$ transitions in the range of 117–127 Å. These lines, except for the $^2P^\circ_{3/2} - (^1S)^2D_{5/2}$ line at 117.2 Å, were remeasured by Fawcett *et al.* [24], who also included identifications of the $^2P^\circ_{1/2,3/2} - (^1P)^2S_{1/2}$ and $^2P^\circ_{3/2} - (^1D)^2D_{3/2}$ transitions at 124.24 Å, 123.07 Å and 121.89 Å and the $3p^43d - 3p^44f$ transitions. The latter include the spin-forbidden $^4F_{7/2} - {}^2G^\circ_{9/2}$ line. Their observations were made in the range of 177 – 184 Å with a laser-produced plasma with an uncertainty of ±0.02 Å.

The ionization energy was obtained by Lotz [25] by extrapolation.

V VIII

S I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^4\ ^3P_2$

Ionization energy 1 399 000 cm^{-1} (173.4 eV)

Fawcett and Peacock [26] and Fawcett [27] observed the $3s^23p^4\ ^3P - 3s3p^5\ ^3P^\circ$ and $^1D_2 - {}^1P^\circ_1$ lines in the range of 398–473 Å in laser-produced plasmas. Improved measurements for these lines in a vacuum spark with an uncertainty of ±0.008 Å were made by Smitt *et al.* [20], whose wavelengths are given here. They also identified the $^1S_0 - {}^1P^\circ_1$ line at 459.647 Å and the $^3P_2 - {}^1P^\circ_1$ spin-forbidden transition at 359.454 Å. A blended $^3P_1 - {}^3P^\circ_2$ line at 472.839 Å deviates by 0.022 Å from the wavelength recalculated from the levels.

Gabriel *et al.* [5] identified the $3p^4\ ^3P - 3p^33d\ ^3D^\circ$ triplet and $^1D_2 - {}^1F^\circ_3$ singlet in the range of 228 – 232 Å. Their observations were made with vacuum sparks with an uncertainty of ±0.05 Å. Fawcett and Gabriel [21] identified the three lines of the $^3P_{1,2} - {}^3P^\circ_2$ and $^1D_2 - {}^1D^\circ_2$ transitions at 243.69 Å, 240.22 Å and 236.01 Å. The designation of the parent term of the upper $3p^33d$ configuration adopted here was provided by Bromage [22].

Nineteen lines of $3p^4 - 3p^34s$ transitions in the range of 135 – 148 Å, including the spin-forbidden transitions $^1D_2 - {}^3P^\circ_2$ and $^3P_2 - {}^1D^\circ_2$ at 140.934 Å and 139.188 Å, were identified by Edlén [28] using vacuum spark observations.

Fawcett *et al.* [24] identified eight lines in the range of 154 – 158 Å as $3p^33d - 3p^34f$ transitions and six lines within 113 – 116 Å as $3p^4 - 3p^34d$ transitions. Wavelengths of these transitions were obtained with a laser-produced plasma with uncertainties of ±0.02 Å and ±0.015 Å, respectively. Fawcett *et al.* [29] gave additional identifications of the $3p^4 - 3p^34d$ transitions in the range of 110 – 112 Å and the $3p^33d\ ^1G^\circ_4 - 3p^34f\ ^1H_5$ transition at 159.24 Å.

The value for the ionization energy was obtained by Lotz [25] by extrapolation.

V IX

P I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^3\ ^4S^\circ_{3/2}$

Ionization energy 1 660 000 cm^{-1} (205.8 eV)

Fawcett and Peacock [26] and Fawcett [27] classified lines of the $3s^23p^3 - 3s3p^4$ transition array in the range of 364 – 468 Å, obtained with laser-produced plasmas. Additional classifications were given by Smitt *et al.* [20] in the extended range of 364 – 489 Å. They observed 16 lines belonging to this array in a vacuum spark discharge with an uncertainty of ±0.008 Å. The lines at 485.110 Å ($^2P^\circ_{1/2} - {}^2D_{3/2}$), 437.005 Å ($^2D^\circ_{5/2} - {}^2D_{3/2}$), and 399.719 Å ($^2P^\circ_{1/2} - {}^2P_{1/2}$) are blends.

Gabriel *et al.* [5, 14] classified the line at 235.72±0.05 Å as the $3p^3\ ^2D^\circ_{5/2} - 3p^2(^3P)3d\ ^2F_{7/2}$ transition. The ^3P parent is from the calculations by Bromage [22]. Fawcett *et al.* [30] identified the $3p^3\ ^4S^\circ - 3p^2(^3P)3d\ ^4P$ resonance transitions at ~244 Å. Fawcett [31] observed more completely the $3p^3 - 3p^23d$ array in the range of 240 – 276 Å with measurement uncertainties of ±0.05 Å.

Six lines due to $3p^3 - 3p^24s$ transitions in the range of 125 – 127 Å were observed in a vacuum spark by Kruger and Pattin [32]. In the longer wavelength region, Fawcett *et al.* [24] identified the $3p^3\ ^2P^\circ - 3p^2(^3P)4s\ ^2P$, $(^1D)\,^2D$ and $^2D^\circ - (^3P)\,^2P$ doublets in the range of 129 – 135 Å, as well as the $3p^23d - 3p^24f$ transitions at 137 – 141 Å. Wavelengths were obtained with a laser-produced plasma with an uncertainty of ±0.02 Å. The spin-forbidden $3p^3\ ^2D^\circ_{5/2} - 3p^24d\ ^4D_{7/2}$ line at 88.48 Å was reported by Fawcett *et al.* [29]. Except for this line no intersystem connection has been established.

The value for the ionization energy was obtained by Lotz [25] by extrapolation.

V X

Si I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^2\ ^3P_0$

Ionization energy 1 859 000 cm^{-1} (230.5 eV)

Fawcett and Peacock [26] and Fawcett [27, 31] analyzed the $3s^23p^2 - 3s3p^3$ transition array in the range of 308 – 471 Å. Improved wavelengths with an uncertainty of ±0.008 Å were obtained by Smitt *et al.* [20] with a vacuum spark discharge. They identified 19 lines, including the spin-forbidden transitions $^1D_2 - {}^3D^\circ_3$ at 527.439 Å, $^3P_2 - {}^1D^\circ_2$ at 369.612 Å, and $^3P_2 - {}^1P^\circ_1$ at 301.283 Å. The wavelength of the blended $^3P_1 - {}^3P^\circ_2$ line at 399.719 Å is different by 0.03 Å from that recalculated with the level values.

Fawcett *et al.* [30] and Fawcett [31] provided classifications of the $3p^2 - 3p3d$ lines in the range of 245 – 266 Å. They measured wavelengths in a vacuum spark discharge with uncertainties of ±0.03 Å and ±0.05 Å, respectively.

The $3p3d - 3p4f$, $3p^2 - 3p4s$ and $3p^2 - 3p4d$ transitions in the ranges of ~124 Å, 115 – 119 Å and ~94 Å, respectively, were identified by Fawcett *et al.* [24] in the spectrum of a laser-produced plasma.

The value for the ionization energy was obtained by Lotz [25] by extrapolation.

V XI

Al I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p\ ^2P^\circ_{1/2}$

Ionization energy 2 062 000 cm^{-1} (255.7 eV)

The transitions $3s^23p - 3s3p^2$ in the range of 320 – 448 Å were identified by Fawcett and Peacock [26] and Fawcett [27], and were remeasured more accurately by Smitt *et al.* [20] with an uncertainty of ±0.008 Å in a vacuum spark discharge.

Fawcett [27] also reported classifications of the $3s3p^2\ ^4P - 3p^3\ ^4S^\circ$ lines in the range of 347 – 359 Å. Litzén and Redfors [33] provided wavelengths for this array with an uncertainty of ±0.02 Å, which are given here. An extension of the analysis was made by Redfors and Litzén [34] with data in the range of 238 – 514 Å measured with an uncertainty of ±0.02 Å using a laser-produced plasma. They added to the $3s3p^2 - 3p^3$ array the doublets $^2P - {}^2P^\circ$, $^2D - {}^2D^\circ$, and $^2D - {}^2P^\circ$ and also identified the $3s^23d - 3s3p(^1P^\circ)3d$, $3s3p^2 - 3s3p(^3P^\circ)3d$, and $3s3p^2 - 3s3p(^1P^\circ)3d$ transitions. In addition Redfors and Litzén classified the $3s^23p\ ^2P^\circ - 3s^23d\ ^2D$ lines. Two $3s3p^2 - 3s3p(^3P^\circ)3d$ lines were reobserved by Levashov *et al.* [35] at 266.656 Å for $^4P_{3/2} - {}^4P^\circ_{1/2}$ and at 266.762 Å for $^4P_{1/2} - {}^4D^\circ_{1/2}$. The values of 267.249 Å and 266.675 Å in Ref. [34] have been replaced with the above lines.

The transition arrays $3p^3$, $3s3p3d - 3p^23d$, $3s3d^2$ were newly identified by Churilov and Levashov [36] in a laser-produced plasma with an estimated uncertainty of ±0.01 Å. We have adopted their results except for the energy levels of $3s^23p\ ^2P^\circ$, $3s3p^2\ ^2D$ and $^2P_{1/2}$, $3s^23d\ ^2D$, and $3p^3\ ^2P^\circ_{3/2}$ taken from Redfors and Litzén [34].

The transitions $3s^23p\ ^2P^\circ - 3s^24d\ ^2D$ were identified by Edlén [37] at ~87 Å. Fawcett *et al.* [38] identified the doublets $3p\ ^2P^\circ - 4s\ ^2S$ and $3d\ ^2D - 4f\ ^2F^\circ$ and the quartets $3s3p^2\ ^4P - 3s3p4s\ ^4P^\circ$ and $3s3p3d\ ^4F^\circ - 3s3p4f\ ^4G$ at 104 – 120 Å.

The value for the ionization energy was obtained by Lotz [25] by extrapolation.

V XII

Mg I isoelectronic sequence

Ground state $1s^22s^22p^63s^2\ ^1S_0$

Ionization energy 2 485 000 ± 3000 cm^{-1}
(308.1 ± 0.4 eV)

Classifications of the $n = 3 - 3$ transitions were made in a series of articles of Fawcett and Peacock [26], Fawcett [27], and Fawcett *et al.* [24] for the transitions between levels in the $3s^2$, $3s3p$, $3s3d$, $3p^2$, and $3p3d$ configurations. Litzén and Redfors [39] reobserved lines in the range of 246 – 610 Å in a laser-produced plasma and identified 42 lines, including the 19 lines of their earlier observations. Wavelengths were measured with an uncertainty of ±0.02 Å. Following this, Redfors [40] reported 10 lines of the $3p3d - 3d^2$ array in the range of 273 – 383 Å. With a similar source Churilov *et al.* [41] increased this to 19 lines. Wavelengths given to the third or to the second decimal place have uncertainties of ±0.01 Å and ±0.02 Å, respectively. Energy levels of the configurations with $n = 3$ are taken from Ref. [39], with the addition of $3d^2$ levels from Ref. [41]. We have interchanged the designations of the $3p3d\ ^3D^\circ_1$ and $^3P^\circ_1$ terms in Ref. [41], as required by the percentage compositions in Ref. [39]. We have added 30 cm^{-1} to all the $3d^2$ levels given by Churilov *et al.* as a result of redetermining the $3d^2$ levels with their measured wavelengths and the $3p3d$ levels from Ref. [39]. However, their classifications for the $3p3d\ ^3D^\circ_3 - 3d^2\ ^3P_2$ and $3p3d\ ^3P^\circ_1 - 3d^2\ ^3P_1$ lines at 301.46 Å and 302.080 Å are questionable, because these lines do not fit the level scheme. The spin-forbidden $3s^2\ ^1S_0 - 3s3p\ ^3P^\circ_1$ line at 522.4±0.2 Å was observed in a tokamak plasma by Finkenthal *et al.* [42].

Edlén [37] first identified triplet systems of the $3s3p - 3s4s$, $3s3p - 3snd$ ($n = 4, 5$), and $3s3d - 3snf$ ($n = 4, 5$) transitions in the range of 61 – 107 Å, and also the $3s^2\ ^1S_0 - 3s4p\ ^1P^\circ_1$ resonance line at 76.307 Å. Fawcett *et al.* [38] identified the $3s3d\ ^1D_2 - 3s4f\ ^1F^\circ_3$ transition at 113.78±0.02 Å, and Fawcett *et al.* [24] reported the $3s3p\ ^1P^\circ_1 - 3s4d\ ^1D_2$ and $3p^2\ ^1D_2 - 3s4f\ ^1F^\circ_3$ transitions at 87.363±0.01 Å and 95.58±0.015 Å. Fawcett *et al.* [38]

also provided nine lines of the $3p3d - 3p4f$ transitions in the range of 104 – 114 Å. Thirty-five additional lines below 105.74 Å are given by Fawcett *et al.* [29] for the triplets, $3s3p\ ^3P^\circ - 3sns\ ^3S$ ($n = 5 - 7$), $3s3p\ ^3P^\circ - 3snd\ ^3D$ ($n = 5 - 8$), and $3s3d\ ^3D_3 - 3snf\ ^3F^\circ_4$ ($n = 6 - 8$) and the singlets $3s^2\ ^1S_0 - 3snp\ ^1P^\circ_1$ ($n = 5 - 10$), $3s3p\ ^1P^\circ_1 - 3s4s\ ^1S_0$, $3s5d\ ^1D_2$ and also for the $3s3p - 3p4p$ and $3p^2 - 3p4s, 4d$ transitions.

The value for the ionization energy was obtained by Sugar and Corliss [3] from the $3s - nf$ series.

V XIII

Na I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s\ \ ^2S_{1/2}$

Ionization energy 2 712 250 ± 100 cm^{-1} (336.276 ± 0.010 eV)

The $3s - 3p$ and $3p - 3d$ lines in the range of 313 – 444 Å were identified by Fawcett and Peacock [26] and remeasured by Fawcett *et al.* [24], except for $3p\ ^2P^\circ_{3/2} - 3d\ ^2D_{3/2}$. An isoelectronic comparison of the measured wavelengths, including the $3d - 4f$ doublet, with Dirac-Fock calculations was made by Reader *et al.* [43] for Ar^{7+} to Xe^{43+}, and least-squares adjusted wavelengths were derived. The overall uncertainty estimate is ±0.007 Å. We give these results and correct the level values with them.

Edlén [44] identified the transitions $3s - np$ ($n = 4, 5$), $3p - 4s$, $3p - nd$ ($n = 4, 5$), and $3d - nf$ ($n = 4, 5$) in a vacuum spark discharge. Except for the $3d - 4f$ doublet, Edlén's wavelengths are given here. The $3d - 4p$ lines at ~118 Å and the $3d\ ^2D_{5/2} - 5p\ ^2P^\circ_{3/2}$ line at 74.321±0.01 Å were identified by Fawcett *et al.* [24, 38], respectively.

Identifications along Rydberg series have been taken from Fawcett *et al.* [29] for the $3p - ns$ ($n = 6 - 11$), $3p - 10d$, and $3d - nf$ ($n = 10, 11$) transitions and from Cohen and Behring [45] for the $3p - 5s$, $3s - np$ ($n = 6 - 11$), $3p - nd$ ($n = 6 - 9, 11$), and $3d - nf$ ($n = 6 - 9$) transitions.

The inner-shell transitions $2p^6 3s^2 S_{1/2} - 2p^5 3s^2\ ^2P^\circ_{3/2,1/2}$ at 24.517±0.005 Å and 24.202±0.005 Å were observed by Feldman and Cohen [46] with a low-inductance vacuum spark source.

The value for the ionization energy was derived by Edlén [44] from core polarization theory applied to the nf series.

V XIV

Ne I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6\ \ ^1S_0$

Ionization energy 7 227 000 ± 3000 cm^{-1} (896.0 ± 0.4 eV)

The $2p^6 - 2p^5 3s$ and $3d$ transitions were identified by Edlén and Tyrén [47] with lines at ~23 Å and ~21 Å in a vacuum spark discharge. The $2s^2 2p^6 - 2s2p^6 3p$ and $2p^6 - 2p^5 nd$ ($n = 3 - 5$), $4s$ lines in the range of 15.6 – 21.3 Å were observed with a low-inductance spark source by Feldman and Cohen [48], who measured wavelengths with an uncertainty of ±0.005 Å.

The $3s - 3p$ and $3p - 3d$ arrays were observed by Jupén and Litzén [49, 50] in laser-produced plasmas. In the latter article, 21 lines from 328 – 508 Å were identified.

The $3p - 4d$ transitions were first found by Kastner *et al.* [51] in the wavelength range of 70.5 – 71.6 Å and also reported by Fawcett *et al.* [52], together with the $3d - 4f$ transitions in the range of 85.4 – 87.2 Å. Improved measurements were carried out by Jupén *et al.* [53], who identified 26 lines of the $n = 3 - 4$ transitions, including the $2p^5(^2P^\circ_{3/2})3s\,(\frac{3}{2},\frac{1}{2})^\circ_2 - 2p^5(^2P^\circ_{3/2})4p\,^2[\frac{5}{2}]_3$ and $2p^5(^2P^\circ_{1/2})3s(\frac{1}{2},\frac{1}{2})^\circ_1 - 2p^5(^2P^\circ_{1/2})4p\,^2[\frac{3}{2}]_2$ lines at 65.330 Å and 65.571 Å. Their measurements are quoted. The wavelength uncertainty varies from ±0.005 to ±0.01 Å. The wavelength of 72.317 Å for the $2p^5(^2P^\circ_{1/2})3p\ ^2[\frac{1}{2}]_1 - 2p^5(^2P^\circ_{1/2})4d\ ^2[\frac{3}{2}]^\circ_2$ transition is apparently a misprint and should be 71.317 Å.

Jupén *et al.* [53] derived new energy levels of the $2s^2 2p^5 3l$ and $2s^2 2p^5 4l$ configurations. We have adopted their level values except for the $2p^5(^2P^\circ_{3/2})3d\ ^2[\frac{1}{2}]^\circ_1$, $2p^5(^2P^\circ_{3/2,1/2})4f\ ^2[\frac{5}{2}]_2$, and $2p^5(^2P^\circ_{3/2})4f\ ^2[\frac{3}{2}]_2$ levels. These levels have been modified to fit the observed wavelengths. The identification of a blended line at 342.202 Å in Ref. [50] is questionable because it does not fit the level scheme. Therefore, we have deleted it here.

The value for the ionization energy was derived by Sugar and Corliss [3] from the $2p^5 nd\ \ ^3D^\circ_1$ series for $n = 3$ to 5.

V XV

F I isoelectronic sequence

Ground state $1s^2 2s^2 2p^5\ \ ^2P^\circ_{3/2}$

Ionization energy 7 878 000 cm^{-1} (976.7 eV)

Finkenthal *et al.* [54] identified the magnetic-dipole transition $2s^2 2p^5\ \ ^2P^\circ_{3/2} - {}^2P^\circ_{1/2}$ at 1719.4±1.7 Å in a tokamak plasma.

Fawcett [55], Doschek *et al.* [56], and Kaufman *et al.* [57] observed the $2s^2 2p^5\ ^2P^\circ - 2s2p^6\ ^2S$ doublet in laser-produced plasmas. Wavelength values of 122.005 Å and 113.930 Å with an uncertainty of ±0.005 Å are taken from the measurements of Ref. [57].

Feldman *et al.* [58] reported the most extensive set of measurements of the arrays $2s2p^6 - 2s2p^5 3s$, $2p^5 - 2p^4 3s$ and $2p^5 - 2p^4 3d$ in the range of 19 – 23 Å, compared with the earlier works of Fawcett [59] and Cohen *et al.* [60]. We give the Feldman *et al.* results, which have an uncertainty of ±0.01 Å. Three additional lines at 19.91 Å, 19.45 Å, and 19.38 Å, belonging to the $2p^5 - 2p^4 3d$ array have been excluded because these lines were not observed in Ref. [58].

For the ionization energy we use a value calculated by Cheng [61] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [62].

V XVI

O I isoelectronic sequence

Ground state $1s^2 2s^2 2p^4\ ^3P_2$

Ionization energy 8 567 000 cm^{-1} (1062.2 eV)

Finkenthal *et al.* [54] identified the magnetic-dipole transitions $2p^4\ ^3P_2 - ^3P_1$ and $^3P_1 - ^1S_0$ at 2042.7±0.8 Å (in air) and 529.9±0.2 Å, respectively, in a tokamak plasma.

Identifications of the triplet array $2s^2 2p^4\ ^3P - 2s2p^5\ ^3P°$ and the singlet $^1S - ^1P°$ and $^1D - ^1P°$ transitions were made by Fawcett [55] and Doschek *et al.* [56], comprising eight lines in the range of 108 – 141 Å. In addition, the line at 138.17±0.02 Å was identified by Fawcett *et al.* [63] as the $2s2p^5\ ^1P^\circ_1 - 2p^6\ ^1S_0$ transition. All the lines were remeasured by Kaufman *et al.* [57] in a laser-produced plasma. They identified four spin-forbidden transitions: $2s^2 2p^4\ ^1D_2 - 2s2p^5\ ^3P^\circ_2$ at 156.060 Å, $^3P_{0,2} - ^1P^\circ_1$ at 100.440 Å, 95.640 Å, and $2s2p^5\ ^3P^\circ_1 - 2p^6\ ^1S_0$ at 103.043 Å. The uncertainty of the wavelengths is ±0.005 Å. The observed levels of $2s^2 2p^4\ ^3P_1$ and $^1S_0$ agree with those from the above magnetic-dipole lines within the experimental uncertainties.

The $2p^4 - 2p^3 3s$ array was first identified by Goldsmith *et al.* [64], whose wavelengths were remeasured more accurately by Doschek *et al.* [65] with an uncertainty of ±0.01 Å. The wavelengths of Doschek *et al.* are adopted here, although most of the lines are doubly classified. The line $2p^4\ ^1D_2 - 2p^3(^2P°)3s\ ^1P^\circ_1$, at 20.082 Å in Ref. [64] has been omitted because it does not fit with the levels quoted here.

Analysis of the $2p^4 - 2p^3 3d$ array was made by Goldsmith *et al.* [64], Fawcett [55], and Fawcett *et al.* [66]. They were reobserved with a laser-produced plasma source by Fawcett and Hayes [67]. We adopt the latter results. Additional identifications made by Bromage and Fawcett [68] are the $^3P_1 - (^2P°)\ ^3D^\circ_1$ and $^1D_2 - (^2P°)\ ^1F^\circ_3$ lines at 18.12 Å and 18.265 Å.

For the ionization energy we use a value calculated by Cheng [61] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [62].

V XVII

N I isoelectronic sequence

Ground state $1s^2 2s^2 2p^3\ ^4S^\circ_{3/2}$

Ionization energy 9 394 000 cm^{-1} (1164.7 eV)

The $2s^2 2p^3 - 2s2p^4$ array was found in the range of 102 – 160 Å by Fawcett [55], by Fawcett *et al.* [63], and by Doschek *et al.* [56], who assigned six new lines to this array. Feldman *et al.* [69] observed the transition $^2D^\circ_{3/2} - ^2S_{1/2}$ at 113.78±0.02 Å. Fawcett *et al.* [63] also identified the doublets $2s2p^4\ ^2D,^2P - 2p^5\ ^2P°$. The $^2P_{1/2} - ^2P^\circ_{1/2}$ line at 151.69 Å was revised as 165.32±0.015 Å by Fawcett and Hayes [67]. Doschek *et al.* [70] identified the $^2D_{3/2} - ^2P^\circ_{3/2}$ line at 129.94±0.015 Å. New observations of the above transitions were made by Kaufman *et al.* [71] in the range of 96 – 168 Å, using a laser-produced plasma. Improved wavelengths are reported for the 22 allowed lines observed previously. They added several $2s2p^4 - 2p^5$ lines, $^2P_{3/2} - ^2P^\circ_{1/2}$ at 151.656 Å and $^2S_{1/2} - ^2P^\circ_{3/2}$ at 157.070 Å, as well as the spin-forbidden $2s^2 2p^3\ ^4S^\circ_{3/2} - 2s2p^4\ ^2P_{3/2}$ line at 96.270 Å. Their wavelength uncertainty is ±0.005 Å. We give their results.

The $2p^3 - 2p^2 3d$ transitions at ~17 Å were observed by Fawcett [55], Fawcett *et al.* [66], and Fawcett and Hayes [67] with laser-produced plasmas. The $2p^3\ ^2P^\circ_{3/2} - 2p^2(^3P)3d\ ^2D_{5/2}$ line at 17.644 Å has been omitted because of its inconsistency with the $2p^3\ ^2D^\circ_{5/2} - 2p^2(^3P)3d\ ^2D_{5/2}$ line at 17.373 Å.

For the ionization energy we use a value calculated by Cheng [61] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [62].

V XVIII

C I isoelectronic sequence

Ground state $1s^2 2s^2 2p^2\ ^3P_0$

Ionization energy 10 164 000 cm^{-1} (1260.2 eV)

Finkenthal *et al.* [54] identified the magnetic-dipole transitions $2s^2 2p^2\ ^3P_2 - ^1D_2$ and $^3P_1 - ^1S_0$ at 1078.2±1.4 Å and 434.2±0.2 Å, respectively, in a tokamak plasma. The latter line, which was tentatively identified, is 1.4 Å longer than the wavelength calculated from the levels.

The $2s^2 2p^2 - 2s2p^3$ array was observed in the range of 111 – 177 Å by Fawcett *et al.* [63] and by Feldman *et al.* [69] and Fawcett and Hayes [67]. Fawcett and Hayes also first identified three lines of the $2s2p^3\ ^3D° - 2p^4\ ^3P$ triplet in the range of 127 – 139 Å. Measurements in the range of 136 – 217 Å using a laser-produced plasma were reported by Fawcett *et al.* [72], who gave identifications for 13 transitions including $2s^2 2p^2\ ^3P - 2s2p^3\ ^3P°$ and

$2s2p^3\ ^3P^\circ - 2p^4\ ^3P$. Improved measurements were made by Sugar *et al.* [73] for 16 allowed lines of this array including spin-forbidden transitions. The $2s^22p^2\ ^3P_2 - 2s2p^3\ ^1D_2^\circ$ line at 119.015 Å and the $^3P_1 - {}^1P_1^\circ$ at 102.410 Å were newly identified. We give their results with an uncertainty of ±0.005 Å. Wavelengths with one or two decimal places are taken from Refs. [63, 67, 72]. Designations of the $2s2p^3\ ^3D_1^\circ - 2p^4\ ^3P_0$ transition at 127.27 Å and the $^3P_1^\circ - {}^3P_0$ line at 147.30 Å are revised as $2s2p^3\ ^3D_1^\circ - 2p^4\ ^3P_1$ and $^3P_0^\circ - {}^3P_1$, respectively, to fit with the level scheme adopted from Sugar *et al.*

The $2s^22p^2 - 2s^22p3s$, $3d$ and $2s2p^3 - 2s2p^23s$, $3d$ transitions were reported by Goldsmith *et al.* [74] in the range of 16 – 18 Å observed with a vacuum spark. Their measurement uncertainty is ±0.005 Å. The $2s2p^3\ ^5S_2^\circ$ level of 366 870 cm^{-1} is adopted from predicted values along an isoelectronic sequence by Edlén [75]. An analysis of the $2s^22p^2 - 2s^22p3d$ transitions was made by Bromage and Fawcett [76] with the spectrum measured by Fawcett *et al.* [66] and Fawcett and Hayes [67]. They confirmed the classifications $^3P_2 - {}^3D_3^\circ$ at 16.378 Å and $^1D_2 - {}^1F_3^\circ$ at 16.460 Å in Refs. [66] and [67], and also identified the $^1S_0 - {}^1P_1^\circ$ and $^1D_2 - {}^3F_2^\circ$ lines at 16.787 Å and 16.914 Å, respectively. The classifications of Goldsmith *et al.* [74] for the lines at 16.423 Å and 16.816 Å have been omitted. They contradict those of Fawcett and Hayes [67] and Bromage and Fawcett [76].

For the ionization energy we use a value calculated by Cheng [61] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [62].

V XIX

B I isoelectronic sequence

Ground state $1s^22s^22p\ \ ^2P_{1/2}^\circ$

Ionization energy 10 924 000 cm^{-1} (1354.4 eV)

The magnetic-dipole transition $^2P_{1/2}^\circ - {}^2P_{3/2}^\circ$ at 1457.6±0.9 Å within the ground $2s^22p$ configuration was observed in a tokamak plasma by Finkenthal *et al.* [54].

Fawcett *et al.* [63] identified seven of the $2s^22p - 2s2p^2$ transitions in the range of 124 – 186 Å. Their identification of $^2P^\circ - {}^2D$ was revised by Fawcett and Hayes [67], who also identified the three lines of the $2s2p^2\ ^4P - 2p^3\ ^4S^\circ$ quartet in the range of 143 – 158 Å using a laser-produced plasma. The position of the $2p^3\ ^4S^\circ$ level is estimated by Sugar and Corliss [3] as 1 030 850 cm^{-1}. The uncertainty of wavelengths quoted here is ±0.015 Å. The $2s2p^2 - 2p^3$ doublet was measured by Fawcett *et al.* [72] with an uncertainty of ±0.05 Å in a similar light source.

Fawcett *et al.* [66] and Fawcett and Hayes [67] identified the $2s2p^2 - 2s2p3d$, $2s^22p - 2s^23d$, and $2s^22p - 2s2p3p$ transitions in the range of 14 – 16 Å in a laser-produced plasma. The uncertainty of the wavelengths is ±0.007 Å except for the blended line at 15.63 Å, where it is ±0.01 Å.

For the ionization energy we use a value calculated by Cheng [61] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [62].

V XX

Be I isoelectronic sequence

Ground state $1s^22s^2\ \ ^1S_0$

Ionization energy 11 996 000 cm^{-1} (1487.3 eV)

The $2s2p - 2p^2$ transitions, including the spin-forbidden $^3P_2^\circ - {}^1D_2$ transition at 164.59±0.05 Å, were identified by Fawcett *et al.* [72] in the range of 164–282 Å using a laser-produced plasma. The $2s^2\ ^1S_0 - 2s2p\ ^1P_1^\circ$ resonance transition at 159.355 Å has been taken from the smoothed wavelengths of Edlén [77].

The $n = 2 - 3$ transition arrays in the range of 14 – 16 Å were measured by Fawcett *et al.* [66], Fawcett and Hayes [67], Boiko *et al.* [78, 79] in laser-produced plasmas. Bromage *et al.* [80] reported their measurements with no uncertainty estimate for the $2s^2 - 2snp$, $2s2p - 2pnp$, $2s2p - 2snd$, and $2p^2 - 2pnd$ transitions with $n = 3$ and 4 in the ranges of 14 – 16 Å and 10 – 12 Å, respectively. We adopted their results except for the $2s2p\ ^3P_2^\circ - 2s3d\ ^3D_3$ line at 14.976±0.007 Å taken from Ref. [66]. The difference between the wavelengths in Ref. [80] and Ref. [66] is ±0.02 Å at most.

For the ionization energy we use a value calculated by Cheng [61] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [62].

V XXI

Li I isoelectronic sequence

Ground state $1s^22s\ \ ^2S_{1/2}$

Ionization energy 12 660 000 ± 2400 cm^{-1}
(1569.6 ± 0.3 eV)

Fawcett *et al.* [72] identified the resonance transition $2s\ ^2S_{1/2} - 2p\ ^2P_{3/2}^\circ$ at 240.37±0.05 Å in a laser-produced plasma. Kim *et al.* [81] obtained smoothed wavelengths for the $2s - 2p$ doublet of 240.422 Å and 293.742 Å. Goldsmith *et al.* [82] reported the $2s - 3p$, $4p$ and $2p - 3s$, $3d$, $4d$ transitions. Extensive measurements along Rydberg series were made by Aglitskii *et al.* [83] in a laser-produced plasma. They identified the $2s - np$ ($n = 3 - 7$), $2p - 3s$, and $2pnd$ ($n = 3 - 8$) transitions in the range of 8.5 – 15 Å with an uncertainty of ±0.003 Å. Many of the doublets with $n \geq 4$ are blended lines, from which only the $n \geq 6$ doublets are taken.

Vainshtein and Safronova [84] calculated energy levels of the $1s^2nl$ configurations with $n = 2-5$, and $l = s, p$, and d. Their energy levels are adjusted to the $1s^22p$ $^2P^\circ_{1/2,3/2}$ levels of Kim *et al.* by adding 90 cm^{-1}. They are used to calculate the wavelengths of doublet transitions between these levels.

Identifications of transitions from doubly excited levels were reported by Aglitskii *et al.* [85, 86] and Boiko *et al.* [79] for $1s^22p - 1s2p^2$ and $1s^22s - 1s2s2p$. The lines at 2.3992 Å and 2.4140 Å were identified as the blends of three lines of the transitions $1s^22p$ $^2P^\circ - 1s2p^2$ ^2P and of seven lines of $1s^22p$ $^2P^\circ - 1s2p^2$ ^4P and $1s^22s$ $^2S - 1s(^2S)2s2p(^3P^\circ)$ $^4P^\circ$, respectively. The uncertainty of the wavelengths is ±0.0005 Å. Using an electron-beam ion trap technique, Beiersdorfer *et al.* [87] resolved 10 lines, one of which at 2.3912 Å is a blend of two lines. The wavelength uncertainties range from ±0.0001 Å to ±0.0003 Å. Vainshtein and Safronova also calculated wavelengths of the $1s^22s - 1s2s2p$, $1s^22p - 1s2p^2$, and $1s^22p - 1s2s^2$ transitions. We use their results to derive these autoionizing levels.

The value for the ionization energy was derived by Edlén [88] from a polarization formula.

V XXII

He I isoelectronic sequence

Ground state $1s^2$ $^1S_0$

Ionization energy 55 259 730 cm^{-1} (6851.336 eV)

Aglitskii *et al.* [85, 86] identified the resonance transitions $1s^2$ $^1S_0 - 1s2p$ $^{3,1}P^\circ_1$ at 2.3939±0.0005 Å and 2.3823±0.0005 Å in a laser-produced plasma. Morita and Fujita [89] and Aglitsky *et al.* [90] remeasured the latter line at 2.3820±0.0004 Å and 2.38175±0.00025 Å, respectively, in vacuum sparks. Beiersdorfer *et al.* [91] measured the $1s^2$ $^1S_0 - 1snp$ $^1P^\circ_1$ $(n = 2, 3)$ transitions at 2.38190±0.0001 Å and 2.02627±0.00012 Å in a tokamak plasma. In a recent measurement with an electron-beam ion trap technique, Beiersdorfer *et al.* [87] identified three new forbidden lines from the $1s2p$ $^3P^\circ_{2,1}$ and $1s2s$ $^3S_1$ levels to the $1s^2$ $^1S_0$ ground state at 2.38943±0.00010 Å, 2.39338±0.00010 Å, and 2.40564±0.00014 Å. They used the $1s^2$ $^1S_0 - 1s2p$ $^1P^\circ_1$ line at the semiempirical value of 2.38187 Å as reference line.

Cheng *et al.* [92] give total energies for the ground and n=2 singlet states of selected He-like ions. We use a later calculation of both singlet and triplet states by Cheng [93] for all elements from Ti through Cu and Kr for the $n = 1$ and 2 configurations. With these data and the binding energy of the H-like ions [94] we obtain the value for the ionization energy of the He-like ions. For the $1s3l$ states we use the level values from Drake [95].

The levels $1s4l$ and $5l$ calculated by Vainshtein and Safronova [84] have been tabulated after increasing them by 1300 cm^{-1} to correspond with corrected values of lower n by Drake. All wavelengths have been derived from differences of the adopted energy levels.

Vainshtein and Safronova also calculated wavelengths of the transitions $1s2s - 2s2p$, $1s2p - 2s^2$, and $1s2p - 2p^2$, which we have compiled without correction.

V XXIII

H I isoelectronic sequence

Ground state $1s$ $^2S_{1/2}$

Ionization energy 58 443 920 ± 10 cm^{-1}
(7246.125 ± 0.001 eV)

No observations of this spectrum have been reported. We have tabulated the wavelengths calculated from the theoretical energy levels of Johnson and Soff [94] for the $n = 2$ shell. Their estimated uncertainty is ±10 cm^{-1}. Their energy differences are in close agreement with those of Mohr [96]. The levels for $n = 2-5$ have been calculated by Erickson [97]. We use his values for the binding energies subtracted from the binding energy of the ground state obtained by Johnson and Soff.

Transition probabilities and oscillator strengths were obtained by scaling the data tabulated for hydrogen spectra by Wiese *et al.* [98]. The scaling was actually performed for the line strengths S, which for a hydrogen-like ion of nuclear charge Z are reduced according to $S_Z = Z^{-2}S_H$, so that

$$S_{\mathrm{V\ XXIII}} = S_H(23)^{-2} = S_H/529.$$

The f and A values were then obtained from the usual numerical conversion formulas, given for example in Ref. [99]. For these conversions the very accurate wavelengths listed in the first column of the V XXIII table were used, for which relativistic and QED effects in the energies were taken into account. Relativistic effects in the line strengths are only of the order of 1 − 3% for V XXIII, according to the work by Younger and Weiss [100], and have been neglected.

The value for the ionization energy was calculated by Johnson and Soff [94].

2.3.2. Spectroscopic Data for V IV through V XXIII

V IV

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
5940.12	$3d5s\ ^1D_2$	$3d5p\ ^1D^o_2$	237 638.8	254 468.8	40	1.6	5.9+7	D	1°,99*
5710.10	$3d5s\ ^1D_2$	$3d5p\ ^3D^o_2$	237 638.8	255 146.8	8				1
5608.71	$3d5s\ ^1D_2$	$3d5p\ ^3F^o_2$	237 638.8	255 463.3	20				1
5520.63	2	3	237 638.8	255 747.6	2				1
5509.19	$3d5s\ ^3D_2$	$3d5p\ ^1D^o_2$	236 322.4	254 468.8	30				1
5496.67	$3d4f\ ^3D^o_3$	$3d5d\ ^1F_3$	265 271.6	283 459.4	1				1
5387.210	$3d4f\ ^1F^o_3$	$3d5d\ ^1F_3$	264 902.2	283 459.4	3				1
5353.090	$3d5s\ ^3D_1$	$3d5p\ ^3D^o_1$	236 148.6	254 824.1	25	9.6 − 1	7.4+7	D	1°,99*
5352.320	3	3	236 766.9	255 445.5	60	2.5	8.4+7	D	1°,99*
5310.77	2	2	236 322.4	255 146.8	20	8.0 − 1	3.8+7	D	1°,99*
5262.164	1	2	236 148.6	255 146.8	50	9.9 − 1	4.7+7	D	1°,99*
5227.89	2	3	236 322.4	255 445.5	10				1
5267.045	$3d5s\ ^3D_3$	$3d5p\ ^3F^o_3$	236 766.9	255 747.6	10	5.9 − 1	2.0+7	D	1°,99*
5222.93	2	2	236 322.4	255 463.3	5	6.0 − 1	3.0+7	D	1°,99*
5175.950	1	2	236 148.6	255 463.3	30	1.2	6.1+7	D	1°,99*
5146.502	2	3	236 322.4	255 747.6	40	2.6	9.2+7	D	1°,99*
5130.78	3	4	236 766.9	256 251.7	50	4.2	1.2+8	D	1°,99*
5074.90	$3d4f\ ^3H^o_4$	$3d5d\ ^3G_3$	264 401.9	284 101.1	5	7.2 − 1	2.7+7	D	1°,99*
5035.460	6	5	264 845.7	284 699.3	10	2.2	5.4+7	D	1°,99*
4971.941	5	5	264 591.9	284 699.3	1	2.4 − 1	5.9+6	D	1°,99*
4985.653	$3d5s\ ^1D_2$	$3d5p\ ^1F^o_3$	237 638.8	257 690.8	50	3.3	1.3+8	D	1°,99*
4970.348	$3d4f\ ^3F^o_4$	$3d5d\ ^3D_3$	264 113.1	284 226.7	3	6.5 − 1	2.5+7	D	1°,99*
4916.94	3	2	263 608.3	283 940.4	2	5.6 − 1	3.1+7	D	1°,99*
4954.408	$3d4f\ ^3G^o_5$	$3d5d\ ^3G_4$	264 161.8	284 340.1	1	6.1 − 1	1.9+7	D	1°,99*
4891.52	3	4	263 902.3	284 340.1					1
4913.083	$3d4f\ ^1G^o_4$	$3d5d\ ^1F_3$	263 111.4	283 459.4	10	1.1	4.2+7	D	1°,99*
4906.280	$3d5s\ ^3D_3$	$3d5p\ ^3P^o_2$	236 766.9	257 143.2	40	2.0	1.1+8	D	1°,99*
4886.36	2	1	236 322.4	256 781.8	20	1.0	9.3+7	D	1°,99*
4855.05	1	0	236 148.6	256 739.9	3	4.8 − 1	1.4+8	D	1°,99*
4845.21	1	1	236 148.6	256 781.8	3	3.9 − 1	3.6+7	D	1°,99*
4801.54	2	2	236 322.4	257 143.2	2	3.7 − 1	2.1+7	D	1°,99*
4899.56	$3d4f\ ^3G^o_4$	$3d5d\ ^3D_3$	263 822.4	284 226.7		3.8 − 1	1.5+7	D	1°,99*
4841.26	$3d5s\ ^1D_2$	$3d5p\ ^1P^o_1$	237 638.8	258 288.8	20	1.4	1.3+8	D	1°,99*
4828.990	$3d4d\ ^1S_0$	$3d5p\ ^3D^o_1$	234 121.8	254 824.1	1				1
4643.985	$3d4f\ ^1H^o_5$	$3d5d\ ^1G_4$	266 600.3	288 127.6	10	1.9	6.5+7	D	1°,99*
4616.57	$3d4f\ ^3H^o_4$	$3d5d\ ^3F_3$	264 401.9	286 056.9	1	3.7 − 1	1.7+7	D	1°,99*
4608.15	5	4	264 591.9	286 286.5	1	4.1 − 1	1.4+7	D	1°,99*
4565.63	$3d4f\ ^3G^o_3$	$3d5d\ ^3F_2$	263 902.3	285 798.9		4.8 − 1	3.1+7	D	1°,99*
4518.58	5	4	264 161.8	286 286.5	8	1.1	4.0+7	D	1°,99*
4508.67	$3d4f\ ^3F^o_4$	$3d5d\ ^3F_4$	264 113.1	286 286.5	2	3.5 − 1	1.3+7	D	1°,99*
4505.17	3	2	263 608.3	285 798.9	1	3.9 − 1	2.6+7	D	1°,99*
4479.195	$3d4f\ ^1F^o_3$	$3d5d\ ^1D_2$	264 902.2	287 221.4	2				1
4450.75	$3d4f\ ^3D^o_3$	$3d5d\ ^3P_2$	265 271.6	287 733.4					1
4136.72	$3d4d\ ^1S_0$	$3d5p\ ^1P^o_1$	234 121.8	258 288.8	5	2.8 − 1	3.6+7	D	1°,99*
3833.74	$3d5p\ ^1P^o_1$	$3d5d\ ^1P_1$	258 288.8	284 365.7?	15	1.6	2.4+8	D	1°,99*
3691.236	$3d5p\ ^3P^o_2$	$3d5d\ ^3D_3$	257 143.2	284 226.7	15	1.9	1.3+8	D	1°,99*
3681.04	1	2	256 781.8	283 940.4	10	1.2	1.2+8	D	1°,99*

V IV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3550.718	$3d5p\ ^3P^o_2$	$3d5d\ ^3S_1$	257 143.2	285 298.6	10	1.2	2.1+8	D	1°,99*
3505.70	1	1	256 781.8	285 298.6	10	8.1 − 1	1.5+8	D	1°,99*
3500.57	0	1	256 739.9	285 298.6	1	3.2 − 1	5.7+7	D	1°,99*
3545.98	$3d5p\ ^3F^o_3$	$3d5d\ ^3D_2$	255 747.6	283 940.4		2.9 − 1	3.1+7	D	1°,99*
3525.89	$3d5p\ ^3F^o_3$	$3d5d\ ^3G_3$	255 747.6	284 101.1		2.5 − 1	1.9+7	D	1°,99*
3514.25	4	5	256 251.7	284 699.3	80	9.9	4.7+8	D	1°,99*
3496.419	3	4	255 747.6	284 340.1	50	7.0	4.4+8	D	1°,99*
3490.913	2	3	255 463.3	284 101.1	30	4.1	3.2+8	D	1°,99*
3504.10	$3d4d\ ^3P_1$	$3d5p\ ^3D^o_2$	226 617.1	255 146.8	1	1.4 − 1	1.5+7	D	1°,99*
3489.51	2	3	226 796.3	255 445.5		2.7 − 1	2.1+7	D	1°,99*
3487.63	$3d4d\ ^1D_2$	$3d5p\ ^1D^o_2$	225 804.1	254 468.8	30	6.3 − 1	6.9+7	D	1°,99*
3473.458	$3d5p\ ^3D^o_3$	$3d5d\ ^3D_3$	255 445.5	284 226.7	20	2.3	1.9+8	D	1°,99*
3471.989	2	2	255 146.8	283 940.4	20	1.6	1.8+8	D	1°,99*
3459.40	1	1	254 824.1	283 722.7	10	1.1	2.0+8	D	1°,99*
3433.52	1	2	254 824.1	283 940.4		5.1 − 1	5.7+7	D	1°,99*
3455.325	$3d5p\ ^1P^o_1$	$3d5d\ ^1D_2$	258 288.8	287 221.4	15	9.9 − 1	1.1+8	D	1°,99*
3452.741	$3d5p\ ^3D^o_2$	$3d5d\ ^3G_3$	255 146.8	284 101.1	3	1.1	8.8+7	D	1°,99*
3448.410	$3d5p\ ^1D^o_2$	$3d5d\ ^1F_3$	254 468.8	283 459.4	50	3.8	3.0+8	D	1°,99*
3385.336	$3d5p\ ^1F^o_3$	$3d5d\ ^1D_2$	257 690.8	287 221.4	1	1.9 − 1	2.2+7	D	1°,99*
3334.79	$3d4d\ ^1G_4$	$3d5p\ ^1F^o_3$	227 712.5	257 690.8	60	2.4	2.1+8	D	1°,99*
3333.986	$3d4d\ ^3P_2$	$3d5p\ ^3P^o_1$	226 796.3	256 781.8	15	2.0 − 1	3.9+7	D	1°,99*
3318.788	1	0	226 617.1	256 739.9	5	1.9 − 1	1.2+8	D	1°,99*
3314.175	1	1	226 617.1	256 781.8	2	1.4 − 1	2.9+7	D	1°,99*
3303.719	0	1	226 521.6	256 781.8	5	1.9 − 1	3.9+7	D	1°,99*
3294.259	2	2	226 796.3	257 143.2	40	7.5 − 1	9.3+7	D	1°,99*
3274.931	1	2	226 617.1	257 143.2	5	2.7 − 1	3.3+7	D	1°,99*
3328.527	$3d5p\ ^3F^o_4$	$3d5d\ ^3F_4$	256 251.7	286 286.5	30	2.6	1.7+8	D	1°,99*
3298.371	3	3	255 747.6	286 056.9	20	2.0	1.7+8	D	1°,99*
3295.501	2	2	255 463.3	285 798.9	10	1.3	1.5+8	D	1°,99*
3284.560	$3d5p\ ^1F^o_3$	$3d5d\ ^1G_4$	257 690.8	288 127.6	50	7.7	5.3+8	D	1°,99*
3268.077	$3d5p\ ^3P^o_2$	$3d5d\ ^3P_2$	257 143.2	287 733.4	15	2.2	2.7+8	D	1°,99*
3229.92	1	2	256 781.8	287 733.4					1
3241.460	$3d5p\ ^3D^o_3$	$3d5d\ ^3F_4$	255 445.5	286 286.5	40	5.3	3.7+8	D	1°,99*
3234.251	2	3	255 146.8	286 056.9	20	3.2	2.9+8	D	1°,99*
3227.507	1	2	254 824.1	285 798.9	15	2.3	2.9+8	D	1°,99*
3135.192	$3d4d\ ^1D_2$	$3d5p\ ^1F^o_3$	225 804.1	257 690.8	20				1
3121.304	$3d4d\ ^3F_2$	$3d5p\ ^3D^o_1$	222 794.6	254 824.1	10	7.0 − 1	1.7+8	D	1°,99*
3113.022	3	2	223 033.0	255 146.8	25	1.1	1.4+8	D	1°,99*
3110.416	4	3	223 304.6	255 445.5	30	1.6	1.6+8	D	1°,99*
3084.36	3	3	223 033.0	255 445.5	1				1
3096.226	$3d5p\ ^3D^o_3$	$3d5d\ ^3P_2$	255 445.5	287 733.4	2	6.8 − 1	9.4+7	D	1°,99*
3067.85	2	2	255 146.8	287 733.4		1.9 − 1	2.6+7	D	1°,99*
3077.476	$3d4d\ ^1D_2$	$3d5p\ ^1P^o_1$	225 804.1	258 288.8	15	3.9 − 1	9.1+7	D	1°,99*
3060.146	$3d4d\ ^3F_2$	$3d5p\ ^3F^o_2$	222 794.6	255 463.3	5	4.0 − 1	5.7+7	D	1°,99*
3055.864	3	3	223 033.0	255 747.6	5	5.7 − 1	5.9+7	D	1°,99*
3034.27	4	4	223 304.6	256 251.7	10	7.6 − 1	6.1+7	D	1°,99*
3052.346	$3d5p\ ^1D^o_2$	$3d5d\ ^1D_2$	254 468.8	287 221.4	10	1.6	2.3+8	D	1°,99*
2899.575	$3d5p\ ^1P^o_1$	$3d6s\ ^1D_2$	258 288.8	292 766.7	2	7.5 − 1	1.2+8	D	1°,99*
2850.160	$3d5p\ ^1F^o_3$	$3d6s\ ^1D_2$	257 690.8	292 766.7	2	1.6	2.7+8	D	1°,99*
2834.089	$3d5p\ ^3P^o_2$	$3d6s\ ^3D_3$	257 143.2	292 417.6	5	1.1	1.2+8	D	1°,99*
2824.131	$3d4d\ ^1G_4$	$3d4f\ ^1G^o_4$	227 712.5	263 111.4	20	6.9 − 1	6.4+7	D	1°,99*

V IV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2764.219	$3d5p\ ^3F^o_4$	$3d6s\ ^3D_3$	256 251.7	292 417.6	15	2.2	2.7+8	D	1°, 99*
2763.860	3	2	255 747.6	291 918.1	15	1.3	2.2+8	D	1°, 99*
2751.528	2	1	255 463.3	291 796.0	10	6.5 − 1	1.9+8	D	1°, 99*
2743.523	$3d4d\ ^3S_1$	$3d5p\ ^3P^o_1$	220 343.5	256 781.8	20	2.3 − 1	6.9+7	D	1°, 99*
2716.594	1	2	220 343.5	257 143.2	20	3.9 − 1	6.9+7	D	1°, 99*
2740.966	$3d5p\ ^3D^o_3$	$3d6s\ ^3D_2$	255 445.5	291 918.1	5	3.2 − 1	5.7+7	D	1°, 99*
2727.780	2	1	255 146.8	291 796.0	1	5.0 − 1	1.6+8	D	1°, 99*
2718.722	2	2	255 146.8	291 918.1	2	2.8 − 1	5.1+7	D	1°, 99*
2703.933	3	3	255 445.5	292 417.6	20				1
2703.933	1	1	254 824.1	291 796.0	20				1
2740.545	$3d4d\ ^1P_1$	$3d5p\ ^1D^o_2$	217 990.7	254 468.8	5	1.2 − 1	2.2+7	D	1°, 99*
2669.483	$3d5p\ ^1D^o_2$	$3d6s\ ^3D_2$	254 468.8	291 918.1	10				1
2667.837	$3d4d\ ^1P_1$	$3d5p\ ^3F^o_2$	217 990.7	255 463.3	1				1
2656.868	$3d4d\ ^3G_3$	$3d5p\ ^3F^o_2$	217 836.3	255 463.3	50	1.3	2.5+8	D	1°, 99*
2655.408	4	3	218 100.0	255 747.6	50	2.0	2.7+8	D	1°, 99*
2645.541	5	4	218 463.6	256 251.7	80	2.6	2.8+8	D	1°, 99*
2636.936	3	3	217 836.3	255 747.6	10	1.1 − 1	1.6+7	D	1°, 99*
2620.320	4	4	218 100.0	256 251.7	25	1.2 − 1	1.3+7	D	1°, 99*
2650.613	$3d4d\ ^3D_2$	$3d5p\ ^3D^o_1$	217 108.0	254 824.1	8	1.2 − 1	3.6+7	D	1°, 99*
2644.946	3	2	217 350.0	255 146.8	8	1.4 − 1	2.7+7	D	1°, 99*
2636.401	1	1	216 905.0	254 824.1	30	3.3 − 1	1.0+8	D	1°, 99*
2628.090	2	2	217 108.0	255 146.8	20	4.5 − 1	8.6+7	D	1°, 99*
2624.213	3	3	217 350.0	255 445.5	50	8.4 − 1	1.1+8	D	1°, 99*
2614.154	1	2	216 905.0	255 146.8	1				1
2607.633	2	3	217 108.0	255 445.5	5				1
2623.483	$3d4d\ ^3P_2$	$3d4f\ ^1F^o_3$	226 796.3	264 902.2	15				1
2610.323	$3d5p\ ^1D^o_2$	$3d6s\ ^1D_2$	254 468.8	292 766.7	10	4.6 − 1	8.9+7	D	1°, 99*
2603.213	$3d4d\ ^3P_1$	$3d4f\ ^3D^o_1$	226 617.1	265 019.7	10	3.6 − 1	1.2+8	D	1°, 99*
2599.983	1	2	226 617.1	265 067.4	30	1.7	3.4+8	D	1°, 99*
2598.287	2	3	226 796.3	265 271.6	30				1
2596.761	0	1	226 521.6	265 019.7	15	8.3 − 1	2.7+8	D	1°, 99*
2595.858	$3d4d\ ^1F_3$	$3d5p\ ^1D^o_2$	215 957.7	254 468.8	20	9.8 − 1	2.0+8	D	1°, 99*
2592.747	$3d4d\ ^3D_1$	$3d5p\ ^3F^o_2$	216 905.0	255 463.3					1
2587.258	2	3	217 108.0	255 747.6	10				1
2569.812	3	4	217 350.0	256 251.7	10				1
2584.636	$3d4d\ ^1D_2$	$3d4f\ ^1D^o_2$	225 804.1	264 482.8	40	1.3	2.6+8	D	1°, 99*
2570.724	$3d4d\ ^1G_4$	$3d4f\ ^1H^o_5$	227 712.5	266 600.3	80	8.3	7.6+8	D	1°, 99*
2557.897	$3d4d\ ^3P_2$	$3d4f\ ^3P^o_2$	226 796.3	265 879.2	15				1
2546.228	1	2	226 617.1	265 879.2	20				1
2556.915	$3d4d\ ^1D_2$	$3d4f\ ^1F^o_3$	225 804.1	264 902.2	50				1
2550.971	$3d4d\ ^1F_3$	$3d5p\ ^3D^o_2$	215 957.7	255 146.8	2				1
2532.982	$3d4d\ ^1D_2$	$3d4f\ ^3D^o_3$	225 804.1	265 271.6	20				1
2530.520	$3d4d\ ^1F_3$	$3d5p\ ^3F^o_2$	215 957.7	255 463.3	2				1
2519.803	$3d4d\ ^3D_2$	$3d5p\ ^3P^o_1$	217 108.0	256 781.8	20	3.2 − 1	1.1+8	D	1°, 99*
2512.242	3	2	217 350.0	257 143.2		5.6 − 1	1.2+8	D	1°, 99*
2509.606	1	0	216 905.0	256 739.9	5	1.3 − 1	1.4+8	D	1°, 99*
2506.969	1	1	216 905.0	256 781.8	10	1.0 − 1	3.6+7	D	1°, 99*
2497.049	2	2	217 108.0	257 143.2	10				1
2511.377	$3d4d\ ^3F_4$	$3d4f\ ^1G^o_4$	223 304.6	263 111.4	1				1
2494.351	3	4	223 033.0	263 111.4	20				1
2480.739	$3d4d\ ^1P_1$	$3d5p\ ^1P^o_1$	217 990.7	258 288.8	30	4.8 − 1	1.7+8	D	1°, 99*
2478.119	$3d4d\ ^3D_3$	$3d5p\ ^1F^o_3$	217 350.0	257 690.8	1				1

V IV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2467.287	$3d4d\ ^3F_4$	$3d4f\ ^3G^\circ_4$	223 304.6	263 822.4	20	2.8 – 1	3.4+7	D	1°, 99*
2450.869	3	4	223 033.0	263 822.4	50	1.98	2.4+8	D	1°, 99*
2446.802	4	5	223 304.6	264 161.8	50	5.2	5.3+8	D	1°, 99*
2446.017	3	3	223 033.0	263 902.3	30	1.3	2.0+8	D	1°, 99*
2431.885	2	3	222 794.6	263 902.3	30	2.0	3.2+8	D	1°, 99*
2464.720	$3d4d\ ^3F_3$	$3d4f\ ^3F^\circ_2$	223 033.0	263 593.0	2				1
2463.796	3	3	223 033.0	263 608.3	10	3.2 – 1	5.1+7	D	1°, 99*
2450.329	2	2	222 794.6	263 593.0	20	1.0	2.2+8	D	1°, 99*
2449.723	4	4	223 304.6	264 113.1	20	1.6	2.0+8	D	1°, 99*
2449.404	2	3	222 794.6	263 608.3	40	2.0	3.2+8	D	1°, 99*
2433.530	3	4	223 033.0	264 113.1	50	1.3	1.6+8	D	1°, 99*
2432.518	$3d4d\ ^3F_4$	$3d4f\ ^3H^\circ_4$	223 304.6	264 401.9	10	2.6 – 1	3.2+7	D	1°, 99*
2421.317	4	5	223 304.6	264 591.9	50	1.6	1.6+8	D	1°, 99*
2416.552	3	4	223 033.0	264 401.9	30	1.4	1.8+8	D	1°, 99*
2413.524	$3d4f\ ^1F^\circ_3$	$3d(^2D_{3/2})5g\ [\frac{7}{2}]_3$	264 902.2	306 323.1	5				1
2413.256	3	4	264 902.2	306 327.7	20				1
2402.855	$3d4f\ ^3D^\circ_3$	$3d(^2D_{5/2})5g\ [\frac{9}{2}]_4$	265 271.6	306 876.3	5				1
2395.450	$3d4d\ ^1F_3$	$3d5p\ ^1F^\circ_3$	215 957.7	257 690.8	10	4.6 – 1	7.6+7	D	1°, 99*
2387.663	$3d4d\ ^3F_3$	$3d4f\ ^1F^\circ_3$	223 033.0	264 902.2	3				1
2384.729	$3d4f\ ^3H^\circ_4$	$3d(^2D_{3/2})5g\ [\frac{7}{2}]_3$	264 401.9	306 323.1	10				1
2381.712	$3d4f\ ^1F^\circ_3$	$3d(^2D_{5/2})5g\ [\frac{9}{2}]_4$	264 902.2	306 876.3	10				1
2378.290	$3d4d\ ^3F_3$	$3d4f\ ^3D^\circ_2$	223 033.0	265 067.4	1	1.8 – 1	4.1+7	D	1°, 99*
2364.512	$3d4f\ ^3H^\circ_5$	$3d(^2D_{5/2})5g\ [\frac{9}{2}]_5$	264 591.9	306 871.0	1				1
2353.639	4	4	264 401.9	306 876.3	3				1
2356.624	$3d4f\ ^3G^\circ_3$	$3d(^2D_{3/2})5g\ [\frac{7}{2}]_3$	263 902.3	306 323.1	5				1
2356.369	3	4	263 902.3	306 327.7	10				1
2351.934	4	4	263 822.4	306 327.7	5				1
2340.704	$3d4f\ ^3G^\circ_5$	$3d(^2D_{5/2})5g\ [\frac{9}{2}]_5$	264 161.8	306 871.0	5				1
2326.291	3	4	263 902.3	306 876.3	3				1
2322.259	4	5	263 822.4	306 871.0	5				1
2321.962	4	4	263 822.4	306 876.3	1				1
2340.140	$3d4f\ ^3F^\circ_3$	$3d(^2D_{3/2})5g\ [\frac{7}{2}]_4$	263 608.3	306 327.7	10				1
2339.548	2	3	263 593.0	306 323.1	20				1
2338.032	$3d4f\ ^3F^\circ_4$	$3d(^2D_{5/2})5g\ [\frac{9}{2}]_5$	264 113.1	306 871.0	10				1
2313.236	$3d4f\ ^1G^\circ_4$	$3d(^2D_{3/2})5g\ [\frac{7}{2}]_4$	263 111.4	306 327.7	1				1
2268.298	$3d4s\ ^1D_2$	$3d4p\ ^1D^\circ_2$	100 200.7	144 273.1	500	1.3	3.2+8	D	1°, 99*
2195.388	$3d4d\ ^3S_1$	$3d4f\ ^3P^\circ_2$	220 343.5	265 879.2	10				1
2187.562	$3d4d\ ^3G_5$	$3d4f\ ^3G^\circ_5$	218 463.6	264 161.8	5	6.0 – 1	7.6+7	D	1°, 99*
2186.394	4	4	218 100.0	263 822.4		1.5 – 1	2.3+7	D	1°, 99*
2173.893	3	4	217 836.3	263 822.4	10	8.0 – 1	1.2+8	D	1°, 99*
2170.384	4	5	218 100.0	264 161.8	40	2.5	3.2+8	D	1°, 99*
2167.200	$3d4d\ ^3G_5$	$3d4f\ ^3H^\circ_5$	218 463.6	264 591.9	20	1.1	1.4+8	D	1°, 99*
2159.055	4	4	218 100.0	264 401.9	10	9.6 – 1	1.5+8	D	1°, 99*
2155.336	5	6	218 463.6	264 845.7	100	1.0+1	1.2+9	D	1°, 99*
2150.231	4	5	218 100.0	264 591.9	40	2.5	3.2+8	D	1°, 99*
2146.828	3	4	217 836.3	264 401.9	50	4.1	6.6+8	D	1°, 99*
2162.498	$3d4s\ ^1D_2$	$3d4p\ ^3D^\circ_2$	100 200.7	146 429.3	30				1
2160.222	$3d4d\ ^3G_3$	$3d4f\ ^3F^\circ_4$	217 836.3	264 113.1	20	2.0	3.1+8	D	1°, 99*
2151.087	$3d4d\ ^3D_3$	$3d4f\ ^3G^\circ_4$	217 350.0	263 822.4	20	2.7	4.3+8	D	1°, 99*
2136.330	2	3	217 108.0	263 902.3	10	1.2	2.4+8	D	1°, 99*
2150.231	$3d4d\ ^1P_1$	$3d4f\ ^1D^\circ_2$	217 990.7	264 482.8	40				1

V IV – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
2149.852	$3d4d\ ^3D_2$	$3d4f\ ^3F^o_3$	217 108.0	263 608.3	20	2.5	5.1+8	D	1°,99*
2141.199	1	2	216 905.0	263 593.0	40	2.4	7.0+8	D	1°,99*
2137.741	3	4	217 350.0	264 113.1	20	1.9	3.0+8	D	1°,99*
2129.934	$3d4s\ ^1D_2$	$3d4p\ ^3F^o_2$	100 200.7	147 135.2	30				1
2106.560	2	3	100 200.7	147 656.5	2				1
2120.052	$3d4d\ ^1F_3$	$3d4f\ ^1G^o_4$	215 957.7	263 111.4	40	4.9	8.1+8	D	1°,99*
2105.709	$3d4s\ ^3D_3$	$3d4p\ ^1D^o_2$	96 798.0	144 273.1					1
2088.737	2	2	96 412.1	144 273.1	50				1
2079.300	1	2	96 196.1	144 273.1	30				1
2086.073	$3d4d\ ^3D_3$	$3d4f\ ^3D^o_3$	217 350.0	265 271.6	30				1
2084.433	2	2	217 108.0	265 067.4	20	1.3	4.0+8	D	1°,99*
2063.563	$3d4d\ ^1F_3$	$3d4f\ ^3H^o_4$	215 957.7	264 401.9	2				1
2060.113	$3d4d\ ^1F_3$	$3d4f\ ^1D^o_2$	215 957.7	264 482.8		1.4 − 1	4.3+7	D	1°,99*
2042.454	$3d4d\ ^1F_3$	$3d4f\ ^1F^o_3$	215 957.7	264 902.2	20				1
2027.144	$3d4d\ ^1F_3$	$3d4f\ ^3D^o_3$	215 957.7	265 271.6	1				1
2014.199	$3d4s\ ^3D_3$	$3d4p\ ^3D^o_2$	96 798.0	146 429.3	40	2.9 − 1	9.7+7	D	1°,99*
2011.180	2	1	96 412.1	146 117.7	40	3.0 − 1	1.7+8	D	1°,99*
2002.480	1	1	96 196.1	146 117.7	100	6.6 − 1	3.6+8	D	1°,99*
1999.320	2	2	96 412.1	146 429.3	200	1.1	3.6+8	D	1°,99*
1997.722	3	3	96 798.0	146 855.1	500	2.0	4.7+8	D	1°,99*
1990.712	1	2	96 196.1	146 429.3	40				1
1982.422	2	3	96 412.1	146 855.1	15	2.7 − 1	6.5+7	D	1°,99*
1971.471	$3d4s\ ^3D_2$	$3d4p\ ^3F^o_2$	96 412.1	147 135.2	40				1
1966.244	3	3	96 798.0	147 656.5	20	2.8 − 1	6.9+7	D	1°,99*
1963.103	1	2	96 196.1	147 135.2	300	1.4	4.8+8	D	1°,99*
1951.432	2	3	96 412.1	147 656.5	400	2.0	5.0+8	D	1°,99*
1939.065	3	4	96 798.0	148 369.2	500	2.9	5.8+8	D	1°,99*
1946.772	$3d4s\ ^1D_2$	$3d4p\ ^3P^o_2$	100 200.7	151 567.3	5				1
1861.558	$3d4s\ ^1D_2$	$3d4p\ ^1F^o_3$	100 200.7	153 918.7	300	2.4	6.6+8	D	1°,99*
1825.836	$3d4s\ ^3D_3$	$3d4p\ ^3P^o_2$	96 798.0	151 567.3	200	1.3	5.3+8	D	1°,99*
1817.676	2	1	96 412.1	151 427.0	100	7.0 − 1	4.8+8	D	1°,99*
1813.050	2	2	96 412.1	151 567.3	50	3.7 − 1	1.5+8	D	1°,99*
1810.566	1	1	96 196.1	151 427.0	30	3.3 − 1	2.3+8	D	1°,99*
1809.854	1	0	96 196.1	151 449.1	60	3.6 − 1	7.2+8	D	1°,99*
1806.184	$3d4s\ ^1D_2$	$3d4p\ ^1P^o_1$	100 200.7	155 565.5	80	1.1	7.3+8	D	1°,99*
1611.879	$3d4p\ ^1F^o_3$	$3d4d\ ^1F_3$	153 918.7	215 957.7	80	1.4	5.2+8	D	1°,99*
1601.915	$3d4p\ ^1P^o_1$	$3d4d\ ^1P_1$	155 565.5	217 990.7	80	1.4	1.2+9	D	1°,99*
1527.721	$3d4p\ ^3P^o_0$	$3d4d\ ^3D_1$	151 449.1	216 905.0	15	3.6 − 1	3.5+8	D	1°,99*
1527.223	1	1	151 427.0	216 905.0	15	2.3 − 1	2.2+8	D	1°,99*
1525.756	2	2	151 567.3	217 108.0	10	1.6 − 1	9.3+7	D	1°,99*
1522.493	1	2	151 427.0	217 108.0	40	9.6 − 1	5.5+8	D	1°,99*
1520.142	2	3	151 567.3	217 350.0	60	1.8	7.2+8	D	1°,99*
1454.000	$3d4p\ ^3P^o_2$	$3d4d\ ^3S_1$	151 567.3	220 343.5	40	1.1	1.1+9	D	1°,99*
1451.496	0	1	151 449.1	220 343.5	10	2.4 − 1	2.5+8	D	1°,99*
1451.042	1	1	151 427.0	220 343.5	30	6.6 − 1	7.0+8	D	1°,99*
1449.681	$3d4p\ ^3F^o_4$	$3d4d\ ^3D_3$	148 369.2	217 350.0	20	2.8 − 1	1.2+8	D	1°,99*
1439.834	3	2	147 656.5	217 108.0	1				1
1434.842	3	3	147 656.5	217 350.0	15	1.2	5.4+8	D	1°,99*
1433.276	2	1	147 135.2	216 905.0	1				1
1429.114	2	2	147 135.2	217 108.0	10	7.5 − 1	5.0+8	D	1°,99*
1424.197	2	3	147 135.2	217 350.0		1.5 − 1	7.1+7	D	1°,99*
1447.120	$3d4p\ ^3D^o_3$	$3d4d\ ^1F_3$	146 855.1	215 957.7					1
1434.092	$3d4p\ ^3F^o_4$	$3d4d\ ^3G_4$	148 369.2	218 100.0	15	3.4 − 1	1.2+8	D	1°,99*
1426.654	4	5	148 369.2	218 463.6	100	7.4	2.2+9	D	1°,99*
1424.916	3	3	147 656.5	217 836.3	10	2.6 − 1	1.2+8	D	1°,99*
1419.580	3	4	147 656.5	218 100.0	80	3.5	1.3+9	D	1°,99*
1414.409	2	3	147 135.2	217 836.3	50	2.6	1.2+9	D	1°,99*

V IV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1423.719	$3d4p\ ^1P^o_1$	$3d4d\ ^1D_2$	155 565.5	225 804.1	30	1.1	7.1+8	D	1°,99*
1423.420	$3d4p\ ^3D^o_3$	$3d4d\ ^3D_2$	146 855.1	217 108.0	10	4.7 − 1	3.1+8	D	1°,99*
1418.921	2	1	146 429.3	216 905.0	10	3.5 − 1	3.8+8	D	1°,99*
1418.533	3	3	146 855.1	217 350.0	30	1.1	5.2+8	D	1°,99*
1414.842	2	2	146 429.3	217 108.0	20	7.0 − 1	4.6+8	D	1°,99*
1412.686	1	1	146 117.7	216 905.0	20	9.6 − 1	1.1+9	D	1°,99*
1410.018	2	3	146 429.3	217 350.0	8				1
1408.639	1	2	146 117.7	217 108.0	8	2.5 − 1	1.7+8	D	1°,99*
1403.618	$3d4p\ ^3D^o_3$	$3d4d\ ^3G_4$	146 855.1	218 100.0	8	2.2	8.4+8	D	1°,99*
1400.416	2	3	146 429.3	217 836.3	5	1.6	7.5+8	D	1°,99*
1395.001	$3d4p\ ^1D^o_2$	$3d4d\ ^1F_3$	144 273.1	215 957.7	60	3.0	1.4+9	D	1°,99*
1391.105	$3d4p\ ^1F^o_3$	$3d4d\ ^1D_2$	153 918.7	225 804.1	20	2.0 − 1	1.4+8	D	1°,99*
1356.529	$3d4p\ ^1D^o_2$	$3d4d\ ^1P_1$	144 273.1	217 990.7	10	4.1 − 1	4.9+8	D	1°,99*
1355.131	$3d4p\ ^1F^o_3$	$3d4d\ ^1G_4$	153 918.7	227 712.5	80	6.2	2.5+9	D	1°,99*
1347.030	$3d4p\ ^3P^o_2$	$3d4d\ ^1D_2$	151 567.3	225 804.1	1				1
1344.493	1	2	151 427.0	225 804.1					1
1339.335	$3d4p\ ^3F^o_4$	$3d4d\ ^3F_3$	148 369.2	223 033.0	5	1.4 − 1	7.5+7	D	1°,99*
1334.493	4	4	148 369.2	223 304.6		2.0	8.3+8	D	1°,99*
1326.666	3	3	147 656.5	223 033.0	5	2.3 − 1	1.2+8	D	1°,99*
1321.917	3	4	147 656.5	223 304.6	10	2.3	9.9+8	D	1°,99*
1321.719	2	2	147 135.2	222 794.6	10	1.3 − 1	9.4+7	D	1°,99*
1317.566	2	3	147 135.2	223 033.0	5	1.6	8.7+8	D	1°,99*
1332.459	$3d4p\ ^3P^o_2$	$3d4d\ ^3P_1$	151 567.3	226 617.1	3	6.0 − 1	7.5+8	D	1°,99*
1331.665	1	0	151 427.0	226 521.6		4.5 − 1	1.7+9	D	1°,99*
1330.355	0	1	151 449.1	226 617.1	10	4.8 − 1	6.0+8	D	1°,99*
1329.968	1	1	151 427.0	226 617.1	10	3.9 − 1	4.8+8	D	1°,99*
1329.288	2	2	151 567.3	226 796.3	10	2.0	1.5+9	D	1°,99*
1326.807	1	2	151 427.0	226 796.3	5	5.1 − 1	4.0+8	D	1°,99*
1312.717	$3d4p\ ^3D^o_3$	$3d4d\ ^3F_3$	146 855.1	223 033.0	20	1.5	8.6+8	D	1°,99*
1309.502	2	2	146 429.3	222 794.6	10	1.1	8.7+8	D	1°,99*
1308.061	3	4	146 855.1	223 304.6	50	1.8	7.9+8	D	1°,99*
1305.420	2	3	146 429.3	223 033.0	40	1.3	7.0+8	D	1°,99*
1304.173	1	2	146 117.7	222 794.6	30	1.9	1.5+9	D	1°,99*
1273.529	$3d4p\ ^1D^o_2$	$3d4d\ ^3F_2$	144 273.1	222 794.6	10				1
1272.972	$3d4p\ ^1P^o_1$	$3d4d\ ^1S_0$	155 565.5	234 121.8	30	6.6 − 1	2.7+9	D	1°,99*
1271.153	$3d4p\ ^3F^o_2$	$3d4d\ ^1D_2$	147 135.2	225 804.1	2				1
1250.918	$3d4p\ ^3D^o_3$	$3d4d\ ^3P_2$	146 855.1	226 796.3	20	3.9 − 1	3.3+8	D	1°,99*
1247.069	2	1	146 429.3	226 617.1	30	3.3 − 1	4.7+8	D	1°,99*
1244.287	2	2	146 429.3	226 796.3	2				1
1243.718	1	0	146 117.7	226 521.6	10	2.2 − 1	9.4+8	D	1°,99*
1242.248	1	1	146 117.7	226 617.1	3				1
1226.523	$3d4p\ ^1D^o_2$	$3d4d\ ^1D_2$	144 273.1	225 804.1	60	1.8	1.5+9	D	1°,99*
1222.352^{C}	$3d^2\ ^1G_4$	$3d4s\ ^1D_2$	18 391.2	100 200.7		E2	1.0+3	E	99*
1194.462	$3d4p\ ^1F^o_3$	$3d5s\ ^1D_2$	153 918.7	237 638.8	20	1.1	1.0+9	D	1°,99*
1131.255	$3d4p\ ^3F^o_4$	$3d5s\ ^3D_3$	148 369.2	236 766.9	20	1.3	9.4+8	D	1°,99*
1127.836	3	2	147 656.5	236 322.4	20	8.4 − 1	8.9+8	D	1°,99*
1112.436	$3d4p\ ^3D^o_2$	$3d5s\ ^3D_2$	146 429.3	236 322.4	5	4.7 − 1	5.0+8	D	1°,99*
1112.199	3	3	146 855.1	236 766.9	5	8.4 − 1	6.3+8	D	1°,99*
1110.720	1	1	146 117.7	236 148.6	2	2.8 − 1	5.0+8	D	1°,99*
1096.375	$3d4p\ ^3D^o_2$	$3d5s\ ^1D_2$	146 429.3	237 638.8	2				1
1086.382	$3d4p\ ^1D^o_2$	$3d5s\ ^3D_2$	144 273.1	236 322.4	5				1
1071.054	$3d4p\ ^1D^o_2$	$3d5s\ ^1D_2$	144 273.1	237 638.8	20	5.4 − 1	6.1+8	D	1°,99*
1040.980^{C}	$3d^2\ ^3F_4$	$3d4s\ ^3D_3$	734.7	96 798.0		E2	1.4+3	E	99*
1039.543^{C}	2	1	0.0	96 196.1		E2	1.2+3	E	99*

V IV – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
884.146	$3d^2\ ^1S_0$	$3d4p\ ^1P^o_1$	42 462.1	155 565.5	30	1.7 − 1	4.7+8	D	1°, 99*
778.433	$3d^2\ ^1G_4$	$3d4p\ ^3D^o_3$	18 391.2	146 855.1					1
752.568	$3d^2\ ^3P_1$	$3d4p\ ^3D^o_1$	13 239.2	146 117.7	20				1
752.038	2	2	13 458.3	146 429.3	30				1
751.908	0	1	13 122.8	146 117.7	30				1
750.809	1	2	13 239.2	146 429.3	40				1
749.641	2	3	13 458.3	146 855.1	40				1
750.110	$3d^2\ ^1D_2$	$3d4p\ ^1D^o_2$	10 959.3	144 273.1	150				1
745.165	$3d^2\ ^3P_2$	$3d4p\ ^3F^o_3$	13 458.3	147 656.5	20				1
737.854	$3d^2\ ^1G_4$	$3d4p\ ^1F^o_3$	18 391.2	153 918.7	400	1.4	2.4+9	D	1°, 99*
734.344	$3d^2\ ^1D_2$	$3d4p\ ^3F^o_2$	10 959.3	147 135.2	20				1
724.809	$3d^2\ ^3P_2$	$3d4p\ ^3P^o_1$	13 458.3	151 427.0	5	1.3 − 1	5.6+8	D	1°, 99*
724.068	2	2	13 458.3	151 567.3	40	4.5 − 1	1.1+9	D	1°, 99*
723.652	1	1	13 239.2	151 427.0	40				1
723.537	1	0	13 239.2	151 449.1	40	1.1 − 1	1.5+9	D	1°, 99*
723.045	0	1	13 122.8	151 427.0	40				1
722.912	1	2	13 239.2	151 567.3	40	1.2 − 1	3.1+8	D	1°, 99*
711.911	$3d^2\ ^1D_2$	$3d4p\ ^3P^o_1$	10 959.3	151 427.0	20				1
702.035	$3d^2\ ^3P_0$	$3d4p\ ^1P^o_1$	13 122.8	155 565.5	1				1
699.497	$3d^2\ ^1D_2$	$3d4p\ ^1F^o_3$	10 959.3	153 918.7	30				1
693.128	$3d^2\ ^3F_2$	$3d4p\ ^1D^o_2$	0.0	144 273.1	50				1
691.530	$3d^2\ ^1D_2$	$3d4p\ ^1P^o_1$	10 959.3	155 565.5	100	2.3 − 1	1.1+9	D	1°, 99*
684.450	$3d^2\ ^3F_3$	$3d4p\ ^3D^o_2$	325.4	146 429.3	100	2.7 − 1	7.7+8	D	1°, 99*
684.368	4	3	734.7	146 855.1	500				1
684.368	2	1	0.0	146 117.7	500				1
682.923	2	2	0.0	146 429.3	40	2.4 − 1	6.9+8	D	1°, 99*
682.455	3	3	325.4	146 855.1	40	3.2 − 1	6.5+8	D	1°, 99*
681.145	$3d^2\ ^3F_3$	$3d4p\ ^3F^o_2$	325.4	147 135.2	40	3.9 − 1	1.1+9	D	1°, 99*
680.632	4	3	734.7	147 656.5	40	5.6 − 1	1.2+9	D	1°, 99*
679.647	2	2	0.0	147 135.2	50				1
678.740	3	3	325.4	147 656.5	60				1
677.345	4	4	734.7	148 369.2	200	4.1 − 1	6.7+8	D	1°, 99*
675.469	3	4	325.4	148 369.2	30				1
402.885	$3d^2\ ^1G_4$	$3d4f\ ^1H^o_5$	18 391.2	266 600.3	6				4
397.122	$3d^2\ ^3P_2$	$3d4f\ ^3D^o_3$	13 458.3	265 271.6	4				4
397.097	1	2	13 239.2	265 067.4	3				4
396.991	0	1	13 122.8	265 019.7					4
394.441	$3d^2\ ^1D_2$	$3d4f\ ^1D^o_2$	10 959.3	264 482.8	3				4
393.790	$3d^2\ ^1D_2$	$3d4f\ ^1F^o_3$	10 959.3	264 902.2	4				4
393.217	$3d^2\ ^1D_2$	$3d4f\ ^3D^o_3$	10 959.3	265 271.6					4
392.602	$3d^2\ ^3F_4$	$3d5p\ ^3D^o_3$	734.7	255 445.5	2				4
392.428	2	1	0.0	254 824.1	3				4
391.362	$3d^2\ ^3F_4$	$3d5p\ ^3F^o_4$	734.7	256 251.7					4
380.537	$3d^2\ ^3F_3$	$3d4f\ ^1G^o_4$	325.4	263 111.4					4
380.101	$3d^2\ ^3F_4$	$3d4f\ ^3G^o_4$	734.7	263 822.4					4
379.613	4	5	734.7	264 161.8	7				4
379.512	3	4	325.4	263 822.4	5				4
379.395	3	3	325.4	263 902.3	3				4
378.929	2	3	0.0	263 902.3	4				4
379.682	$3d^2\ ^3F_4$	$3d4f\ ^3F^o_4$	734.7	264 113.1	4				4
379.372	2	2	0.0	263 593.0	3				4
379.353	2	3	0.0	263 608.3	5				4
379.093	3	4	325.4	264 113.1	4				4

V IV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
378.993	$3d^2\ ^3F_4$	$3d4f\ ^3H^o_5$	734.7	264 591.9	4				4
378.678	3	4	325.4	264 401.9	3				4

V v

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
8457.555	$3p^66s\ ^2S_{1/2}$	$3p^66p\ ^2P^o_{3/2}$	403 855.12	415 675.69	1				6,8°
7595.511	$3p^67h\ ^2H^o$	$3p^68i\ ^2I$	470 488.77	483 650.82	3				8
6635.164	$3p^66d\ ^2D_{3/2}$	$3p^66f\ ^2F^o_{5/2}$	434 303.77	449 370.81	4				8
6628.796	5/2	7/2	434 340.92	449 422.47	7				8
6541.429	$3p^66d\ ^2D_{3/2}$	$3p^67p\ ^2P^o_{1/2}$	434 303.77	449 586.71	3				8
6478.300	5/2	3/2	434 340.92	449 772.79	6				8
6462.734	3/2	3/2	434 303.77	449 772.79	1				8
6188.907	$3p^65f\ ^2F^o_{7/2}$	$3p^66d\ ^2D_{5/2}$	418 187.47	434 340.92	5				8
6020.741	5/2	3/2	417 699.10	434 303.77	3				8
6135.907	$3p^67p\ ^2P^o_{3/2}$	$3p^68s\ ^2S_{1/2}$	449 772.79	466 065.79	2				8
6066.620	1/2	1/2	449 586.71	466 065.79	1				8
5442.704	$3p^5(^2P^o)3d^2(^3F)\ ^2F^o_{7/2}$	$3p^65g\ ^2G_{9/2}$	397 993.66	416 361.78	3				6,8°
5366.750	$3p^66p\ ^2P^o_{3/2}$	$3p^66d\ ^2D_{3/2}$	415 675.69	434 303.77	1				6,8°
5356.070	3/2	5/2	415 675.69	434 340.92	8				6,8°
5294.115	1/2	3/2	415 420.10	434 303.77	4				6,8°
5080.0	$3p^66g\ ^2G$	$3p^67f\ ^2F^o$	450 024.87	469 714					9
5079.413	7/2	5/2	450 024.54	469 706.4	1				8
4976.8	$3p^66h\ ^2H^o$	$3p^67g\ ^2G$	450 247.99	470 333.55					9
4930.533	$3p^66h\ ^2H^o$	$3p^67i\ ^2I$	450 247.99	470 524.11	15				6,8°
4885.299	$3p^66g\ ^2G$	$3p^67h\ ^2H^o$	450 024.87	470 488.77	7				6,8°
4780.787	$3p^66f\ ^2F^o_{7/2}$	$3p^67g\ ^2G_{9/2}$	449 422.47	470 333.75	3				8°,9
4769.064	5/2	7/2	449 370.81	470 333.35	1				8°,9
4515.9	$3p^67i\ ^2I$	$3p^69k\ ^2K^o$	470 524.11	492 662					9
4510.4	$3p^67h\ ^2H^o$	$3p^69i\ ^2I$	470 488.77	492 653					9
4484.8	$3p^67g\ ^2G$	$3p^69h\ ^2H^o$	470 333.55	492 625					9
4375.1	$3p^67f\ ^2F^o$	$3p^69g\ ^2G$	469 714	492 564					9
4293.735	$3p^65s\ ^2S_{1/2}$	$3p^65p\ ^2P^o_{1/2}$	328 217.30	351 500.51	10				6,8°
4200.322	1/2	3/2	328 217.30	352 018.34	20				6,8°
3989.471	$3p^64d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1G)\ ^2F^o_{5/2}$	294 047.24	319 106.19	1				8
3966.598	3/2	5/2	293 902.86	319 106.19	5				8°,9
3746.36	5/2	7/2	294 047.24	320 731.60	12				8°,9
3648.724	$3p^66p\ ^2P^o_{3/2}$	$3p^67s\ ^2S_{1/2}$	415 675.69	443 074.72	4				6,8°
3615.039	1/2	1/2	415 420.10	443 074.72	2				6,8°
3642.887	$3p^65d\ ^2D_{3/2}$	$3p^66p\ ^2P^o_{1/2}$	387 977.07	415 420.10	8				6,8°
3617.966	5/2	3/2	388 043.69	415 675.69	15				6,8°
3609.269	3/2	3/2	387 977.07	415 675.69	2				6,8°
3371.089	$3p^65d\ ^2D_{5/2}$	$3p^65f\ ^2F^o_{5/2}$	388 043.69	417 699.10	1				8
3363.517	3/2	5/2	387 977.07	417 699.10	6				8
3316.470	5/2	7/2	388 043.69	418 187.47	10				8
3139.94	$3p^65f\ ^2F^o_{7/2}$	$3p^66g\ ^2G_{9/2}$	418 187.47	450 025.20	8				8°,9
3092.641	5/2	7/2	417 699.10	450 024.54	4				8°,9
3004.2	$3p^66h\ ^2H^o_{11/2}$	$3p^68g\ ^2G_{9/2}$	450 247.99	483 526					9
2992.0	$3p^66h\ ^2H^o_{11/2}$	$3p^68i\ ^2I_{13/2}$	450 247.99	483 650.82					9
2950.134	$3p^65g\ ^2G_{9/2}$	$3p^66h\ ^2H^o_{11/2}$	416 361.78	450 247.99	8				6,8°
2931.2	$3p^66f\ ^2F^o_{7/2}$	$3p^68g\ ^2G_{9/2}$	449 422.47	483 526					9
2927.2	5/2	7/2	449 370.81	483 523					9

V v – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2780.139	$3p^65p\ ^2P^o_{3/2}$	$3p^65d\ ^2D_{3/2}$	352 018.34	387 977.07	3				6, 8°
2774.997	3/2	5/2	352 018.34	388 043.69	15				6, 8°
2740.669	1/2	3/2	351 500.51	387 977.07	10				6, 8°
2620.5	$3p^64d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1D)\ ^2F^o_{7/2}$	294 047.24	332 198.1					9
2326.749	5/2	5/2	294 047.24	337 012.59	6				8
2318.95	3/2	5/2	293 902.86	337 012.59	20				8°, 9
2610.098	$3p^64f\ ^2F^o_{5/2}$	$3p^65d\ ^2D_{3/2}$	349 675.57	387 977.07	10				6, 8°
2605.523	5/2	5/2	349 675.57	388 043.69	4				6, 8°
2577.127	7/2	5/2	349 252.40	388 043.69	20				6, 8°
2373.458	$3p^66g\ ^2G_{7/2}$	$3p^69f\ ^2F^o_{5/2}$	450 024.54	492 144.3	1				8
2370.260	9/2	7/2	450 025.20	492 201.8	3				8
1962.154	$3p^5(^2P^o)3d^2(^1D)\ ^2F^o_{5/2}$	$3p^65d\ ^2D_{3/2}$	337 012.59	387 977.07	1				8
1929.138	$3p^65p\ ^2P^o_{3/2}$	$3p^66s\ ^2S_{1/2}$	352 018.34	403 855.12	9				6, 8°
1910.062	1/2	1/2	351 500.51	403 855.12	4				6, 8°
1921.915	$3p^5(^2P^o)3d^2(^3F)\ ^2F^o_{7/2}$	$3p^66g\ ^2G_{9/2}$	397 993.66	450 025.20	1				8
1917.686	$3p^65f\ ^2F^o_{7/2}$	$3p^67g\ ^2G_{9/2}$	418 187.47	470 333.75	1				8
1811.425	$3p^64d\ ^2D_{5/2}$	$3p^64f\ ^2F^o_{7/2}$	294 047.24	349 252.40	30				1, 6, 8°
1797.646	5/2	5/2	294 047.24	349 675.57	6				6, 8°
1792.992	3/2	5/2	293 902.86	349 675.57	25				6, 8°
1736.182	$3p^64d\ ^2D_{3/2}$	$3p^65p\ ^2P^o_{1/2}$	293 902.86	351 500.51	10				6, 8°
1724.994	5/2	3/2	294 047.24	352 018.34	15				6, 8°
1720.712	3/2	3/2	293 902.86	352 018.34	4				6, 8°
1716.725	$3p^64s\ ^2S_{1/2}$	$3p^64p\ ^2P^o_{1/2}$	148 143.35	206 393.72	50				1, 6, 8°
1680.204	1/2	3/2	148 143.35	207 660.00	100				1, 6, 8°
1499.596	$3p^64f\ ^2F^o_{5/2}$	$3p^65g\ ^2G_{7/2}$	349 675.57	416 360.29	10				6, 8°
1490.107	7/2	9/2	349 252.40	416 361.78	20				6, 8°
1260.278	$3p^5(^2P^o)3d^2(^1D)\ ^2F^o_{5/2}$	$3p^65g\ ^2G_{7/2}$	337 012.59	416 360.29	1				8
1188.161	7/2	9/2	332 198.1	416 361.78	6				7
1159.516	$3p^64p\ ^2P^o_{3/2}$	$3p^64d\ ^2D_{3/2}$	207 660.00	293 902.86	6				1, 6, 8°
1157.575	3/2	5/2	207 660.00	294 047.24	25				1, 6, 8°
1142.737	1/2	3/2	206 393.72	293 902.86	15				1, 6, 8°
1143.395	$3p^65s\ ^2S_{1/2}$	$3p^66p\ ^2P^o_{3/2}$	328 217.30	415 675.69	1				8
1098.222	$3p^65p\ ^2P^o_{3/2}$	$3p^67s\ ^2S_{1/2}$	352 018.34	443 074.72	2				6, 8°
1092.00	1/2	1/2	351 500.51	443 074.72	1				6, 8°
1045.711	$3p^5(^2P^o)3d^2(^1G)\ ^2F^o_{7/2}$	$3p^65g\ ^2G_{9/2}$	320 731.60	416 361.78	2				8
996.521	$3p^64f\ ^2F^o_{5/2}$	$3p^66g\ ^2G_{7/2}$	349 675.57	450 024.54	5				6, 8°
992.330	7/2	9/2	349 252.40	450 025.20	10				6, 8°
979.547	$3p^64d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2F^o_{5/2}$	294 047.24	396 135.24	1				6, 8°
978.166	3/2	5/2	293 902.86	396 135.24	10				6, 8°
962.031	5/2	7/2	294 047.24	397 993.66	15				6, 8°
897.124	$3p^64f\ ^2F^o_{7/2}$	$3p^67d\ ^2D_{5/2}$	349 252.40	460 719.7	2				8
829.483	$3p^64p\ ^2P^o_{3/2}$	$3p^65s\ ^2S_{1/2}$	207 660.00	328 217.30	30				1, 6, 8°
820.859	1/2	1/2	206 393.72	328 217.30	20				1, 6, 8°
828.791	$3p^64f\ ^2F^o_{5/2}$	$3p^67g\ ^2G_{7/2}$	349 675.57	470 333.35	1				6, 8°
825.891	7/2	9/2	349 252.40	470 333.75	2				6, 8°
822.927	$3p^64d\ ^2D_{3/2}$	$3p^66p\ ^2P^o_{1/2}$	293 902.86	415 420.10	3				6, 8°
822.176	5/2	3/2	294 047.24	415 675.69	6				6, 8°
821.202	3/2	3/2	293 902.86	415 675.69	1				6, 8°
822.668	$3p^65s\ ^2S_{1/2}$	$3p^67p\ ^2P^o_{3/2}$	328 217.30	449 772.79	1				8

V v – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
643.603	$3p^64d\ ^2D_{5/2}$	$3p^66f\ ^2F^o_{7/2}$	294 047.24	449 422.47	1				8
509.697	$3p^64p\ ^2P^o_{3/2}$	$3p^66s\ ^2S_{1/2}$	207 660.00	403 855.12	2				6, 8°
506.429	1/2	1/2	206 393.72	403 855.12	1				6, 8°
491.746	$3p^64s\ ^2S_{1/2}$	$3p^65p\ ^2P^o_{1/2}$	148 143.35	351 500.51	2				6, 8°
490.496	1/2	3/2	148 143.35	352 018.34	4				6, 8°
484.5108	$3p^63d\ ^2D_{3/2}$	$3p^64p\ ^2P^o_{1/2}$	0.00	206 393.72	25				6, 7, 8, 10°
483.0098	5/2	3/2	624.87	207 660.00	35				6, 7, 8, 10°
481.5564	3/2	3/2	0.00	207 660.00	8				6, 7, 8, 10°
424.782	$3p^64p\ ^2P^o_{3/2}$	$3p^67s\ ^2S_{1/2}$	207 660.00	443 074.72	1				8
313.993	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1G)\ ^2F^o_{5/2}$	624.87	319 106.19	10				7, 8°
313.376	3/2	5/2	0.00	319 106.19	14				7, 8°
312.394	5/2	7/2	624.87	320 731.60	17				7, 8°
301.604	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1D)\ ^2F^o_{7/2}$	624.87	332 198.1	10				7, 8°
297.276	5/2	5/2	624.87	337 012.59	2				7, 8°
296.724	3/2	5/2	0.00	337 012.59	5				7, 8°
286.8395	$3p^63d\ ^2D_{5/2}$	$3p^64f\ ^2F^o_{7/2}$	624.87	349 252.40	20				6, 7, 8, 10°
286.490	5/2	5/2	624.87	349 675.57	5				7, 8°
285.9791	3/2	5/2	0.00	349 675.57	18				6, 7, 8, 10°
284.581	$3p^63d\ ^2D_{5/2}$	$3p^65p\ ^2P^o_{3/2}$	624.87	352 018.34	11				7, 8°
284.494	3/2	1/2	0.00	351 500.51	8				7, 8°
284.075	3/2	3/2	0.00	352 018.34	2				7, 8°
252.838	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2F^o_{5/2}$	624.87	396 135.24	8	1.3 − 1	2.3+9	E	7, 8°, 99*
252.440	3/2	5/2	0.00	396 135.24	18	1.8	3.1+10	D−	5, 7, 8°, 99*
251.655	5/2	7/2	624.87	397 993.66	20	2.6	3.5+10	D−	5, 7, 8°, 99*
240.933	$3p^63d\ ^2D_{5/2}$	$3p^66p\ ^2P^o_{3/2}$	624.87	415 675.69	7				7, 8°
240.719	3/2	1/2	0.00	415 420.10	4				8
240.572	3/2	3/2	0.00	415 675.69	1				8
239.765	$3p^63d\ ^2D_{5/2}$	$3p^65f\ ^2F^o_{5/2}$	624.87	417 699.10	7				7, 8°
239.485	5/2	7/2	624.87	418 187.47	19				7, 8°
239.407	3/2	5/2	0.00	417 699.10	16				7, 8°
228.301	$3p^63d\ ^2D_{3/2}$	$3p^5(^2P^o)3d^2(^3P)\ ^2P^o_{1/2}$	0.00	438 018.3	14	2.7	1.7+11	D−	7, 8°, 99*
227.885	5/2	3/2	624.87	439 442.7	17	4.7	1.5+11	D−	7, 8°, 99*
227.561	3/2	3/2	0.00	439 442.7	10	5.2 − 1	1.7+10	E	7, 8°, 99*
225.465	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2D^o_{5/2}$	624.87	444 153.7	20	9.6	2.2+11	D−	5, 7, 8°, 99*
225.225	5/2	3/2	624.87	444 620.8	13	7.2 − 1	2.3+10	E	7, 8°, 99*
225.146	3/2	5/2	0.00	444 153.7	13	7.2 − 1	1.5+10	E	7, 8°, 99*
224.913	3/2	3/2	0.00	444 620.8	18	6.4	2.1+11	D−	5, 7, 8°, 99*
222.842	$3p^63d\ ^2D_{5/2}$	$3p^66f\ ^2F^o_{5/2}$	624.87	449 370.81	3				8
222.818	5/2	7/2	624.87	449 422.47	13				7, 8°
222.533	3/2	5/2	0.00	449 370.81	10				7, 8°
213.178	$3p^63d\ ^2D_{5/2}$	$3p^67f\ ^2F^o_{7/2}$	624.87	469 721	9				7, 8°
212.901	3/2	5/2	0.00	469 706.4	7				7, 8°
210.568	$3p^63d\ ^2D_{5/2}$	$3p^53d(^3F^o)4s\ ^2F^o_{7/2}$	624.87	475 531	12				7, 8°
209.230	5/2	5/2	624.87	478 566	1				8
208.958	3/2	5/2	0.00	478 566	10				7, 8°
207.291	$3p^63d\ ^2D_{5/2}$	$3p^68f\ ^2F^o_{7/2}$	624.87	483 039	6				7, 8°
207.031	3/2	5/2	0.00	483 019	4				7, 8°
203.428	$3p^63d\ ^2D_{5/2}$	$3p^69f\ ^2F^o_{7/2}$	624.87	492 201.8	5				7, 8°
203.194	3/2	5/2	0.00	492 144.3	2				7, 8°
201.746	$3p^63d\ ^2D_{5/2}$	$3p^53d(^1F^o)4s\ ^2F^o_{5/2}$	624.87	496 296	2				7, 8°
201.493	3/2	5/2	0.00	496 296	1				7, 8°
201.235	5/2	7/2	624.87	497 556	4				7, 8°

V v – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
200.202	$3p^6 3d\ ^2D_{5/2}$	$3p^5 3d(^3D^o)4s\ ^2D^o_{5/2}$	624.87	500 117	1				8
200.050	$_{5/2}$	$_{3/2}$	624.87	500 502	5				8
199.955	$_{3/2}$	$_{5/2}$	0.00	500 117	5				8
199.799	$_{3/2}$	$_{3/2}$	0.00	500 502	1				8

V VI

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1629.786	$3s^23p^5(^2P^o_{1/2})4s\ ^2[\frac{1}{2}]^o_0$	$3s^23p^5(^2P^o)4p\ ^3D_1$	553 820.1	615 177.8	6				16
1590.506	$3s^23p^5(^2P^o_{1/2})4s\ ^2[\frac{1}{2}]^o_1$	$3s^23p^5(^2P^o)4p\ ^1P_1$	557 636.1	620 509.2	9				16
1584.942	$3s^23p^5(^2P^o_{3/2})4s\ ^2[\frac{3}{2}]^o_1$	$3s^23p^5(^2P^o)4p\ ^3D_2$	549 298.8	612 392.8	10				16
1517.931	1	1	549 298.8	615 177.8	9				16
1515.020	2	3	546 284.0	612 289.7	12				16
1512.655	2	2	546 284.0	612 392.8	9				16
1451.517	2	1	546 284.0	615 177.8	6				16
1536.373	$3s^23p^5(^2P^o_{1/2})4s\ ^2[\frac{1}{2}]^o_1$	$3s^23p^5(^2P^o)4p\ ^1D_2$	557 636.1	622 724.5	10				16
1516.104	$3s^23p^5(^2P^o_{1/2})4s\ ^2[\frac{1}{2}]^o_1$	$3s^23p^5(^2P^o)4p\ ^3P_1$	557 636.1	623 594.5	8				16
1433.189	0	1	553 820.1	623 594.5	5				16
1466.460	$3s^23p^5(^2P^o_{3/2})4s\ ^2[\frac{3}{2}]^o_1$	$3s^23p^5(^2P^o)4p\ ^3P_2$	549 298.8	617 490.0	7				16
1404.376	2	2	546 284.0	617 490.0	10bl				16
1380.105	1	0	549 298.8	621 757.1	5				16
1293.483	2	1	546 284.0	623 594.5	4				16
1460.991	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_2$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{3}{2}]_2$	709 747.4	778 194.1	1				16
1432.593	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_2$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{5}{2}]_3$	709 747.4	779 550.9	2				16
1426.335	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_2$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_3$	713 742.3	783 852.1	2				16
1425.525	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{1}{2}]^o_1$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{3}{2}]_2$	708 044.6	778 194.1	2				16
1423.100	0	1	707 280.3	777 549.4	3				16
1416.416	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{7}{2}]^o_4$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{9}{2}]_5$	710 695.2	781 295.9	5				16
1410.054	3	4	711 426.2	782 345.4	3				16
1408.381	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{5}{2}]^o_3$	$3s^23p^5(^2P^o_{1/2})4f\ ^2[\frac{7}{2}]_4$	720 836.0	791 839.6	3				16
1361.923	$3s^23p^5(^2P^o_{3/2})4s\ ^2[\frac{3}{2}]^o_1$	$3s^23p^5(^2P^o)4p\ ^1D_2$	549 298.8	622 724.5	3				16
1334.039	$3s^23p^5(^2P^o)4p\ ^1S_0$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_1$	641 800.3	716 760.4	1				16
1225.178	$3s^23p^5(^2P^o)4p\ ^1S_0$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_1$	641 800.3	723 421.6	3				16
1194.950	$3s^23p^5(^2P^o)4p\ ^3P_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{1}{2}]^o_0$	623 594.5	707 280.3					16
1184.130	1	1	623 594.5	708 044.6					16
1104.300	2	1	617 490.0	708 044.6	1				16
1188.159	$3s^23p^5(^2P^o_{1/2})4s\ ^2[\frac{1}{2}]^o_1$	$3s^23p^5(^2P^o)4p\ ^1S_0$	557 636.1	641 800.3	9				16
1085.742	$3s^23p^5(^2P^o)4p\ ^3D_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{1}{2}]^o_0$	615 177.8	707 280.3	1				16
1083.917	$3s^23p^5(^2P^o)4p\ ^3P_2$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_2$	617 490.0	709 747.4	2				16
1052.591	0	1	621 757.1	716 760.4					16
1057.438	$3s^23p^5(^2P^o)4p\ ^3D_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_2$	615 177.8	709 747.4					16
984.419	1	1	615 177.8	716 760.4					16
958.156	2	1	612 392.8	716 760.4					16
1038.953	$3s^23p^5(^2P^o)4p\ ^1P_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_1$	620 509.2	716 760.4					16
1029.044	$3s^23p^5(^2P^o)4p\ ^3P_2$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_3$	617 490.0	714 667.9	5				16
1027.219	$3s^23p^5(^2P^o)4p\ ^1D_2$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{5}{2}]^o_2$	622 724.5	720 074.9					16
1019.249	2	3	622 724.5	720 836.0	5				16
1024.663	$3s^23p^5(^2P^o)4p\ ^3P_1$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_2$	623 594.5	721 187.6	4				16
1001.714	1	1	623 594.5	723 421.6					16
983.632	0	1	621 757.1	723 421.6					16
964.341	2	2	617 490.0	721 187.6					16
1016.204	$3s^23p^5(^2P^o)4p\ ^3D_3$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{7}{2}]^o_4$	612 289.7	710 695.2	7				16
1009.758	2	3	612 392.8	711 426.2	5				16
1008.709	3	3	612 289.7	711 426.2					16
1014.565	$3s^23p^5(^2P^o)4p\ ^3D_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_2$	615 177.8	713 742.3	4				16
986.681	2	2	612 392.8	713 742.3	1				16
976.767	3	3	612 289.7	714 667.9	1				16

V VI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1004.361	$3s^23p^5(^2P^\circ)4p\ ^1P_1$	$3s^23p^5(^2P^\circ_{1/2})4d\ ^2[\frac{5}{2}]^\circ_2$	620 509.2	720 074.9	4				16
971.700	$3s^23p^5(^2P^\circ)4p\ ^1P_1$	$3s^23p^5(^2P^\circ_{1/2})4d\ ^2[\frac{3}{2}]^\circ_1$	620 509.2	723 421.6					16
958.716	$3s^23p^5(^2P^\circ)4p\ ^3S_1$	$3s^23p^5(^2P^\circ_{3/2})4d\ ^2[\frac{1}{2}]^\circ_0$	602 974.3	707 280.3					16
951.753	1	1	602 974.3	708 044.6	2				16
936.557	$3s^23p^5(^2P^\circ)4p\ ^3S_1$	$3s^23p^5(^2P^\circ_{3/2})4d\ ^2[\frac{3}{2}]^\circ_2$	602 974.3	709 747.4	3				16
826.458	$3s^23p^5(^2P^\circ)3d\ ^1P^\circ_1$	$3s3p^63d\ ^1D_2$	445 435.6	566 433.0					16
640.135	$3s^23p^5(^2P^\circ)4p\ ^1D_2$	$3s^23p^5(^2P^\circ_{1/2})5s\ ^2[\frac{1}{2}]^\circ_1$	622 724.5	778 944.0	1				16
632.509	$3s^23p^5(^2P^\circ)4p\ ^3D_2$	$3s^23p^5(^2P^\circ_{3/2})5s\ ^2[\frac{3}{2}]^\circ_2$	612 392.8	770 494.5					16
632.084	3	2	612 289.7	770 494.5	3				16
627.627	2	1	612 392.8	771 723.1	2				16
631.164	$3s^23p^5(^2P^\circ)4p\ ^1P_1$	$3s^23p^5(^2P^\circ_{1/2})5s\ ^2[\frac{1}{2}]^\circ_1$	620 509.2	778 944.0					16
596.947	$3s^23p^5(^2P^\circ)4p\ ^3S_1$	$3s^23p^5(^2P^\circ_{3/2})5s\ ^2[\frac{3}{2}]^\circ_2$	602 974.3	770 494.5	1				16
581.214	$3s^23p^5(^2P^\circ)3d\ ^1P^\circ_1$	$3s^23p^5(^2P^\circ)4p\ ^3P_2$	445 435.6	617 490.0					16
561.297	1	1	445 435.6	623 594.5					16
571.190	$3s^23p^5(^2P^\circ)3d\ ^1P^\circ_1$	$3s^23p^5(^2P^\circ)4p\ ^1P_1$	445 435.6	620 509.2					16
509.260	$3s^23p^5(^2P^\circ)3d\ ^1P^\circ_1$	$3s^23p^5(^2P^\circ)4p\ ^1S_0$	445 435.6	641 800.3	8				16
500.644	$3s^23p^5(^2P^\circ)3d\ ^1F^\circ_3$	$3s3p^63d\ ^3D_3$	350 644.5	550 384.6	3				16
496.985	$3s^23p^5(^2P^\circ)3d\ ^3D^\circ_2$	$3s3p^63d\ ^3D_1$	348 325.3	549 538.0	1				16
496.180	2	2	348 325.3	549 863.6	4				16
495.940	1	1	347 899.9	549 538.0	3				16
495.138	1	2	347 899.9	549 863.6	2				16
494.909	2	3	348 325.3	550 384.6	2				16
489.360	3	2	345 516.5	549 863.6					16
488.120	3	3	345 516.5	550 384.6	6				16
488.462	$3s^23p^5(^2P^\circ)3d\ ^1D^\circ_2$	$3s3p^63d\ ^3D_2$	345 139.4	549 863.6	1				16
487.217	2	3	345 139.4	550 384.6					16
463.418	$3s^23p^5(^2P^\circ)3d\ ^1F^\circ_3$	$3s3p^63d\ ^1D_2$	350 644.5	566 433.0	6				16
458.487	$3s^23p^5(^2P^\circ)3d\ ^3D^\circ_2$	$3s3p^63d\ ^1D_2$	348 325.3	566 433.0	3				16
452.660	3	2	345 516.5	566 433.0	3				16
451.890	$3s^23p^5(^2P^\circ)3d\ ^1D^\circ_2$	$3s3p^63d\ ^1D_2$	345 139.4	566 433.0	7				16
449.795	$3s^23p^5(^2P^\circ)3d\ ^3F^\circ_2$	$3s3p^63d\ ^3D_1$	327 214.9	549 538.0	8				16
449.129	2	2	327 214.9	549 863.6					16
444.634	3	2	324 958.0	549 863.6	9				16
443.601	3	3	324 958.0	550 384.6					16
439.344	4	3	322 773.6	550 384.6	10				16
420.940	$3s^23p^5(^2P^\circ)3d\ ^3P^\circ_2$	$3s3p^63d\ ^3D_1$	311 977.9	549 538.0					16
420.370	2	2	311 977.9	549 863.6	5				16
419.458	2	3	311 977.9	550 384.6	8				16
416.418	1	1	309 394.8	549 538.0	4				16
415.861	1	2	309 394.8	549 863.6	7				16
414.273	0	1	308 149.8	549 538.0	6				16
418.041	$3s^23p^5(^2P^\circ)3d\ ^3F^\circ_2$	$3s3p^63d\ ^1D_2$	327 214.9	566 433.0					16
392.990	$3s^23p^5(^2P^\circ)3d\ ^3P^\circ_2$	$3s3p^63d\ ^1D_2$	311 977.9	566 433.0					16
382.185	$3s^23p^5(^2P^\circ)3d\ ^1F^\circ_3$	$3s^23p^5(^2P^\circ)4p\ ^3D_3$	350 644.5	612 289.7	1				16
382.049	3	2	350 644.5	612 392.8	4				16
378.834	$3s^23p^5(^2P^\circ)3d\ ^3D^\circ_2$	$3s^23p^5(^2P^\circ)4p\ ^3D_3$	348 325.3	612 289.7					16
378.687	2	2	348 325.3	612 392.8	3				16
378.081	1	2	347 899.9	612 392.8	2				16
374.851	3	3	345 516.5	612 289.7	5				16
374.747	2	1	348 325.3	615 177.8	1				16
374.705	3	2	345 516.5	612 392.8					16

V VI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
371.523	$3s^23p^5(^2P^o)3d\ ^3D^o_2$	$3s^23p^5(^2P^o)4p\ ^3P_2$	348 325.3	617 490.0	3				16
370.936	1	2	347 899.9	617 490.0					16
367.683	3	2	345 516.5	617 490.0	9				16
365.154	1	0	347 899.9	621 757.1	4				16
363.285	2	1	348 325.3	623 594.5	8				16
362.717	1	1	347 899.9	623 594.5	2				16
370.314	$3s^23p^5(^2P^o)3d\ ^1D^o_2$	$3s^23p^5(^2P^o)4p\ ^3D_1$	345 139.4	615 177.8	2				16
367.543	$3s^23p^5(^2P^o)3d\ ^1F^o_3$	$3s^23p^5(^2P^o)4p\ ^1D_2$	350 644.5	622 724.5	9				16
367.404	$3s^23p^5(^2P^o)3d\ ^3D^o_2$	$3s^23p^5(^2P^o)4p\ ^1P_1$	348 325.3	620 509.2					16
367.173	$3s^23p^5(^2P^o)3d\ ^1D^o_2$	$3s^23p^5(^2P^o)4p\ ^3P_2$	345 139.4	617 490.0					16
363.153	$3s^23p^5(^2P^o)3d\ ^1D^o_2$	$3s^23p^5(^2P^o)4p\ ^1P_1$	345 139.4	620 509.2	8				16
360.741	$3s^23p^5(^2P^o)3d\ ^3D^o_3$	$3s^23p^5(^2P^o)4p\ ^1D_2$	345 516.5	622 724.5	1				16
360.250	$3s^23p^5(^2P^o)3d\ ^1D^o_2$	$3s^23p^5(^2P^o)4p\ ^1D_2$	345 139.4	622 724.5	1				16
350.781	$3s^23p^5(^2P^o)3d\ ^3F^o_2$	$3s^23p^5(^2P^o)4p\ ^3D_3$	327 214.9	612 289.7	1				16
350.659	2	2	327 214.9	612 392.8	3				16
348.024	3	3	324 958.0	612 289.7	4				16
347.911	3	2	324 958.0	612 392.8	10				16
347.265	2	1	327 214.9	615 177.8	8				16
345.405	4	3	322 773.6	612 289.7	11				16
343.646	$3s^23p^5(^2P^o)3d\ ^3P^o_2$	$3s^23p^5(^2P^o)4p\ ^3S_1$	311 977.9	602 974.3	9				16
340.622	1	1	309 394.8	602 974.3	7				16
339.187	0	1	308 149.8	602 974.3	6				16
340.953	$3s^23p^5(^2P^o)3d\ ^3F^o_2$	$3s^23p^5(^2P^o)4p\ ^1P_1$	327 214.9	620 509.2	4				16
338.392	$3s^23p^5(^2P^o)3d\ ^3F^o_2$	$3s^23p^5(^2P^o)4p\ ^1D_2$	327 214.9	622 724.5	1				16
335.831	3	2	324 958.0	622 724.5	2				16
332.984	$3s^23p^5(^2P^o)3d\ ^3P^o_2$	$3s^23p^5(^2P^o)4p\ ^3D_3$	311 977.9	612 289.7					16
332.878	2	2	311 977.9	612 392.8					16
330.027	1	2	309 394.8	612 392.8					16
329.810	2	1	311 977.9	615 177.8	1				16
325.697	0	1	308 149.8	615 177.8					16
327.322	$3s^23p^5(^2P^o)3d\ ^3P^o_2$	$3s^23p^5(^2P^o)4p\ ^3P_2$	311 977.9	617 490.0	5				16
324.575	1	2	309 394.8	617 490.0	3				16
320.915	2	1	311 977.9	623 594.5	4				16
320.134	1	0	309 394.8	621 757.1	3				16
318.265	1	1	309 394.8	623 594.5	2				16
317.006	0	1	308 149.8	623 594.5					16
324.105	$3s^23p^5(^2P^o)3d\ ^3P^o_2$	$3s^23p^5(^2P^o)4p\ ^1P_1$	311 977.9	620 509.2					16
321.425	1	1	309 394.8	620 509.2					16
323.209	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^o)3d\ ^3P^o_1$	0.0	309 394.8	9				16
321.810	$3s^23p^5(^2P^o)3d\ ^3P^o_2$	$3s^23p^5(^2P^o)4p\ ^1D_2$	311 977.9	622 724.5	3				16
319.149	1	2	309 394.8	622 724.5	1				16
287.440	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^o)3d\ ^3D^o_1$	0.0	347 899.9	11	2.1 – 3	5.7+7	E	16°, 99*
231.893	$3s^23p^5(^2P^o)3d\ ^3D^o_2$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{5}{2}]_3$	348 325.3	779 550.9					16
230.398	3	3	345 516.5	779 550.9	1				16
231.646	$3s^23p^5(^2P^o)3d\ ^1F^o_3$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{9}{2}]_4$	350 644.5	782 345.4	1				16
230.841	$3s^23p^5(^2P^o)3d\ ^1F^o_3$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_3$	350 644.5	783 852.1	4				16
229.856	3	4	350 644.5	785 705.4	1				16
229.606	$3s^23p^5(^2P^o)3d\ ^3D^o_2$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_3$	348 325.3	783 852.1	1				16
227.172	3	4	345 516.5	785 705.4	5				16
226.656	$3s^23p^5(^2P^o)3d\ ^1F^o_3$	$3s^23p^5(^2P^o_{1/2})4f\ ^2[\frac{7}{2}]_4$	350 644.5	791 839.6	6				15, 16°
224.500	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^o)3d\ ^1P^o_1$	0.0	445 435.6	15	3.30	1.46+11	C+	5, 13, 14, 16°, 99*
224.052	$3s^23p^5(^2P^o)3d\ ^3D^o_3$	$3s^23p^5(^2P^o_{1/2})4f\ ^2[\frac{7}{2}]_4$	345 516.5	791 839.6					15, 16°

V VI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
218.994	$3s^23p^5(^2P^o)3d\ ^3F^o_2$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_3$	327 214.9	783 852.1	7				15, 16°
218.636	$3s^23p^5(^2P^o)3d\ ^3F^o_3$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{9}{2}]_4$	324 958.0	782 345.4	9				15, 16°
218.091	4	5	322 773.6	781 295.9	10				15, 16°
217.597	4	4	322 773.6	782 345.4					16
214.495	$3s^23p^5(^2P^o)3d\ ^3P^o_2$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{3}{2}]_2$	311 977.9	778 194.1	2				15, 16°
213.604	1	1	309 394.8	777 549.4	3				15, 16°
213.313	1	2	309 394.8	778 194.1	7				15, 16°
213.044	0	1	308 149.8	777 549.4	6				15, 16°
213.871	$3s^23p^5(^2P^o)3d\ ^3P^o_2$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{5}{2}]_3$	311 977.9	779 550.9	8				15, 16°
182.050	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^o_{3/2})4s\ ^2[\frac{3}{2}]^o_1$	0.0	549 298.8	10	1.1 – 1	7.4+9	D	11, 16°, 99*
179.330	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^o_{1/2})4s\ ^2[\frac{1}{2}]^o_1$	0.0	557 636.1	13	3.1 – 1	2.1+10	D	11, 16°, 99*
141.238	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{1}{2}]^o_1$	0.0	708 044.6					16
139.518	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_1$	0.0	716 760.4	9				12, 16°
138.235	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_1$	0.0	723 421.6	8				12, 16°
129.580	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^o_{3/2})5s\ ^2[\frac{3}{2}]^o_1$	0.0	771 723.1	4				11, 16°
128.379	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^o_{1/2})5s\ ^2[\frac{1}{2}]^o_1$	0.0	778 944.0	3				11, 16°
118.767	$3s^23p^6\ ^1S_0$	$3s3p^64p\ ^3P^o_1$	0.0	841 980	8				17
117.762	$3s^23p^6\ ^1S_0$	$3s3p^64p\ ^1P^o_1$	0.0	849 170	8				17
98.319	$3s^23p^6\ ^1S_0$	$3s3p^65p\ ^3P^o_1$	0.0	1 017 100	4				17
97.932	$3s^23p^6\ ^1S_0$	$3s3p^65p\ ^1P^o_1$	0.0	1 021 120	4				17
90.700	$3s^23p^6\ ^1S_0$	$3s3p^66p\ ^1P^o_1$	0.0	1 102 540	6				17
87.106	$3s^23p^6\ ^1S_0$	$3s3p^67p\ ^1P^o_1$	0.0	1 148 030	3				17
85.071	$3s^23p^6\ ^1S_0$	$3s3p^68p\ ^1P^o_1$	0.0	1 175 490	1				17

V VII

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
472.828	$3s^2 3p^5\ ^2P^o_{1/2}$	$3s3p^6\ ^2S_{1/2}$	7 668	219 162		6.94 − 2	1.04+9	C−	$19, 20^{\circ}, 99^{*}$
456.284	$3/2$	$1/2$	0	219 162		1.43 − 1	2.29+9	C−	$19, 20^{\circ}, 99^{*}$
241.91	$3s^2 3p^5\ ^2P^o_{1/2}$	$3s^2 3p^4(^1D)3d\ ^2S_{1/2}$	7 668	421 050		5.92 − 1	3.38+10	C−	$21^{\circ}, 99^{*}$
237.50	$3/2$	$1/2$	0	421 050		1.42	8.40+10	C−	$21^{\circ}, 99^{*}$
233.47	$3s^2 3p^5\ ^2P^o_{1/2}$	$3s^2 3p^4(^3P)3d\ ^2P_{3/2}$	7 668	435 970					21
231.99	$1/2$	$1/2$	7 668	438 770					21
229.38	$3/2$	$3/2$	0	435 970					$5, 14, 21^{\circ}$
227.88	$3/2$	$1/2$	0	438 770					21
225.79	$3s^2 3p^5\ ^2P^o_{1/2}$	$3s^2 3p^4(^3P)3d\ ^2D_{3/2}$	7 668	450 550		3.94	1.29+11	C	$5, 14, 21^{\circ}, 99^{*}$
225.16	$3/2$	$5/2$	0	444 130		6.24	1.37+11	C	$5, 14, 21^{\circ}, 99^{*}$
221.95	$3/2$	$3/2$	0	450 550		2.0 − 1	6.9+9	D	$21^{\circ}, 99^{*}$
183.46^{L}	$3s^2 3p^4(^3P)3d\ ^4F_{7/2}$	$3s^2 3p^4(^3P)4f\ ^4G^o_{9/2}$							$24^{\circ}, 29$
183.00^{L}	$9/2$	$11/2$							$24^{\circ}, 29$
182.43^{L}	$5/2$	$7/2$			bl				$24^{\circ}, 29$
183.12^{L}	$3s^2 3p^4(^1D)3d\ ^2G_{9/2}$	$3s^2 3p^4(^1D)4f\ ^2H^o_{11/2}$							$24^{\circ}, 29$
182.27^{L}	$3s^2 3p^4(^3P)3d\ ^4F_{7/2}$	$3s^2 3p^4(^3P)4f\ ^2G^o_{9/2}$							$24^{\circ}, 29$
177.20^{L}	$3s^2 3p^4(^3P)3d\ ^4D_{7/2}$	$3s^2 3p^4(^3P)4f\ ^4F^o_{9/2}$							$24^{\circ}, 29$
164.523	$3s^2 3p^5\ ^2P^o_{1/2}$	$3s^2 3p^4(^3P)4s\ ^4P_{1/2}$	7 668	615 490					23
164.302	$3/2$	$5/2$	0	608 640	1				23
163.182	$3/2$	$3/2$	0	612 810	4				23
163.135	$3s^2 3p^5\ ^2P^o_{1/2}$	$3s^2 3p^4(^3P)4s\ ^2P_{3/2}$	7 668	620 650	2				$19, 23^{\circ}$
161.836	$1/2$	$1/2$	7 668	625 570	4				$19, 23^{\circ}$
161.122	$3/2$	$3/2$	0	620 650	6				$19, 23^{\circ}$
159.855	$3/2$	$1/2$	0	625 570	3				$19, 23^{\circ}$
158.467	$3s^2 3p^5\ ^2P^o_{1/2}$	$3s^2 3p^4(^1D)4s\ ^2D_{3/2}$	7 668	638 710	6				23
156.608	$3/2$	$5/2$	0	638 540	7				23
150.625	$3s^2 3p^5\ ^2P^o_{1/2}$	$3s^2 3p^4(^1S)4s\ ^2S_{1/2}$	7 668	671 570	2				23
148.903	$3/2$	$1/2$	0	671 570	3				23
127.08	$3s^2 3p^5\ ^2P^o_{1/2}$	$3s^2 3p^4(^3P)4d\ ^2D_{3/2}$	7 668	794 570	4				$18^{\triangle}, 24^{\circ}, 29$
126.00	$3/2$	$5/2$	0	793 650	8				$18^{\triangle}, 24^{\circ}$
124.24	$3s^2 3p^5\ ^2P^o_{1/2}$	$3s^2 3p^4(^1P)4d\ ^2S_{1/2}$	7 668	812 550					$24^{\circ}, 29$
123.07	$3/2$	$1/2$	0	812 550					$24^{\circ}, 29$
123.03	$3s^2 3p^5\ ^2P^o_{1/2}$	$3s^2 3p^4(^1D)4d\ ^2D_{3/2}$	7 668	820 440	4				$18^{\triangle}, 24^{\circ}, 29$
121.95	$3/2$	$5/2$	0	820 010	6				$18^{\triangle}, 24^{\circ}$
121.89	$3/2$	$3/2$	0	820 440					$24^{\circ}, 29$
122.60	$3s^2 3p^5\ ^2P^o_{3/2}$	$3s^2 3p^4(^1D)4d\ ^2P_{3/2}$	0	815 660	5				$18^{\triangle}, 24^{\circ}$
117.2	$3s^2 3p^5\ ^2P^o_{3/2}$	$3s^2 3p^4(^1S)4d\ ^2D_{5/2}$	0	853 200	3				18

V VIII

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3692.8[C]	$3s^23p^4\ ^3P_2$	$3s^23p^4\ ^1D_2$	0.0	27 072		M1	1.6+1	D−	99*
1830.4[C]	$3s^23p^4\ ^3P_1$	$3s^23p^4\ ^1S_0$	6 007.8	60 641		M1	1.9+2	E	99*
472.839	$3s^23p^4\ ^3P_1$	$3s3p^5\ ^3P^o_2$	6 007.8	217 486.3	12bl				20°, 27
465.493	0	1	7 579.6	222 405.6	7				20°, 26, 27
462.112	1	1	6 007.8	222 405.6	6				20°, 26, 27
459.799	2	2	0.0	217 486.3	10	2.0 − 1	1.3+9	D	20°, 26, 27, 99*
456.134	1	0	6 007.8	225 241.6	7				20°, 27
449.629	2	1	0.0	222 405.6	8				20°, 26, 27
459.647	$3s^23p^4\ ^1S_0$	$3s3p^5\ ^1P^o_1$	60 641	278 200	1				20
398.204	$3s^23p^4\ ^1D_2$	$3s3p^5\ ^1P^o_1$	27 072	278 200	10	3.5 − 1	4.9+9	D	20°, 26, 27, 99*
359.454	$3s^23p^4\ ^3P_2$	$3s3p^5\ ^1P^o_1$	0.0	278 200					20
243.69	$3s^23p^4\ ^3P_1$	$3s^23p^3(^2D^o)3d\ ^3P^o_2$	6 007.8	416 330		8.7 − 1	2+10	D	21°, 99*
240.22	2	2	0.0	416 330		3.6	8.3+10	D	21°, 99*
236.01	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)3d\ ^1D^o_2$	27 072	450 780		4.1	9.8+10	C	21°, 99*
231.33	$3s^23p^4\ ^3P_1$	$3s^23p^3(^4S^o)3d\ ^3D^o_2$	6 007.8	438 300					5
230.82	0	1	7 579.6	440 800					5
230.12	2	3	0.0	434 560					5
230.00	1	1	6 007.8	440 800					5
228.15	2	2	0.0	438 300					5
228.67	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)3d\ ^1F^o_3$	27 072	464 380		7.15	1.3+11	C	5°, 99*
224.83[C]	$3s^23p^4\ ^3P_1$	$3s^23p^3(^2D^o)3d\ ^1D^o_2$	6 007.8	450 780		9.9 − 2	2.6+9	D	99*
159.24[T,L]	$3s^23p^3(^2D^o)3d\ ^1G^o_4$	$3s^23p^3(^2D^o)4f\ ^1H_5$							29
158.04[L]	$3s^23p^3(^2P^o)3d\ ^3F^o_4$	$3s^23p^3(^2P^o)4f\ ^3G_5$							24°, 29
157.53[L]	$3s^23p^3(^2D^o)3d\ ^3G^o_5$	$3s^23p^3(^2D^o)4f\ ^3H_6$							24°, 29
155.45[L]	$3s^23p^33d\ ^5D^o_4$	$3s^23p^34f\ ^5F_5$							24°, 29
155.38[L]	3	4			bl				24°, 29
155.38[L]	2	3			bl				24°, 29
154.68[L]	$3s^23p^3(^2D^o)3d\ ^3F^o_4$	$3s^23p^3(^2D^o)4f\ ^3G_5$							24°, 29
154.55[L]	3	4							24°, 29
154.42[L]	2	3							24°, 29
147.126	$3s^23p^4\ ^3P_0$	$3s^23p^3(^4S^o)4s\ ^3S^o_1$	7 579.6	687 260					28
146.789	1	1	6 007.8	687 260	1				28
145.507	2	1	0.0	687 260	2				28
146.613	$3s^23p^4\ ^1S_0$	$3s^23p^3(^2P^o)4s\ ^1P^o_1$	60 641	742 720	1				28
144.653	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)4s\ ^1D^o_2$	27 072	718 430	3				28
142.247	$3s^23p^4\ ^3P_0$	$3s^23p^3(^2D^o)4s\ ^3D^o_1$	7 579.6	710 600					28
141.924	1	1	6 007.8	710 600					28
141.864	1	2	6 007.8	710 910	1				28
140.665	2	2	0.0	710 910	1				28
140.451	2	3	0.0	711 990	3				28
140.934	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2P^o)4s\ ^3P^o_2$	27 072	736 640					28
139.730	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2P^o)4s\ ^1P^o_1$	27 072	742 720	1				28
139.188	$3s^23p^4\ ^3P_2$	$3s^23p^3(^2D^o)4s\ ^1D^o_2$	0.0	718 430					28
137.491	$3s^23p^4\ ^3P_0$	$3s^23p^3(^2P^o)4s\ ^3P^o_1$	7 579.6	734 890					28
137.316	1	0	6 007.8	734 250					28
137.194	1	1	6 007.8	734 890					28
136.867	1	2	6 007.8	736 640					28
136.078	2	1	0.0	734 890					28
135.751	2	2	0.0	736 640	1				28
115.58	$3s^23p^4\ ^3P_0$	$3s^23p^3(^4S^o)4d\ ^3D^o_1$	7 579.6	872 780					24°, 29
115.42	1	2	6 007.8	872 410					24°, 29
114.59	2	3	0.0	872 680					24°, 29

V VIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
113.92	$3s^23p^4\ ^1S_0$	$3s^23p^3(^4S°)4d\ ^1P°_1$	60 641	938 450					24°, 29
113.60	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D°)4d\ ^1D°_2$	27 072	907 350					24°, 29
113.27	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D°)4d\ ^1F°_3$	27 072	909 920					24°, 29
111.44	$3s^23p^4\ ^3P_1$	$3s^23p^3(^2D°)4d\ ^3P°_2$	6 007.8	903 350					29
111.11	$3s^23p^4\ ^3P_1$	$3s^23p^3(^2D°)4d\ ^3D°_2$	6 007.8	905 990					29
110.55	2	3	0.0	904 570					29
110.38	2	2	0.0	905 990					29

V IX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4110.7^{C}	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^3\ ^2P^o_{1/2}$	34 708+x	59 028+x		M1	1.6+1	D	99*
4014.1^{C}	5/2	3/2	36 319+x	61 224+x		M1	1.6+1	C	99*
3770.2^{C}	3/2	3/2	34 708+x	61 224+x		M1	3.4+1	C	99*
1694.1^{C}	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^3\ ^2P^o_{1/2}$	0	59 028+x		M1	3.3+1	D	99*
1633.3^{C}	3/2	3/2	0	61 224+x		M1	7.1+1	D	99*
488.735	$3s^23p^3\ ^2P^o_{3/2}$	$3s3p^4\ ^2D_{5/2}$	61 224+x	265 835+x		7.6 − 2	3.5+8	D	20°, 99*
485.110	1/2	3/2	59 028+x	265 160+x		2.8 − 2	2.0+8	D	20°, 99*
467.143	$3s^23p^3\ ^4S^o_{3/2}$	$3s3p^4\ ^4P_{5/2}$	0	214 067		2.0 − 1	9.9+8	D	20°, 26, 27, 99*
457.010	3/2	3/2	0	218 814		1.3 − 1	1.1+9	D	20°, 27, 99*
452.132	3/2	1/2	0	221 174		6.8 − 2	1.1+9	D	20°, 27, 31, 99*
437.005	$3s^23p^3\ ^2D^o_{5/2}$	$3s3p^4\ ^2D_{3/2}$	36 319+x	265 160+x		8.4 − 3	7.3+7	E	20°, 99*
435.699	5/2	5/2	36 319+x	265 835+x		3.1 − 1	1.8+9	D	20°, 27, 99*
433.930	3/2	3/2	34 708+x	265 160+x		2.3 − 1	2.0+9	D	20°, 27, 99*
432.663^{C}	3/2	5/2	34 708+x	265 835+x		6.4 − 3	3.8+7	E	99*
409.097	$3s^23p^3\ ^2P^o_{3/2}$	$3s3p^4\ ^2P_{3/2}$	61 224+x	305 664+x	1				20°, 27
405.461	1/2	3/2	59 028+x	305 664+x					20°, 27
399.719	1/2	1/2	59 028+x	309 210+x	2bl				20
387.657	$3s^23p^3\ ^2P^o_{3/2}$	$3s3p^4\ ^2S_{1/2}$	61 224+x	319 184+x	6				20°, 27
384.382	1/2	1/2	59 028+x	319 184+x					20°, 27
371.271	$3s^23p^3\ ^2D^o_{5/2}$	$3s3p^4\ ^2P_{3/2}$	36 319+x	305 664+x	8				20°, 27
369.064	3/2	3/2	34 708+x	305 664+x	2				20
364.296	3/2	1/2	34 708+x	309 210+x	6				20°, 27
276.08	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^2P_{3/2}$	36 319+x	398 530+x					31
270.38	3/2	1/2	34 708+x	404 560+x					31
268.79^{C}	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^4P_{5/2}$	36 319+x	408 350		2.7 − 2	4.2+8	E	99*
267.64^{C}	3/2	5/2	34 708+x	408 350		6.4 − 3	9.9+7	E	99*
265.36^{C}	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2D_{5/2}$	61 224+x	438 070+x		3.3 − 1	5.2+9	D	99*
265.11^{C}	3/2	3/2	61 224+x	438 420+x		1.4 − 3	3.3+7	E	99*
263.58^{C}	1/2	3/2	59 028+x	438 420+x		1.7 − 1	4.1+9	D	99*
254.17	$3s^23p^3\ ^2P^o_{1/2}$	$3s^23p^2(^1D)3d\ ^2P_{1/2}$	59 028+x	452 470+x	bl				31
253.21	3/2	3/2	61 224+x	456 150+x	bl	1.6	4.1+10	E	31°, 99*
251.82	1/2	3/2	59 028+x	456 150+x	bl	4.2 − 1	1.1+10	E	31°, 99*
248.91	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)3d\ ^2D_{5/2}$	36 319+x	438 070+x		2.5	4.4+10	D	31°, 99*
248.69^{C}	5/2	3/2	36 319+x	438 420+x		2.6 − 1	6.9+9	D	99*
247.92^{C}	3/2	5/2	34 708+x	438 070+x		1.1 − 1	1.9+9	D	99*
247.70	3/2	3/2	34 708+x	438 420+x		1.7	4.7+10	D	31°, 99*
244.89	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)3d\ ^4P_{5/2}$	0	408 350		3.6	6.7+10	D	30°, 99*
244.46	3/2	3/2	0	409 060		2.5	6.9+10	D	30°, 99*
243.58	3/2	1/2	0	410 540		1.2	6.9+10	D	30°, 99*
240.30	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^3P)3d\ ^2D_{5/2}$	61 224+x	477 370+x					31
238.19^{C}	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)3d\ ^2P_{3/2}$	36 319+x	456 150+x		3.3 − 2	9.7+8	E	99*
237.28^{C}	3/2	3/2	34 708+x	456 150+x		1.5 − 2	4.6+8	E	99*
235.72	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^2F_{7/2}$	36 319+x	460 550+x		5.5	8.3+10	E	5°, 14, 99*
228.27^{C}	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2D_{5/2}$	0	438 070+x		3.8 − 3	8.2+7	E	99*
140.31^{L}	$3s^23p^2(^1D)3d\ ^2G_{9/2}$	$3s^23p^24f\ ^2H^o_{11/2}$							24°, 29
139.98^{L}	7/2	9/2							24°, 29
137.83^{L}	$3s^23p^23d\ ^4F_{9/2}$	$3s^23p^24f\ ^4G^o_{11/2}$							24°, 29
134.54	$3s^23p^3\ ^2P^o_{1/2}$	$3s^23p^2(^3P)4s\ ^2P_{1/2}$	59 028+x	802 220+x	bl				24°, 29
133.99	3/2	3/2	61 224+x	807 570+x					24°, 29
131.22	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)4s\ ^2D_{5/2}$	61 224+x	823 290+x					24°, 29
131.13	3/2	3/2	61 224+x	823 570+x					24°, 29

V IX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
130.32	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^2(^3P)4s\ ^2P_{1/2}$	34 708+x	802 220+x					24°, 29
129.66	$_{5/2}$	$_{3/2}$	36 319+x	807 570+x					24°, 29
127.068	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)4s\ ^2D_{5/2}$	36 319+x	823 290+x	10				24, 29, 32°
126.810	$_{3/2}$	$_{5/2}$	34 708+x	823 290+x					32
126.765	$_{3/2}$	$_{3/2}$	34 708+x	823 570+x	5				24, 29, 32°
126.732	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)4s\ ^4P_{1/2}$	0	789 070	5				24, 29, 32°
126.152	$_{3/2}$	$_{3/2}$	0	792 690	8				24, 29, 32°
125.420	$_{3/2}$	$_{5/2}$	0	797 320	12				24, 29, 32°
88.48	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^24d\ ^4D_{7/2}$	36 319+x	1 166 500+x					29

V x

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4330.0^{C}	$3s^23p^2\ ^3P_2$	$3s^23p^2\ ^1D_2$	9 421	32 509		M1	1.5+1	E	99*
3101.5^{C}	$3s3p^3\ ^3D^o_3$	$3s3p^3\ ^3P^o_2$	222 104	254 337		M1	1.8+1	E	99*
3033.8^{C}	1	0	220 984	253 936		M1	2.3+1	E	99*
3014.5^{C}	1	1	220 984	254 147		M1	2.3+1	E	99*
3005.3^{C}	2	2	221 072	254 337		M1	1.4+1	E	99*
1573.0^{C}	$3s^23p^2\ ^3P_1$	$3s^23p^2\ ^1S_0$	4 180	67 751		M1	2.1+2	E	99*
558.329^{C}	$3s3p^3\ ^3D^o_3$	$3s^23p3d\ ^3D^o_3$	222 104	401 210		M1	3.5+1	E	99*
527.439	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^3D^o_3$	32 509	222 104		5.5 − 3	1.9+7	E	20°, 99*
472.672^{C}	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3D^o_1$	9 421	220 984		7.5 − 4	7.7+6	E	99*
472.476^{C}	2	2	9 421	221 072		1.3 − 2	7.7+7	D−	99*
470.183	2	3	9 421	222 104		2.0 − 1	8.4+8	D	20°, 27, 99*
461.245	1	1	4 180	220 984		2.6 − 2	2.7+8	D−	20°, 99*
461.059	1	2	4 180	221 072		1.3 − 1	8.3+8	D	20°, 27, 99*
452.522	0	1	0	220 984		6.1 − 2	6.6+8	D	20°, 27, 99*
408.630	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3P^o_1$	9 421	254 147		5.5 − 2	7.4+8	D	20°, 27, 99*
408.304	2	2	9 421	254 337		2.5 − 1	2.0+9	D	20°, 26, 27, 31, 99*
400.390	1	0	4 180	253 936		6.0 − 2	2.6+9	C−	20°, 99*
400.056	1	1	4 180	254 147		6.9 − 2	9.6+8	D	20°, 26, 27, 99*
399.719	1	2	4 180	254 337		4.8 − 2	3.9+8	D	20°, 27, 99*
393.469	0	1	0	254 147		5.7 − 2	8.2+8	D	20°, 26, 27, 99*
404.106	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^1D^o_2$	32 509	279 969	7				20°, 31
369.612	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^1D^o_2$	9 421	279 969	1bl				20
365.518	$3s^23p^2\ ^1S_0$	$3s3p^3\ ^1P^o_1$	67 751	341 335	1				20°, 27
323.811	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^1P^o_1$	32 509	341 335	3bl				20°, 27
313.990	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3S^o_1$	9 421	327 902	5				20°, 27
308.903	1	1	4 180	327 902	2				20°, 27
304.974	0	1	0	327 902	1				20
301.283	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^1P^o_1$	9 421	341 335					20
271.22^{C}	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^3D^o_3$	32 509	401 210		5.0 − 2	6.5+8	E	99*
265.70	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^3P^o_2$	9 421	385 790					31
262.04	1	2	4 180	385 790					31
258.28	1	1	4 180	391 340					31
255.54	0	1	0	391 340	bl				31
255.54	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^3D^o_2$	9 421	400 740					30
255.24	2	3	9 421	401 210		3.6	5.2+10	D	30°, 99*
253.21	1	1	4 180	399 130	bl				30, 31°
252.17	1	2	4 180	400 740					30
250.53	0	1	0	399 130	bl				30, 31°
245.35	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^1F^o_3$	32 509	440 090		3.5	5.5+10	C	30°, 99*
232.20^{C}	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^1F^o_3$	9 421	440 090		5.0 − 2	8.8+8	E	99*
124.40^{L}	$3s^23p3d\ ^3F^o_4$	$3s^23p4f\ ^3G_5$							24°, 29
118.18	$3s^23p^2\ ^1D_2$	$3s^23p4s\ ^1P^o_1$	32 509	878 700					24°, 29
116.85	$3s^23p^2\ ^3P_2$	$3s^23p4s\ ^3P^o_1$	9 421	865 200					24°, 29
115.78	2	2	9 421	873 100					24°, 29
115.58	0	1	0	865 200	bl				24°, 29
115.09	1	2	4 180	873 100					24°, 29
94.96	$3s^23p^2\ ^1D_2$	$3s^23p4d\ ^1F^o_3$	32 509	1 085 600					24°, 29
94.23	$3s^23p^2\ ^3P_2$	$3s^23p4d\ ^3D^o_3$	9 421	1 070 600					24°, 29

V XI

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
515.796^{C}	$3s3p^2\ ^2P_{3/2}$	$3p^3\ ^2P^o_{1/2}$	311 890	505 765		4.4 − 2	5.4+8	D	99*
513.315	3/2	3/2	311 890	506 695		2.8 − 1	1.7+9	D	34°, 99*
502.602	1/2	1/2	306 801	505 765		1.5 − 1	2.0+9	D	34°, 99*
500.265^{C}	1/2	3/2	306 801	506 695		6.6 − 3	4.5+7	E	99*
464.449^{C}	$3s^23d\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2F^o_{5/2}$	377 650	592 959		3.5 − 2	1.8+8	E	99*
462.830^{C}	3/2	5/2	376 897	592 959		2.2 − 1	1.2+9	E	99*
448.445^{C}	5/2	7/2	377 650	600 643		3.7 − 1	1.6+9	E	99*
461.955	$3s3p(^3P^o)3d\ ^4D^o_{5/2}$	$3p^2(^3P)3d\ ^4F_{7/2}$	555 759+x	772 238+x					36
454.195	7/2	9/2	555 583+x	775 753+x					36
461.146^{C}	$3s3p^2\ ^2S_{1/2}$	$3p^3\ ^2P^o_{1/2}$	288 914	505 765		2.2 − 2	3.5+8	D	99*
459.177^{C}	1/2	3/2	288 914	506 695		1.6 − 1	1.2+9	D	99*
456.040^{C}	$3s3p^2\ ^2D_{5/2}$	$3p^3\ ^2D^o_{3/2}$	233 778	453 057		5.9 − 2	4.8+8	E	99*
454.325	3/2	3/2	232 972	453 057		2.1 − 1	1.7+9	E	34°, 99*
453.162	5/2	5/2	233 778	454 448		3.8 − 1	2.0+9	E	34°, 99*
451.516^{C}	3/2	5/2	232 972	454 448		3.4 − 2	1.8+8	E	99*
455.554	$3s3p(^3P^o)3d\ ^4P^o_{3/2}$	$3p^2(^3P)3d\ ^4F_{5/2}$	549 713+x	769 226+x					36
446.015	5/2	7/2	548 037+x	772 238+x					36
447.881	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2D_{3/2}$	9 696	232 972		1.2 − 2	9.6+7	E	20°, 26, 99*
446.265	3/2	5/2	9 696	233 778		2.2 − 1	1.3+9	D	20°, 26, 27, 99*
429.232	1/2	3/2	0	232 972		1.5 − 1	1.3+9	D	20°, 27, 99*
412.859	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	$3p^2(^3P)3d\ ^4D_{7/2}$	548 037+x	790 250+x					36
386.722	$3s3p(^3P^o)3d\ ^4F^o_{9/2}$	$3p^2(^3P)3d\ ^4F_{9/2}$	517 171+x	775 753+x					36
386.370	3/2	3/2							36
386.067	5/2	5/2	510 204+x	769 226+x					36
385.935	7/2	7/2	513 127+x	772 238+x					36
381.526	5/2	7/2	510 204+x	772 238+x					36
375.563^{C}	$3s^23d\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	377 650	643 917		1.1 − 2	1.3+8	E	99*
374.504^{C}	3/2	3/2	376 897	643 917		1.4 − 2	1.6+8	E	99*
375.391	$3s3p(^3P^o)3d\ ^2F^o_{7/2}$	$3p^2(^1S)3d\ ^2D_{5/2}$	600 643	867 032					36
369.384	$3s3p(^3P^o)3d\ ^2P^o_{1/2}$	$3p^2(^3P)3d\ ^2D_{3/2}$	647 577	918 298					36
368.457	3/2	5/2	643 917	915 319					36
367.813	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	$3p^2(^3P)3d\ ^4P_{5/2}$	555 583+x	827 452+x					36
367.126	5/2	3/2	555 759+x	828 147+x					36
366.028	3/2	1/2	555 472+x	828 675+x					36
367.516	$3s^23d\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	377 650	649 771		2.9	1.9+10	E	34°, 99*
365.097^{C}	5/2	5/2	377 650	651 550		1.1 − 1	9.0+8	E	99*
364.073	3/2	5/2	376 897	651 550		2.1	1.7+10	E	34°, 99*
366.579	$3s3p^2\ ^2D_{3/2}$	$3p^3\ ^2P^o_{1/2}$	232 972	505 765		3.6 − 1	8.8+9	D	34°, 99*
366.403	5/2	3/2	233 778	506 695		5.8 − 1	7.2+9	D	34°, 99*
365.333^{C}	3/2	3/2	232 972	506 695		7.2 − 2	9.0+8	D	99*
366.197	$3s3p(^3P^o)3d\ ^4F^o_{9/2}$	$3p^2(^3P)3d\ ^4D_{7/2}$	517 171+x	790 250+x					36
364.639	7/2	5/2	513 127+x	787 371+x					36
361.249	5/2	3/2	510 204+x	787 021+x					36
362.356	$3s3p(^3P^o)3d\ ^2F^o_{7/2}$	$3p^2(^3P)3d\ ^2F_{7/2}$	600 643	876 608					36
355.494	5/2	5/2	592 959	874 258					36
358.846	$3s3p^2\ ^4P_{5/2}$	$3p^3\ ^4S^o_{3/2}$	184 992+x	463 653+x		9.6 − 1	1.2+10	D	27, 33°, 99*
352.334	3/2	3/2	179 839+x	463 653+x		6.8 − 1	9.1+9	D	27, 33°, 99*
347.787	1/2	3/2	176 117+x	463 653+x		3.4 − 1	4.6+9	D	27, 33°, 99*
358.144	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2S_{1/2}$	9 696	288 914		9.2 − 2	2.4+9	D	20°, 26, 27, 99*
346.123	1/2	1/2	0	288 914		3.2 − 1	8.8+9	D	20°, 26, 27, 99*
357.884	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	$3p^2(^3P)3d\ ^4P_{5/2}$	548 037+x	827 452+x					36

V XI – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
342.982	$3s^23d\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2P^o_{3/2}$	377 650	669 304					34
342.982	$_{3/2}$	$_{1/2}$	376 897	668 411		8.0 − 1	2.3+10	D	34°, 99*
338.971	$3s^23d\ ^2D_{3/2}$	$3s3p(^1P^o)3d\ ^2D^o_{3/2}$	376 897	671 902					34
338.681	$_{5/2}$	$_{5/2}$	377 650	672 939		1.4	1.4+10	E	34°, 99*
337.790^C	$_{3/2}$	$_{5/2}$	376 897	672 939		5.2 − 2	5.1+8	E	99*
336.580	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2P_{1/2}$	9 696	306 801		4.8 − 1	1.4+10	D	20°, 26, 27, 99*
330.913	$_{3/2}$	$_{3/2}$	9 696	311 890		1.62	2.47+10	C−	20°, 26, 27, 99*
325.945	$_{1/2}$	$_{1/2}$	0	306 801		4.4 − 1	1.4+10	D	20°, 26, 27, 99*
320.626	$_{1/2}$	$_{3/2}$	0	311 890		3.28 − 1	5.3+9	C−	20°, 26, 27, 99*
332.358	$3s3p(^1P^o)3d\ ^2F^o_{5/2}$	$3s3d^2\ ^2G_{7/2}$	651 550	952 430					36
330.314	$_{7/2}$	$_{9/2}$	649 771	952 513					36
323.633	$3s3p(^3P^o)3d\ ^2D^o_{5/2}$	$3p^2(^3P)3d\ ^2F_{7/2}$	567 610	876 608					36
318.209^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	233 778	548 037+x		3.1 − 2	3.4+8	E	99*
318.09	$3p^3\ ^2P^o_{3/2}$	$3p^2(^1D)3d\ ^2D_{5/2}$	506 695	821 098					36
312.782	$3s3p(^1P^o)3d\ ^2D^o_{5/2}$	$3s3d^2\ ^2F_{7/2}$	672 939	992 650					36
312.261	$_{3/2}$	$_{5/2}$	671 902	992 147					36
310.747^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	233 778	555 583+x		1.2 − 2	1.0+8	E	99*
307.241	$3p^3\ ^2D^o_{5/2}$	$3p^2(^3P)3d\ ^2P_{3/2}$	454 448	779 925					36
305.945^C	$3s3p^2\ ^4P_{3/2}$	$3p^3\ ^2P^o_{3/2}$	179 839+x	506 695		8.0 − 3	1.4+8	E	99*
302.500^C	$_{1/2}$	$_{3/2}$	176 117+x	506 695		3.4 − 3	6.2+7	E	99*
301.180^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	311 890	643 917		4.8 − 1	8.8+9	D	99*
297.897^C	$_{3/2}$	$_{1/2}$	311 890	647 577		1.0 − 1	3.8+9	D	99*
296.634^C	$_{1/2}$	$_{3/2}$	306 801	643 917		5.0 − 2	9.3+8	D	99*
293.448^C	$_{1/2}$	$_{1/2}$	306 801	647 577		4.4 − 1	1.7+10	D	99*
299.548	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2D^o_{5/2}$	233 778	567 610					34
298.960	$_{3/2}$	$_{3/2}$	232 972	567 465					34
295.934	$3s3p(^3P^o)3d\ ^4D^o_{5/2}$	$3s3d^2\ ^4F_{7/2}$	555 759+x	893 672+x					36
295.251	$_{7/2}$	$_{9/2}$	555 583+x	894 278+x					36
294.412^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2F^o_{5/2}$	311 890	651 550		5.2 − 3	6.7+7	E	99*
281.668	$3s3p^2\ ^2S_{1/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	288 914	643 917		1.3	2.7+10	D	34°, 99*
278.824	$_{1/2}$	$_{1/2}$	288 914	647 577		3.6 − 1	1.5+10	D	34°, 99*
281.485	$3p^3\ ^2P^o_{3/2}$	$3p^2(^1S)3d\ ^2D_{3/2}$	506 695	861 954					36
280.488^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	311 890	668 411		1.47 − 1	6.24+9	C−	99*
279.778	$_{3/2}$	$_{3/2}$	311 890	669 304					34
276.541	$_{1/2}$	$_{1/2}$	306 801	668 411		1.5 − 1	6.7+9	D	34°, 99*
275.869	$_{1/2}$	$_{3/2}$	306 801	669 304					34
278.411^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2F^o_{5/2}$	233 778	592 959		9.6 − 2	1.4+9	E	99*
277.778	$_{3/2}$	$_{5/2}$	232 972	592 959		7.2 − 1	1.0+10	E	34°, 99*
272.568	$_{5/2}$	$_{7/2}$	233 778	600 643		1.1	1.2+10	E	34°, 99*
277.778	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2D^o_{3/2}$	311 890	671 902					34
276.963	$_{3/2}$	$_{5/2}$	311 890	672 939		3.2	4.6+10	E	34°, 99*
273.888	$_{1/2}$	$_{3/2}$	306 801	671 902					34
275.448^C	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	184 992+x	548 037+x		2.5 − 1	3.7+9	D	99*
271.572	$_{3/2}$	$_{5/2}$	179 839+x	548 037+x		1.1	1.7+10	D	34°, 99*
267.658	$_{1/2}$	$_{3/2}$	176 117+x	549 713+x					34
266.656	$_{3/2}$	$_{1/2}$	179 839+x	554 864+x		4.8 − 1	2.2+10	E	34, 35°, 99*
264.028^C	$_{1/2}$	$_{1/2}$	176 117+x	554 864+x		5.6 − 2	2.6+9	E	99*
274.883	$3p^3\ ^4S^o_{3/2}$	$3p^2(^3P)3d\ ^4P_{5/2}$	463 653+x	827 452+x					36
274.351	$_{3/2}$	$_{3/2}$	463 653+x	828 147+x					36
272.740	$3p^3\ ^2D^o_{5/2}$	$3p^2(^1D)3d\ ^2D_{5/2}$	454 448	821 098					36
270.251	$_{3/2}$	$_{3/2}$	453 057	823 083					36

V XI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
272.332	$3s^23p\ ^2P^o_{3/2}$	$3s^23d\ ^2D_{3/2}$	9 696	376 897		2.6 − 1	5.8+9	D	34°, 99*
271.773	3/2	5/2	9 696	377 650		2.1	3.2+10	D	5, 34°, 99*
265.324	1/2	3/2	0	376 897		1.1	2.7+10	D	5, 34°, 99*
269.828	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	184 992+x	555 583+x		2.84	3.25+10	C−	34°, 99*
269.718	5/2	5/2	184 992+x	555 759+x		1.3	1.9+10	D	34°, 99*
266.762	1/2	1/2	176 117+x	550 994+x		6.2 − 1	2.9+10	E	34, 35°, 99*
266.202	3/2	3/2	179 839+x	555 472+x					34
265.988	3/2	5/2	179 839+x	555 759+x		7.2 − 1	1.1+10	D	34°, 99*
265.196	$3s3p(^3P^o)3d\ ^4F^o_{9/2}$	$3s3d^2\ ^4F_{9/2}$	517 171+x	894 278+x					36
263.507[C]	$3s3p^2\ ^2S_{1/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	288 914	668 411		2.6 − 1	1.2+10	D	99*
241.193[C]	$3s3p^2\ ^2D_{3/2}$	$3s3p(^3P^o)3d\ ^2P^o_{1/2}$	232 972	647 577		4.4 − 4	2.6+7	E	99*
240.586[C]	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)3d\ ^2F^o_{7/2}$	184 992+x	600 643		8.4 − 3	1.2+8	E	99*
240.333	$3s3p^2\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	233 778	649 771		1.5	2.2+10	E	34°, 99*
239.365[C]	5/2	5/2	233 778	651 550		6.6 − 2	1.3+9	E	99*
238.892	3/2	5/2	232 972	651 550		1.1	2.1+10	E	34°, 99*
236.88	$3p^3\ ^2D^o_{5/2}$	$3p^2(^3P)3d\ ^2F_{7/2}$	454 448	876 608					36
229.653[C]	$3s3p^2\ ^2D_{3/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	232 972	668 411		2.6 − 3	1.7+8	E	99*
213.767[C]	$3s3p^2\ ^4P_{1/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	176 117+x	643 917		3.0 − 3	1.1+8	E	99*
119.36	$3s^23d\ ^2D_{5/2}$	$3s^24f\ ^2F^o_{7/2}$	377 650	1 215 500					38
119.28	3/2	5/2	376 897	1 215 300					38
112.76[L]	$3s3p3d\ ^4F^o_{7/2}$	$3s3p4f\ ^4G_{9/2}$							38
112.63[L]	5/2	7/2							38
112.34[L]	9/2	11/2							38
107.57	$3s^23p\ ^2P^o_{3/2}$	$3s^24s\ ^2S_{1/2}$	9 696	939 500					38
106.42	1/2	1/2	0	939 500					38
106.00	$3s3p^2\ ^4P_{5/2}$	$3s3p4s\ ^4P^o_{3/2}$	184 992+x	1 128 300+x					38
105.34	5/2	5/2	184 992+x	1 134 400+x					38
105.03	1/2	3/2	176 117+x	1 128 300+x					38
104.74	3/2	5/2	179 839+x	1 134 400+x					38
87.868	$3s^23p\ ^2P^o_{3/2}$	$3s^24d\ ^2D_{5/2}$	9 696	1 147 770					37
87.166	1/2	3/2	0	1 147 240					37

V XII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
696.083^{C}	$3s3d\ ^1D_2$	$3p3d\ ^1D^{\circ}_2$	613 354	757 015		1.9 − 1	5.2+8	D−	99*
609.20	$3s3p\ ^1P^{\circ}_1$	$3p^2\ ^1D_2$	281 627	445 775		3.3 − 1	1.2+9	E	24, 29, 39°, 99*
562.25	$3s3p\ ^1P^{\circ}_1$	$3p^2\ ^3P_2$	281 627	459 478					39
522.4	$3s^2\ ^1S_0$	$3s3p\ ^3P^{\circ}_1$	0	191 509		1.4 − 3	1.1+7	E	42°, 99*
502.147^{C}	$3s3d\ ^3D_3$	$3p3d\ ^3F^{\circ}_2$	545 169	744 314		2.3 − 3	1.2+7	E	99*
500.448^{C}	2	2	544 493	744 314		1.2 − 1	6.1+8	D	99*
499.38	1	2	544 068	744 314		4.8 − 1	2.6+9	D−	27, 39°, 99*
490.08	3	3	545 169	749 216		1.5 − 1	5.8+8	C	39°, 99*
488.47	2	3	544 493	749 216		8.0 − 1	3.2+9	C−	27, 39°, 99*
476.78	3	4	545 169	754 909		1.25	4.06+9	C	27, 39°, 99*
421.02	$3s3d\ ^1D_2$	$3p3d\ ^1F^{\circ}_3$	613 354	850 871		2.6	1.3+10	D−	39°, 99*
411.05	$3s3d\ ^3D_3$	$3p3d\ ^3P^{\circ}_2$	545 169	788 448					39
398.498^{C}	1	0	544 068	795 010		1.9 − 1	8.0+9	C−	99*
397.72	1	1	544 068	795 499					39
409.64	$3s3p\ ^1P^{\circ}_1$	$3p^2\ ^1S_0$	281 627	525 745		3.3 − 1	1.3+10	C	27, 39°, 99*
408.65	$3s3d\ ^3D_2$	$3p3d\ ^3D^{\circ}_1$	544 493	789 199					39
399.70	3	3	545 169	795 356		9.8 − 1	5.8+9	C−	27, 39°, 99*
398.624^{C}	2	3	544 493	795 356		1.9 − 1	1.1+9	C−	99*
397.72	2	2	544 493	795 927					39
404.79	$3s3p\ ^3P^{\circ}_2$	$3p^2\ ^1D_2$	198 737	445 775		1.2 − 1	9.2+8	E	39°, 99*
393.30	1	2	191 509	445 775		5.4 − 2	4.5+8	E	39°, 99*
402.90	$3s3d\ ^1D_2$	$3p3d\ ^1P^{\circ}_1$	613 354	861 555		7.0 − 1	9.6+9	D−	39°, 99*
396.53	$3s3p\ ^3P^{\circ}_2$	$3p^2\ ^3P_1$	198 737	450 927		3.9 − 1	5.5+9	C−	26, 39°, 99*
392.53	1	0	191 509	446 265		3.0 − 1	1.3+10	C	26, 39°, 99*
385.47	1	1	191 509	450 927		2.4 − 1	3.6+9	C	26, 39°, 99*
383.53	2	2	198 737	459 478		1.1	9.3+9	D−	26, 39°, 99*
380.78	0	1	188 311	450 927		3.2 − 1	4.9+9	C	26, 39°, 99*
373.17	1	2	191 509	459 478		3.3 − 1	3.2+9	D−	26, 39°, 99*
382.462	$3p3d\ ^1P^{\circ}_1$	$3d^2\ ^1D_2$	861 555	1 123 022	3				40, 41°
365.134	$3p3d\ ^1F^{\circ}_3$	$3d^2\ ^1G_4$	850 871	1 124 757	6	2.93	1.63+10	C−	40, 41°, 99*, 102
355.07	$3s^2\ ^1S_0$	$3s3p\ ^1P^{\circ}_1$	0	281 627		9.47 − 1	1.67+10	C+	26, 39°, 99*
334.97	$3p^2\ ^1D_2$	$3p3d\ ^3F^{\circ}_2$	445 775	744 314					39
330.78	$3p3d\ ^3P^{\circ}_1$	$3d^2\ ^3F_2$	795 499	1 097 824	2				41°, 102
322.513	2	3	788 448	1 098 514	1				40, 41°
330.486	$3p3d\ ^3D^{\circ}_2$	$3d^2\ ^3F_3$	795 927	1 098 514	3				40, 41°, 102
328.954	3	4	795 356	1 099 356	5				40, 41°, 102
324.014	1	2	789 199	1 097 824	2				40, 41°
321.30	$3p^2\ ^1D_2$	$3p3d\ ^1D^{\circ}_2$	445 775	757 015		9.5 − 1	1.2+10	E	39°, 99*
302.080	$3p3d\ ^3D^{\circ}_2$	$3d^2\ ^3P_2$	795 927	1 126 966	3				41
301.46^{T}	3	2	795 356	1 126 966	bl				41
296.728	1	0	789 199	1 126 208	2				41
302.080	$3p3d\ ^3P^{\circ}_1$	$3d^2\ ^3P_1$	795 499	1 126 476	3				41
301.680	0	1	795 010	1 126 476	2				41
301.680	1	2	795 499	1 126 966	2				41
295.841	2	1	788 448	1 126 476	2				41
295.405	2	2	788 448	1 126 966	1				41
301.45	$3s3p\ ^1P^{\circ}_1$	$3s3d\ ^1D_2$	281 627	613 354		2.2	3.2+10	D−	24, 29, 39°, 99*
297.73	$3p^2\ ^1S_0$	$3p3d\ ^1P^{\circ}_1$	525 745	861 555		7.9 − 1	2.0+10	C−	39°, 99*
297.73	$3p^2\ ^3P_2$	$3p3d\ ^3D^{\circ}_3$	459 478	795 356		2.0	2.1+10	E	27, 39°, 99*
297.22	2	2	459 478	795 927					39
291.60	0	1	446 265	789 199					39
289.85	1	2	450 927	795 927					39

V XII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
296.28	$3p^2\ ^3P_1$	$3p3d\ ^3P^o_2$	450 927	788 448					39
290.63	1	0	450 927	795 010		2.0 − 1	1.6+10	C−	39°, 99*
290.21	1	1	450 927	795 499					39
290.31	$3p3d\ ^3F^o_4$	$3d^2\ ^3F_4$	754 909	1 099 356	3				40, 41°, 102
286.287	3	3	749 216	1 098 514	3				40, 41°, 102
282.880	2	2	744 314	1 097 824	2				40, 41°, 102
289.577[C]	$3s3p\ ^3P^o_2$	$3s3d\ ^3D_1$	198 737	544 068		1.9 − 2	4.9+8	D−	99*
289.22	2	2	198 737	544 493		2.8 − 1	4.4+9	C−	24, 29, 39°, 99*
288.65	2	3	198 737	545 169		1.54	1.76+10	C−	24, 27, 29, 39°, 99*
283.64	1	1	191 509	544 068		2.8 − 1	7.7+9	C−	39°, 99*
283.30	1	2	191 509	544 493		8.4 − 1	1.4+10	C−	24, 27, 29, 39°, 99*
281.09	0	1	188 311	544 068		3.7 − 1	1.0+10	C−	24, 29, 39°, 99*
286.05	$3p^2\ ^1D_2$	$3p3d\ ^3D^o_3$	445 775	795 356					39
273.215	$3p3d\ ^1D^o_2$	$3d^2\ ^1D_2$	757 015	1 123 022	3				40, 41°
255.50	$3p^2\ ^3P_2$	$3p3d\ ^1F^o_3$	459 478	850 871					39
246.86	$3p^2\ ^1D_2$	$3p3d\ ^1F^o_3$	445 775	850 871		1.2	1.8+10	E	39°, 99*
240.512[C]	$3p^2\ ^1D_2$	$3p3d\ ^1P^o_1$	445 775	861 555		7.0 − 3	2.7+8	E	99*
113.78	$3s3d\ ^1D_2$	$3s4f\ ^1F^o_3$	613 354	1 492 100					38
113.39	$3p3d\ ^1F^o_3$	$3p4f\ ^1G_4$	850 871	1 732 800					38
108.93	$3p3d\ ^3D^o_3$	$3p4f\ ^3F_4$	795 356	1 713 400					38
107.83	$3p3d\ ^3D^o_3$	$3p4f\ ^3D_3$	795 356	1 722 700					38
107.29	$3p3d\ ^3P^o_1$	$3p4f\ ^3D_1$	795 499	1 727 500					38
107.25	0	1	795 010	1 727 500					38
106.885	$3s3d\ ^3D_3$	$3s4f\ ^3F^o_4$	545 169	1 480 800	4				29, 37°
106.820	2	3	544 493	1 480 600	3				29, 37°
106.781	1	2	544 068	1 480 600	2				29, 37°
105.74	$3s3p\ ^1P^o_1$	$3s4s\ ^1S_0$	281 627	1 227 300	bl				29
105.49	$3p3d\ ^1D^o_2$	$3p4f\ ^3F_3$	757 015	1 705 000					38
104.66	$3p3d\ ^3F^o_3$	$3p4f\ ^3G_4$	749 216	1 704 700					38
104.58	2	3	744 314	1 700 500					38
104.45	4	5	754 909	1 712 300					38
100.37	$3p^2\ ^3P_1$	$3p4s\ ^3P^o_0$	450 927	1 447 200					29
100.13	2	2	459 478	1 458 200					29
98.630	$3s3p\ ^3P^o_2$	$3s4s\ ^3S_1$	198 737	1 212 500	3				29, 37°
97.938	1	1	191 509	1 212 500	2				29, 37°
97.642	0	1	188 311	1 212 500					29, 37°
95.58	$3p^2\ ^1D_2$	$3s4f\ ^1F^o_3$	445 775	1 492 100					24°, 29
87.363	$3s3p\ ^1P^o_1$	$3s4d\ ^1D_2$	281 627	1 426 300					24°, 29, 38
83.677	$3p^2\ ^1D_2$	$3p4d\ ^1F^o_3$	445 775	1 640 800					29
83.134	$3p^2\ ^3P_2$	$3p4d\ ^3D^o_3$	459 478	1 662 400					29
82.844	1	2	450 927	1 658 000					29
82.514	0	1	446 265	1 658 200					29
82.348[T]	$3p^2\ ^1D_2$	$3p4d\ ^3F^o_3$	445 775	1 660 100?					29
82.024	$3p^2\ ^3P_2$	$3p4d\ ^3P^o_2$	459 478	1 678 600					29
81.550	$3s3p\ ^3P^o_2$	$3s4d\ ^3D_2$	198 737	1 425 000					37
81.513	2	3	198 737	1 425 500	4				29, 37°
81.098	1	1	191 509	1 424 500					37
81.077	1	2	191 509	1 425 000	2				29, 37°
80.896	0	1	188 311	1 424 500	1				29, 37°
76.960	$3s3d\ ^3D_3$	$3s5f\ ^3F^o_4$	545 169	1 844 500					29, 37°

V XII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
76.307	$3s^2\ ^1S_0$	$3s4p\ ^1P^o_1$	0	1 310 500	3	3.17 – 1	1.21+11	C–	29, 37°, 99*
74.32	$3s3p\ ^3P^o_2$	$3p4p\ ^3D_3$	198 737	1 544 300	bl				29
74.257	$3s3p\ ^3P^o_2$	$3p4p\ ^3P_1$	198 737	1 545 400					29
73.978	2	2	198 737	1 550 600					29
73.576	1	2	191 509	1 550 600					29
73.856	$3s3p\ ^3P^o_2$	$3p4p\ ^3S_1$	198 737	1 552 600					29
73.474	1	1	191 509	1 552 600					29
66.806	$3s3d\ ^3D_3$	$3s6f\ ^3F^o_4$	545 169	2 042 000					29
65.848	$3s3p\ ^3P^o_2$	$3s5s\ ^3S_1$	198 737	1 716 900					29
65.564	1	1	191 509	1 716 900					29
65.445	0	1	188 311	1 716 900					29
64.920	$3s3p\ ^1P^o_1$	$3s5d\ ^1D_2$	281 627	1 822 000					29
61.921	$3s3d\ ^3D_3$	$3s7f\ ^3F^o_4$	545 169	2 160 100					29
61.717	$3s3p\ ^3P^o_2$	$3s5d\ ^3D_3$	198 737	1 819 000	1				29, 37°
61.455	1	2	191 509	1 818 700					29, 37°
61.352	0	1	188 311	1 818 300					29
59.092	$3s3d\ ^3D_3$	$3s8f\ ^3F^o_4$	545 169	2 237 400					29
56.655	$3s^2\ ^1S_0$	$3s5p\ ^1P^o_1$	0	1 765 100		1.04 – 1	7.2+10	C	29°, 99*
56.53	$3s3p\ ^3P^o_2$	$3s6s\ ^3S_1$	198 737	1 967 700					29
54.702	$3s3p\ ^3P^o_2$	$3s6d\ ^3D_3$	198 737	2 026 800					29
54.493	1	2	191 509	2 026 600					29
52.315	$3s3p\ ^3P^o_2$	$3s7s\ ^3S_1$	198 737	2 110 200					29
51.208	$3s3p\ ^3P^o_2$	$3s7d\ ^3D_3$	198 737	2 151 600					29
50.056	$3s^2\ ^1S_0$	$3s6p\ ^1P^o_1$	0	1 997 800					29
49.226	$3s3p\ ^3P^o_2$	$3s8d\ ^3D_3$	198 737	2 230 200					29
46.913	$3s^2\ ^1S_0$	$3s7p\ ^1P^o_1$	0	2 131 600					29
45.071	$3s^2\ ^1S_0$	$3s8p\ ^1P^o_1$	0	2 218 700					29
44.03	$3s^2\ ^1S_0$	$3s9p\ ^1P^o_1$	0	2 271 200					29
43.358	$3s^2\ ^1S_0$	$3s10p\ ^1P^o_1$	0	2 306 400					29

V XIII

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
884.02^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^64d\ ^2D_{3/2}$	1 392 780	1 505 900		2.0 − 1	4.2+8	C	99*
879.51^{C}	$3/2$	$5/2$	1 392 780	1 506 480		1.8	2.5+9	C	99*
851.14^{C}	$1/2$	$3/2$	1 388 410	1 505 900		1.0	2.4+9	C	99*
487.40^{C}	$2p^65d\ ^2D_{3/2}$	$2p^66p\ ^2P^o_{1/2}$	1 946 230	2 151 400		5.6 − 1	7.8+9	C	99*
485.67^{C}	$5/2$	$3/2$	1 946 500	2 152 400		1.00	7.1+9	C	99*
485.04^{C}	$3/2$	$3/2$	1 946 230	2 152 400		1.1 − 1	8.0+8	D	99*
465.29^{C}	$2p^65f\ ^2F^o_{5/2}$	$2p^66d\ ^2D_{3/2}$	1 967 880	2 182 800		2.9 − 1	2.2+9	C	99*
465.09^{C}	$7/2$	$5/2$	1 967 990	2 183 000		4.1 − 1	2.1+9	C	99*
464.86^{C}	$5/2$	$5/2$	1 967 880	2 183 000		2.0 − 2	1.0+8	D	99*
443.427^{S}	$2p^63s\ ^2S_{1/2}$	$2p^63p\ ^2P^o_{1/2}$	0	225 520		2.90 − 1	4.90+9	B	24, 26, 29, 43°, 99*
422.784^{S}	$1/2$	$3/2$	0	236 530		6.10 − 1	5.69+9	B	24, 26, 29, 43°, 99*
424.50^{C}	$2p^65p\ ^2P^o_{3/2}$	$2p^66s\ ^2S_{1/2}$	1 891 430	2 127 000		6.8 − 1	1.2+10	C	99*
420.80^{C}	$1/2$	$1/2$	1 889 360	2 127 000		3.34 − 1	6.3+9	C	99*
402.58^{C}	$2p^65d\ ^2D_{5/2}$	$2p^66f\ ^2F^o_{5/2}$	1 946 500	2 194 900		1.7 − 1	1.2+9	D	99*
402.25^{C}	$5/2$	$7/2$	1 946 500	2 195 100		3.5	1.8+10	C	99*
402.14^{C}	$3/2$	$5/2$	1 946 230	2 194 900		2.5	1.7+10	C	99*
343.21^{C}	$2p^65p\ ^2P^o_{3/2}$	$2p^66d\ ^2D_{3/2}$	1 891 430	2 182 800		8.0 − 2	1.1+9	D	99*
342.97^{C}	$3/2$	$5/2$	1 891 430	2 183 000		7.2 − 1	6.7+9	C	99*
340.79^{C}	$1/2$	$3/2$	1 889 360	2 182 800		3.98 − 1	5.7+9	C	99*
327.55^{C}	$2p^65s\ ^2S_{1/2}$	$2p^66p\ ^2P^o_{1/2}$	1 846 100	2 151 400		1.4 − 1	4.50+9	C	99*
326.48^{C}	$1/2$	$3/2$	1 846 100	2 152 400		2.90 − 1	4.53+9	C	99*
324.496^{S}	$2p^63p\ ^2P^o_{3/2}$	$2p^63d\ ^2D_{3/2}$	236 530	544 700		1.35 − 1	2.13+9	B	26, 43°, 99*
323.189^{S}	$3/2$	$5/2$	236 530	545 950		1.22	1.3+10	B	24, 26, 29, 43°, 99*
313.305^{S}	$1/2$	$3/2$	225 520	544 700		7.00 − 1	1.19+10	B	24, 26, 29, 43°, 99*
280.25^{C}	$2p^65f\ ^2F^o_{5/2}$	$2p^67d\ ^2D_{3/2}$	1 967 880	2 324 700		4.7 − 2	1.0+9	D	99*
280.10^{C}	$7/2$	$5/2$	1 967 990	2 325 000		6.8 − 2	9.7+8	D	99*
280.02^{C}	$5/2$	$5/2$	1 967 880	2 325 000		3.4 − 3	4.8+7	E	99*
278.40^{C}	$2p^65d\ ^2D_{5/2}$	$2p^67p\ ^2P^o_{3/2}$	1 946 500	2 305 700		1.69 − 1	3.63+9	C	99*
278.19^{C}	$3/2$	$1/2$	1 946 230	2 305 700		9.6 − 2	4.1+9	C	99*
278.19^{C}	$3/2$	$3/2$	1 946 230	2 305 700		1.9 − 2	4.0+8	D	99*
260.78^{C}	$2p^64d\ ^2D_{3/2}$	$2p^65p\ ^2P^o_{1/2}$	1 505 900	1 889 360		3.5 − 1	1.7+10	C	99*
259.77^{C}	$5/2$	$3/2$	1 506 480	1 891 430		6.6 − 1	1.6+10	C	99*
259.38^{C}	$3/2$	$3/2$	1 505 900	1 891 430		7.2 − 2	1.7+9	D	99*
259.07^{C}	$2p^65d\ ^2D_{5/2}$	$2p^67f\ ^2F^o_{5/2}$	1 946 500	2 332 500		4.9 − 2	8.2+8	D	99*
258.89^{C}	$3/2$	$5/2$	1 946 230	2 332 500		6.8 − 1	1.2+10	C	99*
258.87^{C}	$5/2$	$7/2$	1 946 500	2 332 800		9.6 − 1	1.2+10	C	99*
252.00^{C}	$2p^64f\ ^2F^o_{5/2}$	$2p^65d\ ^2D_{3/2}$	1 549 410	1 946 230		1.1 − 1	3.0+9	C	99*
251.97^{C}	$7/2$	$5/2$	1 549 620	1 946 500		1.65 − 1	2.89+9	C	99*
251.83^{C}	$5/2$	$5/2$	1 549 410	1 946 500		8.4 − 3	1.5+8	D	99*
250.65^{C}	$2p^65p\ ^2P^o_{3/2}$	$2p^67s\ ^2S_{1/2}$	1 891 430	2 290 400		1.28 − 1	6.8+9	C	99*
249.35^{C}	$1/2$	$1/2$	1 889 360	2 290 400		6.4 − 2	3.4+9	C	99*
230.80^{C}	$2p^65p\ ^2P^o_{3/2}$	$2p^67d\ ^2D_{3/2}$	1 891 430	2 324 700		3.0 − 2	9.5+8	D	99*
230.64^{C}	$3/2$	$5/2$	1 891 430	2 325 000		2.6 − 1	5.5+9	C	99*
229.71^{C}	$1/2$	$3/2$	1 889 360	2 324 700		1.5 − 1	4.6+9	C	99*
223.01^{C}	$2p^65f\ ^2F^o_{5/2}$	$2p^68d\ ^2D_{3/2}$	1 967 880	2 416 300		1.8 − 2	5.9+8	D	99*
222.96^{C}	$7/2$	$5/2$	1 967 990	2 416 500		2.6 − 2	5.8+8	D	99*
222.91^{C}	$5/2$	$5/2$	1 967 880	2 416 500		1.3 − 3	2.9+7	E	99*
220.59^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^65s\ ^2S_{1/2}$	1 392 780	1 846 100		4.8 − 1	3.2+10	C	99*
218.49^{C}	$1/2$	$1/2$	1 388 410	1 846 100		2.4 − 1	1.7+10	C	99*
218.53^{C}	$2p^65d\ ^2D_{5/2}$	$2p^68p\ ^2P^o_{3/2}$	1 946 500	2 404 100		6.0 − 2	2.2+9	C	99*
218.40^{C}	$3/2$	$1/2$	1 946 230	2 404 100		3.5 − 2	2.4+9	D	99*
218.40^{C}	$3/2$	$3/2$	1 946 230	2 404 100		6.8 − 3	2.4+8	D	99*

V XIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
216.73[C]	$2p^64d\ ^2D_{5/2}$	$2p^65f\ ^2F^o_{5/2}$	1 506 480	1 967 880		2.1 − 1	5.0+9	D	99*
216.68[C]	$_{5/2}$	$_{7/2}$	1 506 480	1 967 990		4.1	7.2+10	C	99*
216.46[C]	$_{3/2}$	$_{5/2}$	1 505 900	1 967 880		2.8	6.7+10	C	99*
210.53[C]	$2p^65d\ ^2D_{5/2}$	$2p^68f\ ^2F^o_{7/2}$	1 946 500	2 421 500		4.3 − 1	8.2+9	C	99*
210.53[C]	$_{5/2}$	$_{5/2}$	1 946 500	2 421 500		2.2 − 2	5.4+8	D	99*
210.41[C]	$_{3/2}$	$_{5/2}$	1 946 230	2 421 500		3.0 − 1	7.6+9	C	99*
199.37[C]	$2p^65p\ ^2P^o_{3/2}$	$2p^68s\ ^2S_{1/2}$	1 891 430	2 393 000		5.00 − 2	4.19+9	C	99*
198.55[C]	$_{1/2}$	$_{1/2}$	1 889 360	2 393 000		2.50 − 2	2.11+9	C	99*
190.52[C]	$2p^65p\ ^2P^o_{3/2}$	$2p^68d\ ^2D_{3/2}$	1 891 430	2 416 300		1.5 − 2	6.8+8	D	99*
190.45[C]	$_{3/2}$	$_{5/2}$	1 891 430	2 416 500		1.3 − 1	4.1+9	C	99*
189.77[C]	$_{1/2}$	$_{3/2}$	1 889 360	2 416 300		7.40 − 2	3.43+9	C	99*
183.59[C]	$2p^63s\ ^2S_{1/2}$	$2p^63d\ ^2D_{3/2}$	0	544 700		E2	4.89+5	C	99*
183.17[C]	$_{1/2}$	$_{5/2}$	0	545 950		E2	4.89+5	C	99*
180.68[C]	$2p^64p\ ^2P^o_{3/2}$	$2p^65d\ ^2D_{3/2}$	1 392 780	1 946 230		8.4 − 2	4.4+9	D	99*
180.60[C]	$_{3/2}$	$_{5/2}$	1 392 780	1 946 500		7.6 − 1	2.6+10	C	99*
179.27[C]	$_{1/2}$	$_{3/2}$	1 388 410	1 946 230		4.4 − 1	2.3+10	C	99*
169.82[C]	$2p^64s\ ^2S_{1/2}$	$2p^65p\ ^2P^o_{1/2}$	1 300 490	1 889 360		1.4 − 1	1.6+10	C	99*
169.22[C]	$_{1/2}$	$_{3/2}$	1 300 490	1 891 430		2.70 − 1	1.57+10	C	99*
157.88[C]	$2p^64f\ ^2F^o_{7/2}$	$2p^66d\ ^2D_{5/2}$	1 549 620	2 183 000		2.7 − 2	1.2+9	D	99*
157.88[C]	$_{5/2}$	$_{3/2}$	1 549 410	2 182 800		1.9 − 2	1.3+9	D	99*
157.83[C]	$_{5/2}$	$_{5/2}$	1 549 410	2 183 000		1.4 − 3	6.1+7	E	99*
154.92[C]	$2p^64d\ ^2D_{3/2}$	$2p^66p\ ^2P^o_{1/2}$	1 505 900	2 151 400		5.6 − 2	7.9+9	C	99*
154.82[C]	$_{5/2}$	$_{3/2}$	1 506 480	2 152 400		1.0 − 1	7.2+9	C	99*
154.68[C]	$_{3/2}$	$_{3/2}$	1 505 900	2 152 400		1.2 − 2	8.1+8	D	99*
145.26[C]	$2p^64d\ ^2D_{5/2}$	$2p^66f\ ^2F^o_{5/2}$	1 506 480	2 194 900		5.0 − 2	2.6+9	D	99*
145.22[C]	$_{5/2}$	$_{7/2}$	1 506 480	2 195 100		1.0	4.1+10	C	99*
145.14[C]	$_{3/2}$	$_{5/2}$	1 505 900	2 194 900		7.2 − 1	3.8+10	C	99*
136.20[C]	$2p^64p\ ^2P^o_{3/2}$	$2p^66s\ ^2S_{1/2}$	1 392 780	2 127 000		9.2 − 2	1.6+10	C	99*
135.39[C]	$_{1/2}$	$_{1/2}$	1 388 410	2 127 000		4.4 − 2	8.2+9	C	99*
128.98[C]	$2p^64f\ ^2F^o_{5/2}$	$2p^67d\ ^2D_{3/2}$	1 549 410	2 324 700		6.6 − 3	6.6+8	D	99*
128.97[C]	$_{7/2}$	$_{5/2}$	1 549 620	2 325 000		9.6 − 3	6.4+8	D	99*
128.93[C]	$_{5/2}$	$_{5/2}$	1 549 410	2 325 000		4.7 − 4	3.2+7	E	99*
126.58[C]	$2p^64p\ ^2P^o_{3/2}$	$2p^66d\ ^2D_{3/2}$	1 392 780	2 182 800		3.1 − 2	3.2+9	D	99*
126.55[C]	$_{3/2}$	$_{5/2}$	1 392 780	2 183 000		2.6 − 1	1.8+10	C	99*
125.88[C]	$_{1/2}$	$_{3/2}$	1 388 410	2 182 800		1.5 − 1	1.6+10	C	99*
125.12[C]	$2p^64d\ ^2D_{5/2}$	$2p^67p\ ^2P^o_{3/2}$	1 506 480	2 305 700		3.9 − 2	4.1+9	D	99*
125.03[C]	$_{3/2}$	$_{3/2}$	1 505 900	2 305 700		4.0 − 3	4.4+8	E	99*
125.03[C]	$_{3/2}$	$_{1/2}$	1 505 900	2 305 700		2.1 − 2	4.5+9	D	99*
121.06[C]	$2p^64d\ ^2D_{5/2}$	$2p^67f\ ^2F^o_{5/2}$	1 506 480	2 332 500		2.1 − 2	1.6+9	D	99*
121.02[C]	$_{5/2}$	$_{7/2}$	1 506 480	2 332 800		4.3 − 1	2.4+10	C	99*
120.98[C]	$_{3/2}$	$_{5/2}$	1 505 900	2 332 500		3.0 − 1	2.3+10	C	99*
118.50	$2p^63d\ ^2D_{3/2}$	$2p^64p\ ^2P^o_{1/2}$	544 700	1 388 410		1.6 − 1	3.8+10	C	38°, 99*
118.08	$_{5/2}$	$_{3/2}$	545 950	1 392 780		2.88 − 1	3.45+10	C	38°, 99*
117.91[C]	$_{3/2}$	$_{3/2}$	544 700	1 392 780		3.1 − 2	3.7+9	D	99*
117.52[C]	$2p^64s\ ^2S_{1/2}$	$2p^66p\ ^2P^o_{1/2}$	1 300 490	2 151 400		4.4 − 2	1.1+10	C	99*
117.38[C]	$_{1/2}$	$_{3/2}$	1 300 490	2 152 400		8.8 − 2	1.1+10	C	99*
115.36[C]	$2p^64f\ ^2F^o_{7/2}$	$2p^68d\ ^2D_{5/2}$	1 549 620	2 416 500		4.7 − 3	4.0+8	E	99*
115.35[C]	$_{5/2}$	$_{3/2}$	1 549 410	2 416 300		3.2 − 3	4.0+8	E	99*
115.33[C]	$_{5/2}$	$_{5/2}$	1 549 410	2 416 500		2.3 − 4	2.0+7	E	99*
111.41[C]	$2p^64p\ ^2P^o_{3/2}$	$2p^67s\ ^2S_{1/2}$	1 392 780	2 290 400		3.6 − 2	9.5+9	D	99*
110.87[C]	$_{1/2}$	$_{1/2}$	1 388 410	2 290 400		1.7 − 2	4.7+9	D	99*

V XIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
111.41^{C}	$2p^64d\ ^2D_{5/2}$	$2p^68p\ ^2P^o_{3/2}$	1 506 480	2 404 100		1.8 – 2	2.4+9	D	99*
111.33^{C}	3/2	1/2	1 505 900	2 404 100		1.0 – 2	2.7+9	D	99*
111.33^{C}	3/2	3/2	1 505 900	2 404 100		2.0 – 3	2.7+8	E	99*
109.29^{C}	$2p^64d\ ^2D_{5/2}$	$2p^68f\ ^2F^o_{5/2}$	1 506 480	2 421 500		1.1 – 2	1.0+9	D	99*
109.29^{C}	5/2	7/2	1 506 480	2 421 500		2.2 – 1	1.6+10	C	99*
109.22^{C}	3/2	5/2	1 505 900	2 421 500		1.6 – 1	1.5+10	C	99*
107.31^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^67d\ ^2D_{3/2}$	1 392 780	2 324 700		1.5 – 2	2.2+9	D	99*
107.27^{C}	3/2	5/2	1 392 780	2 325 000		1.4 – 1	1.3+10	C	99*
106.80^{C}	1/2	3/2	1 388 410	2 324 700		7.6 – 2	1.1+10	C	99*
99.978^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^68s\ ^2S_{1/2}$	1 392 780	2 393 000		1.8 – 2	6.0+9	D	99*
99.543^{C}	1/2	1/2	1 388 410	2 393 000		9.2 – 3	3.1+9	D	99*
99.655^{C}	$2p^63d\ ^2D_{5/2}$	$2p^64f\ ^2F^o_{5/2}$	545 950	1 549 410		2.6 – 1	2.9+10	D	99*
99.634^{S}	5/2	7/2	545 950	1 549 620		5.2	4.4+11	C	43°, 44, 99*
99.531^{S}	3/2	5/2	544 700	1 549 410		3.7	4.1+11	C	43°, 44, 99*
97.702^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^68d\ ^2D_{3/2}$	1 392 780	2 416 300		8.8 – 3	1.5+9	D	99*
97.683^{C}	3/2	5/2	1 392 780	2 416 500		7.88 – 2	9.2+9	C	99*
97.287^{C}	1/2	3/2	1 388 410	2 416 300		4.40 – 2	7.8+9	C	99*
93.994	$2p^63p\ ^2P^o_{3/2}$	$2p^64s\ ^2S_{1/2}$	236 530	1 300 490					44
93.025	1/2	1/2	225 520	1 300 490					29, 44°
78.783	$2p^63p\ ^2P^o_{3/2}$	$2p^64d\ ^2D_{3/2}$	236 530	1 505 900		1.0 – 1	2.8+10	D	44°, 45△, 99*
78.746	3/2	5/2	236 530	1 506 480		9.28 – 1	1.66+11	C	29, 44°, 99*
78.101	1/2	3/2	225 520	1 505 900		5.20 – 1	1.42+11	C	29, 44°, 99*
74.368^{C}	$2p^63d\ ^2D_{3/2}$	$2p^65p\ ^2P^o_{1/2}$	544 700	1 889 360		2.4 – 2	1.5+10	D	99*
74.321	5/2	3/2	545 950	1 891 430		4.5 – 2	1.4+10	D	24°, 29, 45△, 99*
74.254^{C}	3/2	3/2	544 700	1 891 430		4.8 – 3	1.5+9	E	99*
72.025	$2p^63s\ ^2S_{1/2}$	$2p^64p\ ^2P^o_{1/2}$	0	1 388 410		1.29 – 1	8.3+10	B	29, 44°, 99*
71.799	1/2	3/2	0	1 392 780		2.44 – 1	7.9+10	B	29, 44°, 99*
70.327^{C}	$2p^63d\ ^2D_{5/2}$	$2p^65f\ ^2F^o_{5/2}$	545 950	1 967 880		4.7 – 2	1.1+10	D	99*
70.323	5/2	7/2	545 950	1 967 990		9.78 – 1	1.65+11	C	29, 44°, 99*
70.262	3/2	5/2	544 700	1 967 880		6.84 – 1	1.54+11	C	29, 44°, 99*
62.249^{C}	$2p^63d\ ^2D_{5/2}$	$2p^66p\ ^2P^o_{3/2}$	545 950	2 152 400		1.6 – 2	6.7+9	D	99*
62.239^{C}	3/2	1/2	544 700	2 151 400		8.8 – 3	7.6+9	D	99*
62.201^{C}	3/2	3/2	544 700	2 152 400		1.7 – 3	7.4+8	E	99*
62.132	$2p^63p\ ^2P^o_{3/2}$	$2p^65s\ ^2S_{1/2}$	236 530	1 846 100		5.28 – 2	4.56+10	C	29, 45°, 99*
61.705	1/2	1/2	225 520	1 846 100		2.6 – 2	2.3+10	C	29, 45°, 99*
60.645^{C}	$2p^63d\ ^2D_{5/2}$	$2p^66f\ ^2F^o_{5/2}$	545 950	2 194 900		1.9 – 2	5.6+9	D	99*
60.640	5/2	7/2	545 950	2 195 100		3.7 – 1	8.4+10	C	29, 45°, 99*
60.596	3/2	5/2	544 700	2 194 900		2.6 – 1	7.9+10	C	45°, 99*
58.490^{C}	$2p^63p\ ^2P^o_{3/2}$	$2p^65d\ ^2D_{3/2}$	236 530	1 946 230		3.5 – 2	1.7+10	D	99*
58.482	3/2	5/2	236 530	1 946 500		3.1 – 1	1.0+11	C	29, 44°, 45△, 99*
58.116	1/2	3/2	225 520	1 946 230		1.7 – 1	8.5+10	C	29, 44°, 45△, 99*
56.826^{C}	$2p^63d\ ^2D_{5/2}$	$2p^67p\ ^2P^o_{3/2}$	545 950	2 305 700		7.2 – 3	3.9+9	D	99*
56.786^{C}	3/2	1/2	544 700	2 305 700		4.4 – 3	4.4+9	D	99*
56.786^{C}	3/2	3/2	544 700	2 305 700		8.4 – 4	4.4+8	E	99*
55.974^{C}	$2p^63d\ ^2D_{5/2}$	$2p^67f\ ^2F^o_{5/2}$	545 950	2 332 500		9.0 – 3	3.3+9	D	99*
55.967	5/2	7/2	545 950	2 332 800		1.8 – 1	4.8+10	C	29, 45°, 99*
55.932	3/2	5/2	544 700	2 332 500		1.2 – 1	4.4+10	C	45°, 99*
53.817^{C}	$2p^63d\ ^2D_{5/2}$	$2p^68p\ ^2P^o_{3/2}$	545 950	2 404 100		4.4 – 3	2.5+9	E	99*
53.781^{C}	3/2	1/2	544 700	2 404 100		2.4 – 3	2.8+9	E	99*
53.781^{C}	3/2	3/2	544 700	2 404 100		4.8 – 4	2.8+8	E	99*
53.318	$2p^63d\ ^2D_{5/2}$	$2p^68f\ ^2F^o_{7/2}$	545 950	2 421 500		1.04 – 1	3.04+10	C	29, 45°, 99*
53.318^{C}	5/2	5/2	545 950	2 421 500		5.2 – 3	2.0+9	E	99*
53.281	3/2	5/2	544 700	2 421 500		7.24 – 2	2.84+10	C	45°, 99*

V XIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
52.928	$2p^63s\ ^2S_{1/2}$	$2p^65p\ ^2P^o_{1/2}$	0	1 889 360		4.0 – 2	4.8+10	C	29, 44°, 99*
52.870	1/2	3/2	0	1 891 430		8.0 – 2	4.8+10	C	29, 44°, 99*
52.897^{C}	$2p^63p\ ^2P^o_{3/2}$	$2p^66s\ ^2S_{1/2}$	236 530	2 127 000		2.0 – 2	2.4+10	D	99*
52.590	1/2	1/2	225 520	2 127 000		1.0 – 2	1.3+10	D	29°, 99*
51.620	$2p^63d\ ^2D_{5/2}$	$2p^69f\ ^2F^o_{7/2}$	545 950	2 483 200					29, 45°
51.380^{C}	$2p^63p\ ^2P^o_{3/2}$	$2p^66d\ ^2D_{3/2}$	236 530	2 182 800		1.6 – 2	1.0+10	D	99*
51.376	3/2	5/2	236 530	2 183 000		1.46 – 1	6.2+10	C	29, 45°, 99*
51.091	1/2	3/2	225 520	2 182 800		8.14 – 2	5.2+10	C	29, 45°, 99*
50.494	$2p^63d\ ^2D_{5/2}$	$2p^610f\ ^2F^o_{7/2}$	545 950	2 526 400					29
49.642	$2p^63d\ ^2D_{5/2}$	$2p^611f\ ^2F^o_{7/2}$	545 950	2 560 400					29
48.682	$2p^63p\ ^2P^o_{3/2}$	$2p^67s\ ^2S_{1/2}$	236 530	2 290 400		1.1 – 2	1.5+10	D	29°, 45△, 99*
48.435	1/2	1/2	225 520	2 290 400		5.2 – 3	7.4+9	D	29°, 45△, 99*
47.889^{C}	$2p^63p\ ^2P^o_{3/2}$	$2p^67d\ ^2D_{3/2}$	236 530	2 324 700		8.8 – 3	6.5+9	D	99*
47.884	3/2	5/2	236 530	2 325 000		8.12 – 2	3.94+10	C	29, 45°, 99*
47.637	1/2	3/2	225 520	2 324 700		4.6 – 2	3.3+10	C	29, 45°, 99*
46.482	$2p^63s\ ^2S_{1/2}$	$2p^66p\ ^2P^o_{1/2}$	0	2 151 400		1.9 – 2	2.9+10	D	45°, 99*
46.460	1/2	3/2	0	2 152 400		3.8 – 2	2.9+10	C	29, 45°, 99*
46.395	$2p^63p\ ^2P^o_{3/2}$	$2p^68s\ ^2S_{1/2}$	236 530	2 393 000		6.0 – 3	9.4+9	D	29°, 99*
46.118	1/2	1/2	225 520	2 393 000		3.0 – 3	4.9+9	D	29°, 99*
45.876^{C}	$2p^63p\ ^2P^o_{3/2}$	$2p^68d\ ^2D_{3/2}$	236 530	2 416 300		5.6 – 3	4.5+9	D	99*
45.873	3/2	5/2	236 530	2 416 500		5.2 – 2	2.7+10	C	29, 45°, 99*
45.645	1/2	3/2	225 520	2 416 300		2.82 – 2	2.25+10	C	29, 45°, 99*
44.919	$2p^63p\ ^2P^o_{3/2}$	$2p^69s\ ^2S_{1/2}$	236 530	2 462 800					29
44.594	$2p^63p\ ^2P^o_{3/2}$	$2p^69d\ ^2D_{5/2}$	236 530	2 479 000					29, 45°
44.376	1/2	3/2	225 520	2 479 000					29, 45°
44.013	$2p^63p\ ^2P^o_{3/2}$	$2p^610s\ ^2S_{1/2}$	236 530	2 508 600					29
43.741	$2p^63p\ ^2P^o_{3/2}$	$2p^610d\ ^2D_{5/2}$	236 530	2 522 800					29
43.371	$2p^63s\ ^2S_{1/2}$	$2p^67p\ ^2P^o_{3/2}$	0	2 305 700					29, 45°
43.371	1/2	1/2	0	2 305 700					45
43.268	$2p^63p\ ^2P^o_{3/2}$	$2p^611s\ ^2S_{1/2}$	236 530	2 547 800					29
43.103	$2p^63p\ ^2P^o_{3/2}$	$2p^611d\ ^2D_{5/2}$	236 530	2 556 600					45
42.909	1/2	3/2	225 520	2 556 000					45
41.596	$2p^63s\ ^2S_{1/2}$	$2p^68p\ ^2P^o_{3/2}$	0	2 404 100					29, 45°
41.596	1/2	1/2	0	2 404 100					45
40.477	$2p^63s\ ^2S_{1/2}$	$2p^69p\ ^2P^o_{3/2}$	0	2 470 500					29, 45°
40.477	1/2	1/2	0	2 470 500					45
39.721	$2p^63s\ ^2S_{1/2}$	$2p^610p\ ^2P^o_{3/2}$	0	2 517 600					29, 45°
39.721	1/2	1/2	0	2 517 600					45
39.181	$2p^63s\ ^2S_{1/2}$	$2p^611p\ ^2P^o_{3/2}$	0	2 552 300					45
39.181	1/2	1/2	0	2 552 300					45
24.517	$2p^63s\ ^2S_{1/2}$	$2p^53s^2\ ^2P^o_{3/2}$	0	4 079 000					46
24.202	1/2	1/2	0	4 132 000					46

V XIV

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
720.456^C	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_0$	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	4 248 410	4 387 211		5.3 − 3	2.3+7	E	99*
508.625	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_2$	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	4 190 606	4 387 211	2	2.4 − 1	2.1+9	D	50°, 99*
379.694	1	0	4 202 700	4 466 070	2				50
471.884	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_2$	4 202 700	4 414 607	4				50
437.516	2	3	4 190 606	4 419 174	5	7.5 − 1	3.8+9	D	49, 50°, 99*
451.865	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_0$	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{3}{2}]_1$	4 248 410	4 469 715	2				50
434.887	1	2	4 257 100	4 487 045	3				49, 50°
442.779	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_1$	4 202 700	4 428 554	2				50
423.92	1	2	4 202 700	4 438 597	2				50
403.239	2	2	4 190 606	4 438 597	3				50
436.978	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{1}{2}]_1$	4 257 100	4 485 944	3bl				50
304.211	1	0	4 257 100	4 585 819	1				50
434.91^C	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_0$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{1}{2}]^o_1$	4 466 070	4 696 000		1.6 − 2	1.9+8	D−	99*
327.55^C	1	0	4 387 211	4 692 510		1.2 − 1	7.5+9	D	99*
323.85^C	1	1	4 387 211	4 696 000		2.9 − 1	6.2+9	D	99*
346.161^C	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_3$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_2$	4 419 174	4 708 057		2.8 − 2	3.1+8	E	99*
343.715	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_3$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{7}{2}]^o_4$	4 419 174	4 710 105	5	1.1	7.2+9	D	49, 50°, 99*
337.53	3	3	4 419 174	4 715 469	1				50
332.373	2	3	4 414 607	4 715 469	5				49, 50°
342.783^C	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_0$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_1$	4 466 070	4 757 800		1.9 − 1	3.7+9	D	99*
311.676	1	2	4 387 211	4 708 057	2	2.9 − 1	4.0+9	E	50°, 99*
340.954	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{3}{2}]^o_2$	4 485 944	4 779 239	3				50
340.392	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{5}{2}]^o_3$	4 438 597	4 732 377	3				49, 50°
336.177	1	2	4 428 554	4 726 016	2				50
339.852	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{5}{2}]^o_3$	4 487 045	4 781 291	4				49, 50°
328.342	1	2	4 469 715	4 774 275	3				49, 50°
109.67^C	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	$2s2p^63p\ ^3P^o_1$	4 387 211	5 299 000		8.1 − 2	1.5+10	E	99*
90.227	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{3}{2}]^o_1$	$2s^22p^5(^2P^o_{1/2})4f\ ^2[\frac{5}{2}]_2$	4 827 200	5 935 500	5				53
86.356	2	3	4 779 239	5 937 239	20				52, 53°
89.103	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_1$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{5}{2}]_2$	4 757 800	5 880 100	5				53
85.360	2	3	4 708 057	5 879 567	20				52, 53°
87.141	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{5}{2}]^o_3$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_4$	4 732 377	5 879 941	60				52, 53°
86.684	2	3	4 726 016	5 879 633	30				52, 53°
86.609	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{5}{2}]^o_3$	$2s^22p^5(^2P^o_{1/2})4f\ ^2[\frac{7}{2}]_4$	4 781 291	5 935 911	40				52, 53°
86.125	2	3	4 774 275	5 935 375	15				52, 53°
86.148	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{7}{2}]^o_3$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{9}{2}]_4$	4 715 469	5 876 259	80bl				52, 53°
85.758	4	5	4 710 105	5 876 175	60				52, 53°
85.899	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{7}{2}]^o_3$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_3$	4 715 469	5 879 633	10				53
85.482	4	4	4 710 105	5 879 941	15				52, 53°
84.757	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{1}{2}]^o_1$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{3}{2}]_2$	4 696 000	5 875 800	5				53
84.420	0	1	4 692 510	[5 877 442]	3				53
71.589	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_3$	4 438 597	5 835 457	5				51, 52, 53°
71.187	1	2	4 428 554	5 833 302	4				51, 53°
71.317	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_2$	4 485 944	5 888 124	2				51, 53°
71.290	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{1/2})4d\ ^2[\frac{5}{2}]^o_3$	4 487 045	5 889 775	4				51, 53°
70.573	1	2	4 469 715	5 886 695	2				51, 52, 53°
71.022	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_3$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{7}{2}]^o_4$	4 419 174	5 827 194	10				51, 52, 53°
70.677	2	3	4 414 607	5 829 497	5				51, 52, 53°

V XIV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
70.487	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_2$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_2$	4 414 607	5 833 302	1				52, 53°
69.726	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{1}{2}]^o_0$	4 387 211	5 821 381	2				53
69.609	$_1$	$_1$	4 387 211	5 823 811	1				53
65.571	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{1/2})4p\ ^2[\frac{3}{2}]_2$	4 257 100	5 782 170	1				53
65.330	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_2$	$2s^22p^5(^2P^o_{3/2})4p\ ^2[\frac{5}{2}]_3$	4 190 606	5 721 285	3				53
23.794	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	4 202 700		1.07 – 1	4.2+11	C–	47°, 99*
23.490	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	4 257 100		1.23 – 1	4.96+11	C–	47°, 99*
21.294	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{1}{2}]^o_1$	0	4 696 000		9.6 – 3	4.7+10	E	48°, 59, 99*
21.018	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_1$	0	4 757 800		3.8 – 1	1.9+12	D	47°, 99*
20.716	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{3}{2}]^o_1$	0	4 827 200		2.51	1.30+13	C–	47°, 99*
18.870	$2s^22p^6\ ^1S_0$	$2s2p^63p\ ^3P^o_1$	0	5 299 000	3				48
18.782	$2s^22p^6\ ^1S_0$	$2s2p^63p\ ^1P^o_1$	0	5 324 000	7				48°, 59
17.754	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})4s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	5 632 000	1				48
17.575	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})4s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	5 690 000	1				48
17.094	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_1$	0	5 850 000	4				48°, 59
16.939	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_1$	0	5 904 000	5				48°, 59
15.748	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})5d\ ^2[\frac{3}{2}]^o_1$	0	6 350 000	1				48
15.609	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})5d\ ^2[\frac{3}{2}]^o_1$	0	6 407 000	2				48

V XV

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1719.4	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^5\ ^2P^o_{1/2}$	0	58 093		M1	3.53+3	B	54°, 99*
122.005	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^6\ ^2S_{1/2}$	58 093	877 732		1.24 − 1	2.77+10	C+	55, 56, 57°, 99*
113.930	3/2	1/2	0	877 732		2.68 − 1	6.90+10	C+	55, 56, 57°, 99*
22.375	$2s2p^6\ ^2S_{1/2}$	$2s2p^5(^3P^o)3s\ ^2P^o_{3/2}$	877 732	5 347 000	16				58°, 59, 60
22.214	1/2	1/2	877 732	5 379 400	12				58
22.232	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3s\ ^4P_{1/2}$	58 093	4 556 100	6				58
22.192	3/2	5/2	0	4 506 100	18	1.3 − 2	3.0+10	E	58°, 59, 60, 99*
22.083	3/2	3/2	0	4 528 400	35				58°, 59, 60
22.192	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3s\ ^2P_{3/2}$	58 093	4 564 300	18				58
22.083	1/2	1/2	58 093	4 586 800	35	1.3 − 1	9.0+11	C−	58°, 99*
21.909	3/2	3/2	0	4 564 300	30				58°, 59, 60
21.800	3/2	1/2	0	4 586 800	20	1.12 − 1	7.9+11	C−	58°, 99*
21.832	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3s\ ^2D_{3/2}$	58 093	4 638 500	20	2.0 − 1	7.0+11	D	58°, 59, 60, 99*
21.568	3/2	5/2	0	4 636 500	30	2.6 − 1	6.2+11	D	58°, 59, 60, 99*
21.285	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1S)3s\ ^2S_{1/2}$	58 093	4 756 200	20	6.8 − 2	5.0+11	D	58°, 99*
21.019	3/2	1/2	0	4 756 200	40bl	3.0 − 2	2.3+11	E	58°, 99*
20.078	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3d\ ^4P_{3/2}$	58 093	5 039 000	20				58
19.888	3/2	1/2	0	5 028 200	15	1.2 − 1	9.8+11	E	58°, 99*
19.844	3/2	3/2	0	5 039 000	25				58
19.782	3/2	5/2	0	5 055 100	10				58
20.038	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3d\ ^2P_{1/2}$	58 093	5 048 600	3				58°, 60
19.903	1/2	3/2	58 093	5 082 500	18				58°, 60
19.80	3/2	1/2	0	5 048 600	5bl				58°, 60
19.671	3/2	3/2	0	5 082 500	9bl				58°, 60
19.988	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3d\ ^2D_{3/2}$	58 093	5 061 300	17				58
19.757	3/2	3/2	0	5 061 300	6				58°, 60
19.645	3/2	5/2	0	5 090 400	15				58°, 59, 60
19.844	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^4F_{5/2}$	0	5 039 300	25				58
19.725	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^2F_{5/2}$	0	5 069 700	8				58
19.671	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2S_{1/2}$	58 093	5 143 200	9bl	2.0 − 1	1.7+12	D	58°, 99*
19.443	3/2	1/2	0	5 143 200	25	9.6 − 1	8.5+12	D	58°, 99*
19.589	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2P_{3/2}$	58 093	5 163 000	15	3.6 − 1	1.6+12	D	58°, 99*
19.369[C]	3/2	3/2	0	5 163 000		2.5	1.1+13	D	99*
19.518	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2D_{3/2}$	58 093	5 181 800	35	2.0	8.8+12	D	58°, 99*
19.366	3/2	5/2	0	5 163 700	50				58°, 59, 60
19.298	3/2	3/2	0	5 181 800	30	3.9 − 1	1.8+12	D	58°, 99*
19.203	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1S)3d\ ^2D_{3/2}$	58 093	5 265 600	15	1.4	6.3+12	D	58°, 60, 99*
19.028	3/2	5/2	0	5 255 400	12	3.6 − 1	1.1+12	D	58°, 60, 99*
18.991[C]	3/2	3/2	0	5 265 600		2.2 − 2	1.0+11	E	99*

V XVI

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2042.7	$2s^22p^4\ ^3P_2$	$2s^22p^4\ ^3P_1$	0	48 937		M1	2.48+3	C+	54°, 99*
1386.9^C	$2s^22p^4\ ^3P_1$	$2s^22p^4\ ^1D_2$	48 937	121 039		M1	3.0+2	D	99*
826.180^C	2	2	0	121 039		M1	4.0+3	D	99*
529.9	$2s^22p^4\ ^3P_1$	$2s^22p^4\ ^1S_0$	48 937	237 705		M1	4.2+4	D	54°, 99*
178.191^C	$2s^22p^4\ ^1S_0$	$2s2p^5\ ^3P^o_1$	237 705	798 899		5.3 − 3	3.7+8	E	99*
156.060	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^3P^o_2$	121 039	761 824		2.1 − 2	1.1+9	E	57°, 99*
140.277	$2s^22p^4\ ^3P_1$	$2s2p^5\ ^3P^o_2$	48 937	761 824		1.29 − 1	8.7+9	C	55, 56, 57°, 99*
133.525	0	1	49 970	798 899		1.02 − 1	1.27+10	C	55, 56, 57°, 99*
133.338	1	1	48 937	798 899		8.07 − 2	1.01+10	C	55, 56, 57°, 99*
131.263	2	2	0	761 824		3.9 − 1	3.0+10	C	55, 56, 57°, 99*
129.195	1	0	48 937	822 961		1.13 − 1	4.52+10	C	55, 56, 57°, 99*
125.173	2	1	0	798 899		1.52 − 1	2.16+10	C	55, 56, 57°, 99*
138.168	$2s2p^5\ ^1P^o_1$	$2p^6\ ^1S_0$	1 045 590	1 769 360		3.72 − 1	1.30+11	C	57°, 63, 70, 99*
123.780	$2s^22p^4\ ^1S_0$	$2s2p^5\ ^1P^o_1$	237 705	1 045 590		6.2 − 2	9.0+9	C	55, 56, 57°, 99*
108.160	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^1P^o_1$	121 039	1 045 590		6.50 − 1	1.24+11	C	55, 56, 57°, 99*
103.043	$2s2p^5\ ^3P^o_1$	$2p^6\ ^1S_0$	798 899	1 769 360		6.3 − 3	4.0+9	E	57°, 99*
100.440	$2s^22p^4\ ^3P_0$	$2s2p^5\ ^1P^o_1$	49 970	1 045 590		3.2 − 3	7.1+8	E	57°, 99*
100.336^C	1	1	48 937	1 045 590		1.5 − 3	3.3+8	E	99*
95.640	2	1	0	1 045 590		2.8 − 2	6.7+9	E	57°, 99*
20.659	$2s^22p^4\ ^3P_0$	$2s^22p^3(^4S^o)3s\ ^3S^o_1$	49 970	4 891 000		5.0 − 2	2.6+11	C−	64, 65°, 99*
20.659	1	1	48 937	4 891 000		1.02 − 1	5.3+11	C−	64, 65°, 99*
20.444	2	1	0	4 891 000		2.7 − 1	1.4+12	C−	64, 65°, 99*
20.513	$2s^22p^4\ ^1S_0$	$2s^22p^3(^2P^o)3s\ ^1P^o_1$	237 705	5 113 000		1.5 − 1	7.9+11	D	64, 65°, 99*
20.444	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3s\ ^1D^o_2$	121 039	5 012 000		4.3 − 1	1.4+12	C−	64, 65°, 99*
20.278	$2s^22p^4\ ^3P_0$	$2s^22p^3(^2D^o)3s\ ^3D^o_1$	49 970	4 981 000		3.0 − 2	1.6+11	C−	64, 65°, 99*
20.278	1	2	48 937	4 980 000		6.0 − 2	1.9+11	D	64, 65°, 99*
20.28^C	1	1	48 937	4 981 000		9.9 − 2	5.4+11	C−	99*
20.079	2	2	0	4 980 000		1.5 − 1	4.8+11	D−	64, 65°, 99*
20.017	2	3	0	4 996 000		2.7 − 1	6.4+11	C−	64, 65°, 99*
20.21^C	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3s\ ^3P^o_2$	121 039	5 068 000		1.0 − 1	3.2+11	E	99*
20.15^C	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2D^o)3s\ ^1D^o_2$	48 937	5 012 000		3.9 − 2	1.3+11	E	99*
19.95^C	2	2	0	5 012 000		2.3 − 2	7.7+10	E	99*
20.03^C	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3s\ ^1P^o_1$	121 039	5 113 000		1.4 − 1	7.5+11	D	99*
19.92^C	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2P^o)3s\ ^3P^o_2$	48 937	5 068 000		1.1 − 1	3.5+11	D	99*
19.730	2	2	0	5 068 000		3.7 − 2	1.3+11	D−	64°, 99*
18.890	$2s^22p^4\ ^3P_1$	$2s^22p^3(^4S^o)3d\ ^3D^o_2$	48 937	5 343 000		3.9 − 1	1.5+12	D	64△, 67°, 99*
18.72^C	2	2	0	5 343 000		2.8 − 1	1.1+12	D	99*
18.689	2	3	0	5 351 000		1.30	3.55+12	C−	66, 67°, 99*
18.68^C	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3d\ ^3D^o_3$	121 039	5 475 000		5.5 − 2	1.5+11	E	99*
18.630	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3d\ ^1D^o_2$	121 039	5 489 000					64, 67°
18.525	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3d\ ^1F^o_3$	121 039	5 518 000		2.0	5.6+12	D	64, 66, 67°, 99*
18.492	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2D^o)3d\ ^3D^o_2$	48 937	5 457 000					66°, 67
18.265	2	3	0	5 475 000		3.6	1.0+13	C−	55, 66, 67°, 99*
18.265	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3d\ ^1F^o_3$	121 039	5 596 000					66, 67△, 68°
18.26	$2s^22p^4\ ^3P_2$	$2s^22p^3(^2D^o)3d\ ^3P^o_2$	0	5 476 000					64, 67°
18.123^C	$2s^22p^4\ ^3P_2$	$2s^22p^3(^2D^o)3d\ ^1F^o_3$	0	5 518 000		8.5 − 1	2.5+12	E	99*
18.12	$2s^22p^4\ ^3P_0$	$2s^22p^3(^2P^o)3d\ ^3D^o_1$	49 970	5 568 000					55, 67°
18.12	1	1	48 937	5 568 000					68
18.008	2	3	0	5 552 000					55, 64, 66, 67°

V XVII

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
5172.^{C}	$2s^22p^3\ ^2D^o_{3/2}$	$2s^22p^3\ ^2D^o_{5/2}$	120 930	140 260		M1	6.2+1	C	99*
3438.^{C}	$2s^22p^3\ ^2P^o_{1/2}$	$2s^22p^3\ ^2P^o_{3/2}$	211 420	240 500		M1	1.71+2	C	99*
1624.^{C}	$2p^5\ ^2P^o_{3/2}$	$2p^5\ ^2P^o_{1/2}$	1 636 530	1 698 100		M1	4.29+3	C+	99*
1105.^{C}	$2s^22p^3\ ^2D^o_{3/2}$	$2s^22p^3\ ^2P^o_{1/2}$	120 930	211 420		M1	2.4+3	D	99*
997.61^C	5/2	3/2	140 260	240 500		M1	3.3+3	D	99*
836.33^C	3/2	3/2	120 930	240 500		M1	9.0+3	D	99*
826.92^C	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^3\ ^2D^o_{3/2}$	0	120 930		M1	3.6+3	D	99*
712.96^C	3/2	5/2	0	140 260		M1	1.5+2	D−	99*
472.99^C	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^3\ ^2P^o_{1/2}$	0	211 420		M1	8.2+3	D−	99*
415.80^C	3/2	3/2	0	240 500		M1	1.1+4	D	99*
258.36^C	$2s^22p^3\ ^2P^o_{3/2}$	$2s(^2S)2p^4(^3P)\ ^4P_{5/2}$	240 500	627 560		1.2 − 3	2.0+7	E	99*
234.90^C	3/2	3/2	240 500	666 210		2.8 − 3	8.6+7	E	99*
212.69^C	1/2	1/2	211 420	681 580		8.8 − 4	6.5+7	E	99*
205.21^C	$2s^22p^3\ ^2D^o_{5/2}$	$2s(^2S)2p^4(^3P)\ ^4P_{5/2}$	140 260	627 560		3.9 − 3	1.0+8	E	99*
197.38^C	3/2	5/2	120 930	627 560		5.6 − 3	1.6+8	E	99*
183.39^C	3/2	3/2	120 930	666 210		4.4 − 4	2.2+7	E	99*
178.36^C	3/2	1/2	120 930	681 580		7.2 − 4	7.5+7	E	99*
184.05^C	$2s(^2S)2p^4(^3P)\ ^2P_{1/2}$	$2p^5\ ^2P^o_{3/2}$	1 093 200	1 636 530		4.40 − 2	2.17+9	C	99*
167.279	3/2	3/2	1 038 740	1 636 530		4.48 − 1	2.67+10	C	63, 67, 71°, 99*
165.322	1/2	1/2	1 093 200	1 698 100		2.16 − 1	2.64+10	C	63, 67, 71°, 99*
151.656	3/2	1/2	1 038 740	1 698 100		1.56 − 1	2.26+10	C	71°, 99*
159.65^C	$2s^22p^3\ ^2P^o_{3/2}$	$2s(^2S)2p^4(^1D)\ ^2D_{3/2}$	240 500	866 880		8.0 − 3	5.2+8	D	99*
158.143	3/2	5/2	240 500	872 820		1.12 − 1	5.0+9	C	63, 71°, 99*
152.566	1/2	3/2	211 420	866 880		3.82 − 2	2.74+9	C	56, 63, 71°, 99*
159.347	$2s^22p^3\ ^4S^o_{3/2}$	$2s(^2S)2p^4(^3P)\ ^4P_{5/2}$	0	627 560		2.5 − 1	1.1+10	C	55, 56, 63, 71°, 99*
150.103	3/2	3/2	0	666 210		1.81 − 1	1.34+10	C	55, 56, 63, 71°, 99*
146.719	3/2	1/2	0	681 580		9.52 − 2	1.47+10	C	56, 63, 71°, 99*
157.070	$2s(^2S)2p^4(^1S)\ ^2S_{1/2}$	$2p^5\ ^2P^o_{3/2}$	999 840	1 636 530		9.30 − 2	6.3+9	C	71°, 99*
143.21^C	1/2	1/2	999 840	1 698 100		2.8 − 3	4.6+8	D	99*
137.62^C	$2s^22p^3\ ^2D^o_{5/2}$	$2s(^2S)2p^4(^1D)\ ^2D_{3/2}$	140 260	866 880		5.1 − 3	4.5+8	E	99*
136.511	5/2	5/2	140 260	872 820		4.3 − 1	2.5+10	C	55, 56, 63, 71°, 99*
134.056	3/2	3/2	120 930	866 880		3.3 − 1	3.1+10	C	55, 56, 63, 71°, 99*
133.00^C	3/2	5/2	120 930	872 820		1.1 − 4	7.0+6	E	99*
131.687	$2s^22p^3\ ^2P^o_{3/2}$	$2s(^2S)2p^4(^1S)\ ^2S_{1/2}$	240 500	999 840		3.6 − 2	6.8+9	D	55, 69, 71°, 99*
126.832	1/2	1/2	211 420	999 840		1.4 − 1	2.9+10	C	55, 69, 71°, 99*
130.941	$2s(^2S)2p^4(^1D)\ ^2D_{5/2}$	$2p^5\ ^2P^o_{3/2}$	872 820	1 636 530		3.8 − 1	3.7+10	C	63, 67, 70, 71°, 99*
129.927	3/2	3/2	866 880	1 636 530		1.06 − 1	1.05+10	C	70, 71°, 99*
120.304	3/2	1/2	866 880	1 698 100		1.75 − 1	4.04+10	C	63, 67, 70, 71°, 99*
125.278	$2s^22p^3\ ^2P^o_{3/2}$	$2s(^2S)2p^4(^3P)\ ^2P_{3/2}$	240 500	1 038 740		8.28 − 2	8.8+9	C	56, 63, 71°, 99*
120.873	1/2	3/2	211 420	1 038 740		5.42 − 2	6.2+9	C	55, 56, 63, 71°, 99*
117.276	3/2	1/2	240 500	1 093 200		2.8 − 1	6.9+10	C	55, 56, 63, 71°, 99*
113.406	1/2	1/2	211 420	1 093 200		2.02 − 2	5.2+9	C	56, 63, 71°, 99*
115.36^C	$2s^22p^3\ ^4S^o_{3/2}$	$2s(^2S)2p^4(^1D)\ ^2D_{3/2}$	0	866 880		2.6 − 3	3.3+8	E	99*
113.785	$2s^22p^3\ ^2D^o_{3/2}$	$2s(^2S)2p^4(^1S)\ ^2S_{1/2}$	120 930	999 840		1.1 − 1	2.9+10	E	69, 71°, 99*
111.299	$2s^22p^3\ ^2D^o_{5/2}$	$2s(^2S)2p^4(^3P)\ ^2P_{3/2}$	140 260	1 038 740		6.00 − 1	8.08+10	C	55, 56, 63, 71°, 99*
108.952	3/2	3/2	120 930	1 038 740		1.08 − 1	1.51+10	C	56, 63, 71°, 99*
102.854	3/2	1/2	120 930	1 093 200		1.02 − 1	3.22+10	C	55, 56, 63, 71°, 99*
104.72^C	$2s(^2S)2p^4(^3P)\ ^4P_{1/2}$	$2p^5\ ^2P^o_{3/2}$	681 580	1 636 530		1.1 − 3	1.6+8	E	99*
103.06^C	3/2	3/2	666 210	1 636 530		3.1 − 3	4.9+8	E	99*
99.111^C	5/2	3/2	627 560	1 636 530		7.2 − 3	1.2+9	E	99*
98.375^C	1/2	1/2	681 580	1 698 100		1.2 − 3	4.1+8	E	99*
100.02^C	$2s^22p^3\ ^4S^o_{3/2}$	$2s(^2S)2p^4(^1S)\ ^2S_{1/2}$	0	999 840		1.9 − 3	6.3+8	E	99*

V XVII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
96.270	$2s^22p^3\ ^4S^o_{3/2}$	$2s(^2S)2p^4(^3P)\ ^2P_{3/2}$	0	1 038 740	1	9.6 – 3	1.7+9	E	71°, 99*
91.475[C]	3/2	1/2	0	1 093 200		4.0 – 4	1.6+8	E	99*
17.644	$2s^22p^3\ ^2D^o_{3/2}$	$2s^22p^2(^3P)3d\ ^2F_{5/2}$	120 930	5 789 000	4				66
17.536	5/2	7/2	140 260	5 843 000	3				66°, 67
17.490	$2s^22p^3\ ^2P^o_{3/2}$	$2s^22p^2(^1D)3d\ ^2D_{5/2}$	240 500	5 958 000	3				66°, 67
17.373	$2s^22p^3\ ^2D^o_{5/2}$	$2s^22p^2(^3P)3d\ ^2D_{5/2}$	140 260	5 897 000	4				66°, 67
17.259	$2s^22p^3\ ^2D^o_{5/2}$	$2s^22p^2(^1D)3d\ ^2F_{7/2}$	140 260	5 934 000	6				55, 66°, 67
17.16	3/2	5/2	120 930	5 948 000	1bl				67
17.158	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^2(^3P)3d\ ^4P_{3/2}$	0	5 828 000	1				66°, 67
17.158	3/2	5/2	0	5 828 000	1				66°, 67

V XVIII

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
$3307.^{C}$	$2s^22p^2\ ^3P_1$	$2s^22p^2\ ^3P_2$	37 960	68 190		M1	3.24+2	C+	99*
$2634.^{C}$	0	1	0	37 960		M1	9.21+2	E	99*
1078.2	$2s^22p^2\ ^3P_2$	$2s^22p^2\ ^1D_2$	68 190	160 910		M1	3.7+3	D+	54°, 99*
813.34^{C}	1	2	37 960	160 910		M1	3.2+3	D	99*
434.2^{T}	$2s^22p^2\ ^3P_1$	$2s^22p^2\ ^1S_0$	37 960	[269 000]		M1	4.3+4	D	54°, 99*
334.81^{C}	$2s^22p^2\ ^3P_2$	$2s(^2S)2p^3(^4S^\circ)\ ^5S^\circ_2$	68 190	[366 870]		1.0 − 3	1.2+7	E	99*
304.03^{C}	1	2	37 960	[366 870]		6.3 − 4	9.1+6	E	99*
290.45^{C}	$2s(^2S)2p^3(^2P^\circ)\ ^1P^\circ_1$	$2p^4\ ^3P_2$	1 014 420	1 358 710		4.8 − 3	7.6+7	E	99*
252.30^{C}	1	1	1 014 420	1 410 770		1.0 − 2	3.6+8	E	99*
280.87^{C}	$2s^22p^2\ ^1S_0$	$2s(^2S)2p^3(^2D^\circ)\ ^3D^\circ_1$	[269 000]	625 040		1.0 − 3	2.8+7	E	99*
222.08^{C}	$2s(^2S)2p^3(^2D^\circ)\ ^1D^\circ_2$	$2p^4\ ^3P_2$	908 420	1 358 710		1.9 − 2	5.1+8	E	99*
199.06^{C}	2	1	908 420	1 410 770		1.6 − 3	9.0+7	E	99*
216.69	$2s(^2S)2p^3(^4S^\circ)\ ^3S^\circ_1$	$2p^4\ ^3P_2$	897 330	1 358 710		2.1 − 1	6.0+9	C	72°, 99*
194.76^{C}	1	1	897 330	1 410 770		1.7 − 1	9.8+9	C	99*
192.76^{C}	1	0	897 330	1 416 110		6.93 − 2	1.24+10	C	99*
216.01^{C}	$2s^22p^2\ ^1D_2$	$2s(^2S)2p^3(^2D^\circ)\ ^3D^\circ_2$	160 910	623 860		1.1 − 3	3.0+7	E	99*
215.46^{C}	2	1	160 910	625 040		1.9 − 3	8.8+7	E	99*
210.95^{C}	2	3	160 910	634 950		2.2 − 2	4.6+8	E	99*
214.63^{C}	$2s(^2S)2p^3(^2P^\circ)\ ^1P^\circ_1$	$2p^4\ ^1D_2$	1 014 420	1 480 330		1.31 − 1	3.79+9	C	99*
214.40^{C}	$2s^22p^2\ ^1S_0$	$2s(^2S)2p^3(^2P^\circ)\ ^3P^\circ_1$	[269 000]	735 420		1.8 − 3	8.7+7	E	99*
179.96^{C}	$2s^22p^2\ ^3P_2$	$2s(^2S)2p^3(^2D^\circ)\ ^3D^\circ_2$	68 190	623 860		9.5 − 4	3.9+7	E	99*
179.58^{C}	2	1	68 190	625 040		2.7 − 4	1.8+7	E	99*
176.440	2	3	68 190	634 950		1.82 − 1	5.6+9	C	63, 67, 73°, 99*
170.678	1	2	37 960	623 860		1.6 − 1	7.4+9	C	63, 67, 73°, 99*
170.33^{C}	1	1	37 960	625 040		1.6 − 2	1.2+9	D	99*
159.991	0	1	0	625 040		8.7 − 2	7.6+9	C	63, 67, 72, 73°, 99*
174.852	$2s(^2S)2p^3(^2D^\circ)\ ^1D^\circ_2$	$2p^4\ ^1D_2$	908 420	1 480 330		6.60 − 1	2.88+10	C	72, 73°, 99*
174.06^{C}	$2s^22p^2\ ^1D_2$	$2s(^2S)2p^3(^2P^\circ)\ ^3P^\circ_1$	160 910	735 420		3.3 − 3	2.4+8	E	99*
171.69^{C}	2	2	160 910	743 350		3.4 − 3	1.5+8	E	99*
162.53	$2s(^2S)2p^3(^2P^\circ)\ ^3P^\circ_2$	$2p^4\ ^3P_2$	743 350	1 358 710		6.95 − 2	3.51+9	C	72°, 99*
160.40	1	2	735 420	1 358 710		5.82 − 2	3.02+9	C	72°, 99*
149.86	2	1	743 350	1 410 770		1.21 − 1	1.2+10	C	72°, 99*
148.07^{C}	1	1	735 420	1 410 770		4.8 − 4	4.9+7	E	99*
147.30	0	1	731 870	1 410 770		3.67 − 2	3.76+9	C	72°, 99*
146.91^{C}	1	0	735 420	1 416 110		5.16 − 2	1.59+10	C	99*
159.15^{C}	$2s^22p^2\ ^1S_0$	$2s(^2S)2p^3(^4S^\circ)\ ^3S^\circ_1$	[269 000]	897 330		3.5 − 3	3.0+8	E	99*
152.933	$2s(^2S)2p^3(^2P^\circ)\ ^1P^\circ_1$	$2p^4\ ^1S_0$	1 014 420	1 668 300		2.3 − 1	6.7+10	C	72, 73°, 99*
149.86	$2s^22p^2\ ^3P_2$	$2s(^2S)2p^3(^2P^\circ)\ ^3P^\circ_1$	68 190	735 420		3.7 − 2	3.6+9	D	63△, 72°, 99*
148.113	2	2	68 190	743 350		2.5 − 1	1.5+10	C	63, 67, 69, 72, 73°, 99*
144.111	1	0	37 960	731 870		5.61 − 2	1.8+10	C	63, 72, 73°, 99*
143.377	1	1	37 960	735 420		9.36 − 2	1.01+10	C	63, 72, 73°, 99*
141.73	1	2	37 960	743 350		1.3 − 2	8.8+8	D	63°, 99*
136.00	0	1	0	735 420		3.27 − 2	3.93+9	C	63°, 72, 99*
138.168	$2s(^2S)2p^3(^2D^\circ)\ ^3D^\circ_3$	$2p^4\ ^3P_2$	634 950	1 358 710		3.9 − 1	2.7+10	C	67, 73°, 99*
136.30^{C}	1	2	625 040	1 358 710		2.6 − 2	1.9+9	D	99*
136.08^{C}	2	2	623 860	1 358 710		1.48 − 1	1.06+10	C	99*
127.27	1	1	625 040	1 410 770		9.03 − 2	1.24+10	C	67°, 99*
127.079	2	1	623 860	1 410 770		1.47 − 1	2.02+10	C	67, 73°, 99*
126.411	1	0	625 040	1 416 110		7.44 − 2	3.11+10	C	73°, 99*
135.69^{C}	$2s(^2S)2p^3(^2P^\circ)\ ^3P^\circ_2$	$2p^4\ ^1D_2$	743 350	1 480 330		8.5 − 3	6.2+8	E	99*
134.24^{C}	1	2	735 420	1 480 330		6.6 − 3	4.9+8	E	99*
134.1	$2s^22p^2\ ^1S_0$	$2s(^2S)2p^3(^2P^\circ)\ ^1P^\circ_1$	[269 000]	1 014 420		1.17 − 1	1.45+10	C	63°, 99*
133.778	$2s^22p^2\ ^1D_2$	$2s(^2S)2p^3(^2D^\circ)\ ^1D^\circ_2$	160 910	908 420		5.50 − 1	4.10+10	C	63, 67, 69, 73°, 99*

V XVIII – Continued

Wavelength (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
129.71^C	$2s(^2S)2p^3(^4S^o)\ ^3S^o_1$	$2p^4\ ^1S_0$	897 330	1 668 300		9.3 – 3	3.7+9	E	99*
120.607	$2s^22p^2\ ^3P_2$	$2s(^2S)2p^3(^4S^o)\ ^3S^o_1$	68 190	897 330		3.3 – 1	5.0+10	C	63, 67, 69, 73°, 99*
116.365	1	1	37 960	897 330		1.44 – 1	2.37+10	C	63, 67, 69, 73°, 99*
111.442	0	1	0	897 330		4.73 – 2	8.5+9	C	63, 67, 69, 73°, 99*
119.015	$2s^22p^2\ ^3P_2$	$2s(^2S)2p^3(^2D^o)\ ^1D^o_2$	68 190	908 420		4.4 – 2	4.1+9	E	73°, 99*
114.88^C	1	2	37 960	908 420		1.8 – 3	1.8+8	E	99*
118.29^C	$2s(^2S)2p^3(^2D^o)\ ^3D^o_3$	$2p^4\ ^1D_2$	634 950	1 480 330		3.0 – 2	2.9+9	E	99*
116.76^C	2	2	623 860	1 480 330		4.5 – 3	4.4+8	E	99*
117.163	$2s^22p^2\ ^1D_2$	$2s(^2S)2p^3(^2P^o)\ ^1P^o_1$	160 910	1 014 420		3.5 – 1	5.6+10	C	63, 67, 69, 73°, 99*
107.19^C	$2s(^2S)2p^3(^2P^o)\ ^3P^o_1$	$2p^4\ ^1S_0$	735 420	1 668 300		3.0 – 3	1.7+9	E	99*
102.410	$2s^22p^2\ ^3P_1$	$2s(^2S)2p^3(^2P^o)\ ^1P^o_1$	37 960	1 014 420		1.3 – 2	2.8+9	E	73°, 99*
17.717	$2s^22p^2\ ^1D_2$	$2s^22p3s\ ^1P^o_1$	160 910	5 805 000	1				74
17.678	$2s^22p^2\ ^3P_2$	$2s^22p3s\ ^3P^o_1$	68 190	5 726 000	4bl				74
17.482	2	2	68 190	5 786 000	8bl				74
17.400	1	2	37 960	5 786 000	9bl				74
17.545	$2s(^2S)2p^3(^2D^o)\ ^3D^o_2$	$2s2p^2(^2D)3s\ ^3D_2$	623 860	6 323 300	2				74
17.442	$2s(^2S)2p^3(^4S^o)\ ^5S^o_2$	$2s2p^2(^4P)3s\ ^5P_3$	[366 870]	6 100 000?	4				74
17.018	$2s(^2S)2p^3(^2D^o)\ ^3D^o_2$	$2s2p^2(^4P)3d\ ^3F_3$	623 860	6 500 000	2				74
16.914	$2s^22p^2\ ^1D_2$	$2s^22p3d\ ^3F^o_2$	160 910	6 073 000					76
16.787	$2s^22p^2\ ^1S_0$	$2s^22p3d\ ^1P^o_1$	[269 000]	6 226 000	3				74$^\triangle$, 76°
16.558	$2s(^2S)2p^3(^2D^o)\ ^3D^o_3$	$2s2p^2(^2D)3d\ ^3F_4$	634 950	6 674 000	7				66, 74°
16.467	$2s^22p^2\ ^1D_2$	$2s^22p3d\ ^1F^o_3$	160 910	6 234 000	8				66, 67, 74°
16.378	$2s^22p^2\ ^3P_2$	$2s^22p3d\ ^3D^o_3$	68 190	6 174 000	bl	3.1	1.1+13	E	66, 67°, 74, 99*
16.32^C	$2s^22p^2\ ^3P_2$	$2s^22p3d\ ^3P^o_1$	68 190	6 195 000		3.5 – 1	2.9+12	E	99*
16.24^C	1	1	37 960	6 195 000		6.9 – 1	5.8+12	E	99*

V XIX

Wavelength (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1457.6	$2s^22p\ ^2P^o_{1/2}$	$2s^22p\ ^2P^o_{3/2}$	0	68 610		M1	2.9+3	B	54°, 99*
438.0^C	$2s2p^2\ ^2P_{3/2}$	$2p^3\ ^4S^o_{3/2}$	802 560	1 030 850+x		1.7 − 3	1.4+7	E	99*
306.8^C	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^4P_{5/2}$	68 610	394 560+x		1.8 − 3	2.2+7	E	99*
301.0^C	$1/2$	$1/2$	0	332 180+x		7.8 − 4	2.9+7	E	99*
285.4^C	$2s2p^2\ ^2P_{3/2}$	$2p^3\ ^2D^o_{3/2}$	802 560	1 152 900		3.2 − 3	6.5+7	E	99*
275.1^C	$3/2$	$5/2$	802 560	1 166 100		1.89 − 1	2.78+9	C	99*
230.8^C	$2s2p^2\ ^2D_{3/2}$	$2p^3\ ^4S^o_{3/2}$	597 590	1 030 850+x		7.2 − 4	2.3+7	E	99*
204.0^C	$2s2p^2\ ^2P_{3/2}$	$2p^3\ ^2P^o_{1/2}$	802 560	1 292 800		2.9 − 2	2.3+9	D	99*
198.51	$1/2$	$1/2$	788 850	1 292 800					72
193.93	$3/2$	$3/2$	802 560	1 318 200		3.1 − 1	1.4+10	C	72°, 99*
189.04^C	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^2D_{3/2}$	68 610	597 590		3.3 − 3	1.6+8	E	99*
186.32	$3/2$	$5/2$	68 610	605 320		1.54 − 1	4.92+9	C	63, 67°, 99*
167.34	$1/2$	$3/2$	0	597 590		1.2 − 1	7.3+9	C	63, 67°, 99*
182.6^C	$2s2p^2\ ^2D_{5/2}$	$2p^3\ ^2D^o_{3/2}$	605 320	1 152 900		7.08 − 2	3.54+9	C	99*
180.07	$3/2$	$3/2$	597 590	1 152 900		1.33 − 1	6.9+9	C	72°, 99*
178.32	$5/2$	$5/2$	605 320	1 166 100		2.98 − 1	1.04+10	C	72°, 99*
175.9^C	$3/2$	$5/2$	597 590	1 166 100		5.52 − 2	1.98+9	C	99*
166.19	$2s2p^2\ ^2S_{1/2}$	$2p^3\ ^2P^o_{3/2}$	716 370	1 318 200					72
157.17	$2s2p^2\ ^4P_{5/2}$	$2p^3\ ^4S^o_{3/2}$	394 560+x	1 030 850+x		2.44 − 1	1.64+10	C	67°, 99*
149.42	$3/2$	$3/2$	361 600+x	1 030 850+x		1.68 − 1	1.25+10	C	67°, 99*
143.13	$1/2$	$3/2$	332 180+x	1 030 850+x		9.12 − 2	7.4+9	C	67°, 99*
143.82	$2s2p^2\ ^2D_{3/2}$	$2p^3\ ^2P^o_{1/2}$	597 590	1 292 800		1.35 − 1	2.18+10	C	72°, 99*
140.25	$5/2$	$3/2$	605 320	1 318 200		1.43 − 1	1.21+10	C	72°, 99*
138.78	$3/2$	$3/2$	597 590	1 318 200		4.44 − 2	3.84+9	C	72°, 99*
139.59	$2s^22p\ ^2P^o_{1/2}$	$2s2p^2\ ^2S_{1/2}$	0	716 370					63, 67°
138.84	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^2P_{1/2}$	68 610	788 850					63, 67°
136.25	$3/2$	$3/2$	68 610	802 560		3.8 − 1	3.4+10	C	63, 67°, 99*, 101
124.60^C	$1/2$	$3/2$	0	802 560		5.06 − 2	5.4+9	C	63$^\triangle$, 99*
129.6^C	$2s2p^2\ ^4P_{5/2}$	$2p^3\ ^2D^o_{5/2}$	394 560+x	1 166 100		1.0 − 2	6.7+8	E	99*
126.4^C	$3/2$	$3/2$	361 600+x	1 152 900		6.0 − 3	6.3+8	E	99*
108.3^C	$2s2p^2\ ^4P_{5/2}$	$2p^3\ ^2P^o_{3/2}$	394 560+x	1 318 200		6.0 − 4	8.6+7	E	99*
104.5^C	$3/2$	$3/2$	361 600+x	1 318 200		1.0 − 3	1.6+8	E	99*
104.1^C	$1/2$	$1/2$	332 180+x	1 292 800		3.6 − 4	1.1+8	E	99*
16.007	$2s2p^2\ ^2D_{3/2}$	$2s2p(^3P^o)3d\ ^2F^o_{5/2}$	597 590	6 845 000	4				66°, 67
15.924	$5/2$	$7/2$	605 320	6 885 000	4				66°, 67
15.73^C	$2s^22p\ ^2P^o_{3/2}$	$2s^23d\ ^2D_{3/2}$	68 610	6 427 000		2.6 − 1	1.7+12	D	99*
15.702	$3/2$	$5/2$	68 610	6 437 000	3	2.3	1.0+13	D	66°, 67, 99*
15.560	$1/2$	$3/2$	0	6 427 000	3	1.3	9.0+12	D	66°, 67, 99*
15.63	$2s2p^2\ ^4P_{5/2}$	$2s2p(^3P^o)3d\ ^4D^o_{7/2}$	394 560+x	6 792 000+x	3bl				67
15.63	$2s2p^2\ ^4P_{5/2}$	$2s2p(^3P^o)3d\ ^4P^o_{5/2}$	394 560+x	6 792 000+x	3bl				67
15.495	$2s2p^2\ ^2D_{5/2}$	$2s2p(^1P^o)3d\ ^2F^o_{7/2}$	605 320	7 059 000	3				66°, 67
15.333	$2s^22p\ ^2P^o_{3/2}$	$2s2p(^3P^o)3p\ ^2P_{3/2}$	68 610	6 590 000	3				66°, 67
15.039	$2s^22p\ ^2P^o_{3/2}$	$2s2p(^3P^o)3p\ ^2D_{5/2}$	68 610	6 718 000	6				66°, 67
14.636	$2s^22p\ ^2P^o_{3/2}$	$2s2p(^1P^o)3p\ ^2D_{5/2}$	68 610	6 901 000	2				66

V XX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
5127.^{C}	$2s2p\ ^3P^o_0$	$2s2p\ ^3P^o_1$	303 100	322 600		M1	1.29+2	C+	99*
1908.^{C}	$_1$	$_2$	322 600	375 000		M1	1.91+3	C+	99*
3154.^{C}	$2p^2\ ^3P_1$	$2p^2\ ^3P_2$	856 900	888 600		M1	3.53+2	C	99*
2717.^{C}	$_0$	$_1$	820 100	856 900		M1	8.3+2	C	99*
1064.^{C}	$2p^2\ ^3P_2$	$2p^2\ ^1D_2$	888 600	982 600		M1	4.1+3	D+	99*
795.5^{C}	$_1$	$_2$	856 900	982 600		M1	4.1+3	D+	99*
686.8^{C}	$2s3p\ ^1P^o_1$	$2s3d\ ^1D_2$	6 964 000	7 109 600		1.6 − 1	4.5+8	E	99*
519.2^{C}	$2s2p\ ^1P^o_1$	$2p^2\ ^3P_0$	627 500	820 100		6.3 − 4	1.6+7	E	99*
435.9^{C}	$_1$	$_1$	627 500	856 900		2.5 − 4	2.9+6	E	99*
383.0^{C}	$_1$	$_2$	627 500	888 600		1.6 − 2	1.5+8	D	99*
396.0^{C}	$2s2p\ ^3P^o_2$	$2s2p\ ^1P^o_1$	375 000	627 500		M1	4.5+3	D	99*
328.0^{C}	$_1$	$_1$	322 600	627 500		M1	4.8+3	D−	99*
308.3^{C}	$_0$	$_1$	303 100	627 500		M1	7.7+3	D−	99*
311.8^{C}	$2p^2\ ^3P_1$	$2p^2\ ^1S_0$	856 900	1 177 600		M1	6.2+4	D	99*
310.0^{C}	$2s^2\ ^1S_0$	$2s2p\ ^3P^o_1$	0	322 600		8.3 − 4	1.9+7	D	99*
281.62	$2s2p\ ^1P^o_1$	$2p^2\ ^1D_2$	627 500	982 600		1.94 − 1	3.26+9	B	72°, 99*
207.51	$2s2p\ ^3P^o_2$	$2p^2\ ^3P_1$	375 000	856 900		7.40 − 2	3.82+9	B	72°, 99*
201.02	$_1$	$_0$	322 600	820 100		6.21 − 2	1.03+10	B	72°, 99*
194.74	$_2$	$_2$	375 000	888 600		2.04 − 1	7.18+9	B	72°, 99*
187.17	$_1$	$_1$	322 600	856 900		4.89 − 2	3.10+9	B	72°, 99*
180.58	$_0$	$_1$	303 100	856 900		6.88 − 2	4.69+9	B	72°, 99*
176.68	$_1$	$_2$	322 600	888 600		8.94 − 2	3.82+9	B	72°, 99*
181.78	$2s2p\ ^1P^o_1$	$2p^2\ ^1S_0$	627 500	1 177 600		1.23 − 1	2.48+10	B	72°, 99*
164.59	$2s2p\ ^3P^o_2$	$2p^2\ ^1D_2$	375 000	982 600		4.2 − 2	2.1+9	C	72°, 99*
151.5^{C}	$_1$	$_2$	322 600	982 600		2.9 − 3	1.7+8	D	99*
159.355^{P}	$2s^2\ ^1S_0$	$2s2p\ ^1P^o_1$	0	627 500		1.69 − 1	1.48+10	B	77°, 99*
15.639	$2p^2\ ^1S_0$	$2p3d\ ^1P^o_1$	1 177 600	7 571 900		1.29	1.17+13	C−	80°, 99*
15.526^{C}	$2p^2\ ^1D_2$	$2p3d\ ^1D^o_2$	982 600	7 423 300		3.0 − 1	1.7+12	C−	99*
15.427	$2s2p\ ^1P^o_1$	$2s3d\ ^1D_2$	627 500	7 109 600		1.8	1.0+13	C−	67, 78, 79, 80°, 99*
15.336	$2p^2\ ^3P_2$	$2p3d\ ^3F^o_3$	888 600	7 409 200		7.0 − 1	2.8+12	C−	80°, 99*
15.332^{C}	$2p^2\ ^1D_2$	$2p3d\ ^3P^o_2$	982 600	7 505 000		4.5 − 1	2.6+12	C−	99*
15.303^{C}	$2p^2\ ^3P_2$	$2p3d\ ^1D^o_2$	888 600	7 423 300		1.1 − 1	6.3+11	C−	99*
15.229	$_1$	$_2$	856 900	7 423 300		1.1	6.4+12	D	80°, 99*
15.272^{C}	$2p^2\ ^3P_2$	$2p3d\ ^3D^o_1$	888 600	7 436 500		6.5 − 3	6.2+10	D	99*
15.198^{C}	$_1$	$_1$	856 900	7 436 500		3.0 − 1	2.9+12	C−	99*
15.187^{C}	$_2$	$_2$	888 600	7 473 300		1.3 − 1	7.5+11	D	99*
15.141	$_2$	$_3$	888 600	7 493 200		3.5	1.5+13	C−	66, 67, 79, 80°, 99*
15.114	$_1$	$_2$	856 900	7 473 300		1.36	7.9+12	C−	67, 80°, 99*
15.114	$_0$	$_1$	820 100	7 436 500		1.28	1.25+13	C−	80°, 99*
15.216	$2p^2\ ^1D_2$	$2p3d\ ^1F^o_3$	982 600	7 554 600		5.25	2.16+13	C−	66, 67, 79, 80°, 99*
15.176^{C}	$2p^2\ ^1D_2$	$2p3d\ ^1P^o_1$	982 600	7 571 900		7.5 − 2	7.2+11	D	99*
15.114	$2p^2\ ^3P_2$	$2p3d\ ^3P^o_2$	888 600	7 505 000		1.44	8.4+12	C−	80°, 99*
15.042^{C}	$_1$	$_2$	856 900	7 505 000		1.5 − 1	8.8+11	D	99*
14.989^{C}	$2s2p\ ^3P^o_2$	$2s3d\ ^3D_1$	375 000	7 046 600		3.6 − 2	3.6+11	C−	99*
14.987^{C}	$_2$	$_2$	375 000	7 047 500		5.5 − 1	3.3+12	C−	99*
14.976	$_2$	$_3$	375 000	7 052 400		3.0	1.3+13	C−	66°, 67, 78, 79, 99*
14.872^{C}	$_1$	$_1$	322 600	7 046 600		5.4 − 1	5.4+12	C−	99*
14.870	$_1$	$_2$	322 600	7 047 500		1.7	1.0+13	C−	66, 67, 78, 79, 80°, 99*
14.829	$_0$	$_1$	303 100	7 046 600		7.4 − 1	7.5+12	C−	80°, 99*
14.759^{C}	$2s2p\ ^1P^o_1$	$2p3p\ ^3P_2$	627 500	7 402 900		1.4 − 1	8.6+11	D	99*

V XX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
14.649	$2s2p\ ^1P^o_1$	$2p3p\ ^1D_2$	627 500	7 453 900		7.2 − 1	4.5+12	C−	78, 79, 80°, 99*
14.401	$2s^2\ ^1S_0$	$2s3p\ ^3P^o_1$	0	6 943 800		3.1 − 1	3.3+12	C−	80°, 99*
14.387[C]	$2s2p\ ^3P^o_2$	$2p3p\ ^3D_2$	375 000	7 325 900		3.2 − 2	2.0+11	D	99*
14.279	1	2	322 600	7 325 900		4.5 − 1	2.9+12	C−	78, 79, 80°, 99*
14.279	2	3	375 000	7 378 300		7.0 − 1	3.3+12	C−	66, 67, 78, 80°, 99*
14.360	$2s^2\ ^1S_0$	$2s3p\ ^1P^o_1$	0	6 964 000		3.8 − 1	4.1+12	C−	66, 67, 78, 79, 80°, 99*
14.229	$2s2p\ ^3P^o_2$	$2p3p\ ^3P_2$	375 000	7 402 900		4.9 − 1	3.2+12	C−	66, 80°, 99*
14.124[C]	1	2	322 600	7 402 900		3.9 − 2	2.6+11	D	99*
11.615	$2s2p\ ^1P^o_1$	$2s4d\ ^1D_2$	627 500	9 237 100	1				80
11.523	$2p^2\ ^1D_2$	$2p4d\ ^1F^o_3$	982 600	9 660 900	4				80
11.523	$2p^2\ ^3P_2$	$2p4d\ ^3F^o_3$	888 600	9 567 000					80
11.478	$2p^2\ ^3P_1$	$2p4d\ ^3D^o_2$	856 900	9 569 200	1				80
11.427	0	1	820 100	9 571 300	4bl				80
11.427	2	3	888 600	9 639 800	4bl				80
11.427	$2p^2\ ^3P_2$	$2p4d\ ^3P^o_2$	888 600	9 639 800	4bl				80
11.378	$2p^2\ ^3P_1$	$2p4d\ ^1D^o_2$	856 900	9 645 800	1				80
11.308	$2s2p\ ^3P^o_2$	$2s4d\ ^3D_3$	375 000	9 218 300	2				80
11.243	1	2	322 600	9 217 000	3				80
11.215	0	1	303 100	9 219 700	1				80
10.941	$2s^2\ ^1S_0$	$2s4p\ ^1P^o_1$	0	9 140 000		1.6 − 1	3.0+12	D	80°, 99*
10.838	$2s2p\ ^3P^o_2$	$2p4p\ ^3D_3$	375 000	9 601 800	1				80

V XXI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1324.5^{C}	$1s^22p\ ^2P^o_{1/2}$	$1s^22p\ ^2P^o_{3/2}$	340 435	415 935		M1	3.87+3	B	99*
293.74^{S}	$1s^22s\ ^2S_{1/2}$	$1s^22p\ ^2P^o_{1/2}$	0	340 435		4.04 − 2	1.56+9	B+	81°, 99*
240.42^{S}	$_{1/2}$	$_{3/2}$	0	415 935		9.96 − 2	2.87+9	B+	72, 81°, 99*
90.358^{C}	$1s^24p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	[9 614 130]	[10 720 840]		2.3 − 1	4.8+10	D	99*
90.234^{C}	$_{3/2}$	$_{5/2}$	[9 614 130]	[10 722 360]		2.08	2.89+11	C+	99*
89.594^{C}	$_{1/2}$	$_{3/2}$	[9 604 690]	[10 720 840]		1.15	2.41+11	C+	99*
48.52^{C}	$1s^24p\ ^2P^o_{3/2}$	$1s^27d\ ^2D_{5/2}$	[9 614 130]	11 675 000		2.21 − 1	1.05+11	C+	99*
48.52^{C}	$_{3/2}$	$_{3/2}$	[9 614 130]	11 675 000		2.4 − 2	1.8+10	D	99*
48.30^{C}	$_{1/2}$	$_{3/2}$	[9 604 690]	11 675 000		1.23 − 1	8.79+10	C+	99*
42.9183^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	[7 235 050]	[9 565 060]					
42.5100^{C}	$_{1/2}$	$_{1/2}$	[7 212 670]	[9 565 060]					
41.7676^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	[7 235 050]	[9 629 250]		2.3 − 1	2.2+11	C+	99*
41.7159^{C}	$_{3/2}$	$_{5/2}$	[7 235 050]	[9 632 220]		2.1	1.4+12	B	99*
41.3808^{C}	$_{1/2}$	$_{3/2}$	[7 212 670]	[9 629 250]		1.2	1.1+12	B	99*
40.2194^{C}	$1s^23s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	[7 118 330]	[9 604 690]					
40.0673^{C}	$_{1/2}$	$_{3/2}$	[7 118 330]	[9 614 130]					
28.9604^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	[7 235 050]	[10 688 040]					
28.7739^{C}	$_{1/2}$	$_{1/2}$	[7 212 670]	[10 688 040]					
28.6879^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	[7 235 050]	[10 720 840]		5.6 − 2	1.1+11	D	99*
28.6754^{C}	$_{3/2}$	$_{5/2}$	[7 235 050]	[10 722 360]		4.96 − 1	6.68+11	C+	99*
28.5049^{C}	$_{1/2}$	$_{3/2}$	[7 212 670]	[10 720 840]		2.76 − 1	5.67+11	C+	99*
24.51^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^26d\ ^2D_{5/2}$	[7 235 050]	11 315 000		2.00 − 1	3.70+11	C+	99*
24.51^{C}	$_{3/2}$	$_{3/2}$	[7 235 050]	11 315 000		2.2 − 2	6.2+10	D	99*
24.38^{C}	$_{1/2}$	$_{3/2}$	[7 212 670]	11 315 000		1.12 − 1	3.14+11	C+	99*
14.9200^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^23s\ ^2S_{1/2}$	415 935	[7 118 330]					66,82,83,84
14.7538^{C}	$_{1/2}$	$_{1/2}$	340 435	[7 118 330]					66,82,83,84
14.5879^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^23d\ ^2D_{3/2}$	415 935	[7 270 940]		2.7 − 1	2.1+12	B	83, 84, 99*
14.5729^{C}	$_{3/2}$	$_{5/2}$	415 935	[7 277 990]		2.44	1.28+13	B	66, 82, 83, 84, 99*
14.4290^{C}	$_{1/2}$	$_{3/2}$	340 435	[7 270 940]		1.34	1.07+13	B	66, 82, 83, 84, 99*
13.8645^{C}	$1s^22s\ ^2S_{1/2}$	$1s^23p\ ^2P^o_{1/2}$	0	[7 212 670]		2.52 − 1	4.37+12	B	66, 82, 83, 84, 99*
13.8216^{C}	$_{1/2}$	$_{3/2}$	0	[7 235 050]		4.88 − 1	4.26+12	B	66, 82, 83, 84, 99*
10.9300^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	415 935	[9 565 060]					84
10.8405^{C}	$_{1/2}$	$_{1/2}$	340 435	[9 565 060]					84
10.8539^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	415 935	[9 629 250]		4.8 − 2	6.7+11	C+	83, 84, 99*
10.8504^{C}	$_{3/2}$	$_{5/2}$	415 935	[9 632 220]		4.4 − 1	4.2+12	B	82, 83, 84, 99*
10.7656^{C}	$_{1/2}$	$_{3/2}$	340 435	[9 629 250]		2.4 − 1	3.5+12	B	82, 83, 84, 99*
10.4116^{C}	$1s^22s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	0	[9 604 690]					82,83,84
10.4014^{C}	$_{1/2}$	$_{3/2}$	0	[9 614 130]					82,83,84
9.7351^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	415 935	[10 688 040]					84
9.6641^{C}	$_{1/2}$	$_{1/2}$	340 435	[10 688 040]					84
9.7041^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	415 935	[10 720 840]		1.8 − 2	3.2+11	D	83, 84, 99*
9.7027^{C}	$_{3/2}$	$_{5/2}$	415 935	[10 722 360]		1.62 − 1	1.91+12	C+	83, 84, 99*
9.6335^{C}	$_{1/2}$	$_{3/2}$	340 435	[10 720 840]		9.06 − 2	1.63+12	C+	83, 84, 99*
9.33857^{C}	$1s^22s\ ^2S_{1/2}$	$1s^25p\ ^2P^o_{1/2}$	0	[10 708 280]					83,84
9.33437^{C}	$_{1/2}$	$_{3/2}$	0	[10 713 100]					83,84
9.175	$1s^22p\ ^2P^o_{3/2}$	$1s^26d\ ^2D_{5/2}$	415 935	11 315 000		7.92 − 2	1.04+12	C+	83°, 99*
9.175	$_{3/2}$	$_{3/2}$	415 935	11 315 000		8.8 − 3	1.8+11	D	83°, 99*
9.111	$_{1/2}$	$_{3/2}$	340 435	11 315 000		4.44 − 2	8.91+11	C+	83°, 99*
8.882	$1s^22p\ ^2P^o_{3/2}$	$1s^27d\ ^2D_{5/2}$	415 935	11 675 000		4.52 − 2	6.36+11	C+	83°, 99*
8.882	$_{3/2}$	$_{3/2}$	415 935	11 675 000		5.2 − 3	1.1+11	D	83°, 99*
8.826	$_{1/2}$	$_{3/2}$	340 435	11 675 000		2.52 − 2	5.40+11	C+	83°, 99*

V XXI – Continued

Wavelength (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
8.843	$1s^22s\ ^2S_{1/2}$	$1s^26p\ ^2P^o_{3/2}$	0	11 308 000					83
8.843	1/2	1/2	0	11 308 000					83
8.703	$1s^22p\ ^2P^o_{3/2}$	$1s^28d\ ^2D_{5/2}$	415 935	11 906 000					83
8.703	3/2	3/2	415 935	11 906 000					83
8.643	1/2	3/2	340 435	11 906 000					83
8.576	$1s^22s\ ^2S_{1/2}$	$1s^27p\ ^2P^o_{3/2}$	0	11 660 000					83
8.576	1/2	1/2	0	11 660 000					83
2.4452^C	$1s^22p\ ^2P^o_{3/2}$	$1s2s^2\ ^2S_{1/2}$	415 935	[41 312 000]					84,87
2.4408^C	1/2	1/2	340 435	[41 312 000]					84,87
2.4171^C	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^4P_{1/2}$	415 935	[41 788 000]					84
2.4150^C	3/2	3/2	415 935	[41 824 000]					84
2.4131^C	3/2	5/2	415 935	[41 856 000]					79,84,87
2.4127^C	1/2	1/2	340 435	[41 788 000]					84
2.4106^C	1/2	3/2	340 435	[41 824 000]					84
2.4156^C	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^4P^o_{1/2}$	0	[41 398 000]					84
2.4145^C	1/2	3/2	0	[41 416 000]					84
2.4050^C	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1D)\ ^2D_{3/2}$	415 935	[41 995 000]					84
2.4040^C	3/2	5/2	415 935	[42 013 000]		7.2 – 1	1.4+14	C	79, 84, 85, 86, 87, 99*
2.4007^C	1/2	3/2	340 435	[41 995 000]		6.6 – 1	1.9+14	C	79, 84, 85, 86, 87, 99*
2.4039^C	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^2P_{1/2}$	415 935	[42 015 000]					84
2.3996^C	1/2	1/2	340 435	[42 015 000]					84
2.3992^C	3/2	3/2	415 935	[42 095 000]		1.4	3.9+14	C	79, 84, 85, 86, 87, 99*
2.3950^C	1/2	3/2	340 435	[42 095 000]					84
2.3996^C	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^2P^o_{1/2}$	0	[41 674 000]		1.56 – 1	9.0+13	C	84, 87, 99*
2.3973^C	1/2	3/2	0	[41 714 000]		2.4 – 2	7.2+12	D	84, 87, 99*
2.3915^C	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^1P^o)\ ^2P^o_{1/2}$	0	[41 815 000]					79,84,85,86,87
2.3906^C	1/2	3/2	0	[41 830 000]					79,84,86,87
2.3907^C	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1S)\ ^2S_{1/2}$	415 935	[42 245 000]		2.4 – 1	1.4+14	D	79, 84, 85, 86, 87, 99*
2.3864^C	1/2	1/2	340 435	[42 245 000]					84

V XXII

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
8100^{C}	$1s5s\ ^1S_0$	$1s5p\ ^1P^o_1$	[53 119 700]	[53 132 000]		1.0 − 1	3.4+6	E	99*
7900^{C}	$1s5s\ ^3S_1$	$1s5p\ ^3P^o_1$	[53 107 300]	[53 119 900]		9.6 − 2	3.4+6	E	99*
5900^{C}	1	2	[53 107 300]	[53 124 300]					
7900^{C}	$1s4p\ ^3P^o_2$	$1s4d\ ^3D_2$	[51 919 900]	[51 932 600]					
6300^{C}	2	3	[51 919 900]	[51 935 800]					
4720^{C}	1	2	[51 911 400]	[51 932 600]					
4690^{C}	1	1	[51 911 400]	[51 932 700]					
4380^{C}	0	1	[51 909 900]	[51 932 700]					
4130^{C}	$1s4s\ ^1S_0$	$1s4p\ ^1P^o_1$	[51 910 900]	[51 935 100]		8.1 − 2	1.0+7	E	99*
4030^{C}	$1s4s\ ^3S_1$	$1s4p\ ^3P^o_1$	[51 886 600]	[51 911 400]		7.8 − 2	1.1+7	E	99*
3000^{C}	1	2	[51 886 600]	[51 919 900]					
1760^{C}	$1s3s\ ^1S_0$	$1s3p\ ^1P^o_1$	[49 292 760]	[49 349 740]		5.8 − 2	4.2+7	D	99*
1700^{C}	$1s3s\ ^3S_1$	$1s3p\ ^3P^o_1$	[49 234 710]	[49 293 700]		5.4 − 2	4.2+7	E	99*
514.0^{C}	$1s2s\ ^1S_0$	$1s2p\ ^1P^o_1$	[41 787 830]	[41 982 380]		3.27 − 2	2.76+8	B	99*
496.89^{C}	$1s2s\ ^3S_1$	$1s2p\ ^3P^o_0$	[41 568 880]	[41 770 130]		1.16 − 2	3.12+8	B	99*
469.00^{C}	1	1	[41 568 880]	[41 782 100]		3.51 − 2	3.54+8	B	99*
355.78^{C}	1	2	[41 568 880]	[41 849 950]		8.04 − 2	8.48+8	B	99*
241.84^{C}	$1s2s\ ^3S_1$	$1s2p\ ^1P^o_1$	[41 568 880]	[41 982 380]		3.72 − 3	1.41+8	B	99*
84.42^{C}	$1s4p\ ^1P^o_1$	$1s5s\ ^1S_0$	[51 935 100]	[53 119 700]		1.7 − 1	1.6+11	C	99*
84.22^{C}	$1s4p\ ^3P^o_2$	$1s5s\ ^3S_1$	[51 919 900]	[53 107 300]					
83.62^{C}	1	1	[51 911 400]	[53 107 300]		1.7 − 1	5.2+10	D	99*
81.89^{C}	$1s4s\ ^1S_0$	$1s5p\ ^1P^o_1$	[51 910 900]	[53 132 000]		4.5 − 1	1.5+11	D	99*
81.08^{C}	$1s4s\ ^3S_1$	$1s5p\ ^3P^o_1$	[51 886 600]	[53 119 900]		4.56 − 1	1.54+11	C	99*
39.045^{C}	$1s3p\ ^1P^o_1$	$1s4s\ ^1S_0$	[49 349 740]	[51 910 900]		1.0 − 1	4.5+11	C	99*
38.980^{C}	$1s3d\ ^3D_1$	$1s4p\ ^3P^o_0$	[49 344 470]	[51 909 900]					
38.957^{C}	1	1	[49 344 470]	[51 911 400]					
38.952^{C}	2	1	[49 344 160]	[51 911 400]					
38.944^{C}	3	2	[49 352 090]	[51 919 900]					
38.824^{C}	2	2	[49 344 160]	[51 919 900]					
38.871^{C}	$1s3p\ ^3P^o_2$	$1s4s\ ^3S_1$	[49 313 970]	[51 886 600]					
38.567^{C}	1	1	[49 293 700]	[51 886 600]		1.0 − 1	1.5+11	C−	99*
38.742^{C}	$1s3d\ ^1D_2$	$1s4p\ ^1P^o_1$	[49 353 910]	[51 935 100]		5.5 − 2	8.2+10	C	99*
38.654^{C}	$1s3p\ ^1P^o_1$	$1s4d\ ^1D_2$	[49 349 740]	[51 936 800]		1.9	1.7+12	C	99*
38.188^{C}	$1s3p\ ^3P^o_2$	$1s4d\ ^3D_2$	[49 313 970]	[51 932 600]					
38.141^{C}	2	3	[49 313 970]	[51 935 800]					
37.895^{C}	1	2	[49 293 700]	[51 932 600]					
37.893^{C}	1	1	[49 293 700]	[51 932 700]					
37.843^{C}	0	1	[49 290 220]	[51 932 700]					
37.845^{C}	$1s3s\ ^1S_0$	$1s4p\ ^1P^o_1$	[49 292 760]	[51 935 100]		4.08 − 1	6.3+11	C	99*
37.360^{C}	$1s3s\ ^3S_1$	$1s4p\ ^3P^o_1$	[49 234 710]	[51 911 400]		4.08 − 1	6.5+11	C	99*
37.241^{C}	1	2	[49 234 710]	[51 919 900]					
26.525^{C}	$1s3p\ ^1P^o_1$	$1s5s\ ^1S_0$	[49 349 740]	[53 119 700]		2.3 − 2	2.2+11	C	99*
26.362^{C}	$1s3p\ ^3P^o_2$	$1s5s\ ^3S_1$	[49 313 970]	[53 107 300]					
26.222^{C}	1	1	[49 293 700]	[53 107 300]		2.3 − 2	7.5+10	D	99*
26.047^{C}	$1s3s\ ^1S_0$	$1s5p\ ^1P^o_1$	[49 292 760]	[53 132 000]		1.05 − 1	3.44+11	C+	99*
25.739^{C}	$1s3s\ ^3S_1$	$1s5p\ ^3P^o_1$	[49 234 710]	[53 119 900]		1.1 − 1	3.5+11	C	99*
25.710^{C}	1	2	[49 234 710]	[53 124 300]					
13.679^{C}	$1s2p\ ^1P^o_1$	$1s3s\ ^1S_0$	[41 982 380]	[49 292 760]		4.5 − 2	1.6+12	C+	99*

V XXII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
13.566[C]	$1s2p\ ^1P^o_1$	$1s3d\ ^1D_2$	[41 982 380]	[49 353 910]		2.1	1.5+13	C+	99*
13.541[C]	$1s2p\ ^3P^o_2$	$1s3s\ ^3S_1$	[41 849 950]	[49 234 710]					
13.418[C]	1	1	[41 782 100]	[49 234 710]		4.2 − 2	5.2+11	C−	99*
13.344[C]	$1s2p\ ^3P^o_2$	$1s3d\ ^3D_2$	[41 849 950]	[49 344 160]					
13.330[C]	2	3	[41 849 950]	[49 352 090]					
13.224[C]	1	2	[41 782 100]	[49 344 160]					
13.223[C]	1	1	[41 782 100]	[49 344 470]					
13.202[C]	0	1	[41 770 130]	[49 344 470]					
13.224[C]	$1s2s\ ^1S_0$	$1s3p\ ^1P^o_1$	[41 787 830]	[49 349 740]		3.70 − 1	4.70+12	C	99*
12.945[C]	$1s2s\ ^3S_1$	$1s3p\ ^3P^o_1$	[41 568 880]	[49 293 700]		3.72 − 1	4.94+12	C	99*
10.072[C]	$1s2p\ ^1P^o_1$	$1s4s\ ^1S_0$	[41 982 380]	[51 910 900]		9.3 − 3	6.1+11	C	99*
10.046[C]	$1s2p\ ^1P^o_1$	$1s4d\ ^1D_2$	[41 982 380]	[51 936 800]		3.6 − 1	4.8+12	C	99*
9.9635[C]	$1s2p\ ^3P^o_2$	$1s4s\ ^3S_1$	[41 849 950]	[51 886 600]					
9.8966[C]	1	1	[41 782 100]	[51 886 600]		9.6 − 3	2.2+11	D	99*
9.9180[C]	$1s2p\ ^3P^o_2$	$1s4d\ ^3D_2$	[41 849 950]	[51 932 600]					
9.9149[C]	2	3	[41 849 950]	[51 935 800]					
9.8517[C]	1	2	[41 782 100]	[51 932 600]					
9.8516[C]	1	1	[41 782 100]	[51 932 700]					
9.8400[C]	0	1	[41 770 130]	[51 932 700]					
9.8549[C]	$1s2s\ ^1S_0$	$1s4p\ ^1P^o_1$	[41 787 830]	[51 935 100]		9.0 − 2	2.1+12	C+	99*
9.6688[C]	$1s2s\ ^3S_1$	$1s4p\ ^3P^o_1$	[41 568 880]	[51 911 400]		9.0 − 2	2.1+12	C+	99*
9.6609[C]	1	2	[41 568 880]	[51 919 900]					
8.9788[C]	$1s2p\ ^1P^o_1$	$1s5s\ ^1S_0$	[41 982 380]	[53 119 700]		3.9 − 3	3.2+11	C	99*
8.8831[C]	$1s2p\ ^3P^o_2$	$1s5s\ ^3S_1$	[41 849 950]	[53 107 300]					
8.8299[C]	1	1	[41 782 100]	[53 107 300]		3.9 − 3	1.1+11	D	99*
8.8151[C]	$1s2s\ ^1S_0$	$1s5p\ ^1P^o_1$	[41 787 830]	[53 132 000]		3.7 − 2	1.1+12	C+	99*
8.6572[C]	$1s2s\ ^3S_1$	$1s5p\ ^3P^o_1$	[41 568 880]	[53 119 900]		3.6 − 2	1.1+12	C+	99*
8.6539[C]	1	2	[41 568 880]	[53 124 300]					
2.405646[C]	$1s^2\ ^1S_0$	$1s2s\ ^3S_1$	0	[41 568 880]		M1	6.07+7	B	87, 99*
2.394055[C]	$1s^2\ ^1S_0$	$1s2p\ ^3P^o_0$	0	[41 770 130]					87
2.393369[C]	0	1	0	[41 782 100]		4.22 − 2	1.64+13	B	85, 86, 87, 99*
2.389489[C]	0	2	0	[41 849 950]		M2	2.43+9	B	87, 99*
2.381952[C]	$1s^2\ ^1S_0$	$1s2p\ ^1P^o_1$	0	[41 982 380]		7.28 − 1	2.85+14	B	85, 86, 89, 90, 91, 99*, 103
2.3211[C]	$1s2p\ ^1P^o_1$	$2s^2\ ^1S_0$	[41 982 380]	[85 064 000]		3.6 − 2	4.6+13	C	84, 99*
2.3105[C]	$1s2p\ ^3P^o_1$	$2s^2\ ^1S_0$	[41 782 100]	[85 064 000]		1.6 − 2	2.0+13	D	84, 99*
2.3080[C]	$1s2p\ ^1P^o_1$	$2p^2\ ^3P_0$	[41 982 380]	[85 309 000]					84
2.3057[C]	1	1	[41 982 380]	[85 352 000]					84
2.3036[C]	1	2	[41 982 380]	[85 392 000]		1.7 − 1	4.3+13	D	84, 99*
2.3076[C]	$1s2s\ ^1S_0$	$2s2p\ ^3P^o_1$	[41 787 830]	[85 123 000]					84
2.2987[C]	$1s2p\ ^3P^o_2$	$2p^2\ ^3P_1$	[41 849 950]	[85 352 000]		3.4 − 1	1.4+14	C	84, 99*
2.2975[C]	1	0	[41 782 100]	[85 309 000]		2.5 − 1	3.2+14	C	84, 99*
2.2966[C]	2	2	[41 849 950]	[85 392 000]		8.0 − 1	2.0+14	C	84, 99*
2.2952[C]	1	1	[41 782 100]	[85 352 000]		2.0 − 1	8.2+13	D	84, 99*
2.2946[C]	0	1	[41 770 130]	[85 352 000]		2.8 − 1	1.2+14	C	84, 99*
2.2931[C]	1	2	[41 782 100]	[85 392 000]		3.9 − 1	1.0+14	C	84, 99*
2.2976[C]	$1s2p\ ^1P^o_1$	$2p^2\ ^1D_2$	[41 982 380]	[85 505 000]		1.1	2.9+14	C	84, 99*
2.2973[C]	$1s2s\ ^3S_1$	$2s2p\ ^3P^o_0$	[41 568 880]	[85 098 000]		1.4 − 1	1.7+14	C	84, 99*
2.2960[C]	1	1	[41 568 880]	[85 123 000]		3.9 − 1	1.7+14	C	84, 99*
2.2922[C]	1	2	[41 568 880]	[85 195 000]		6.6 − 1	1.7+14	C	84, 99*

V XXII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2.2907^{C}	$1s2p\ ^3P^o_2$	$2p^2\ ^1D_2$	[41 849 950]	[85 505 000]		2.2 – 1	5.6+13	D	84, 99*
2.2872^{C}	$_1$	$_2$	[41 782 100]	[85 505 000]					84
2.2902^{C}	$1s2s\ ^1S_0$	$2s2p\ ^1P^o_1$	[41 787 830]	[85 452 000]		4.0 – 1	1.7+14	C	84, 99*
2.2839^{C}	$1s2p\ ^1P^o_1$	$2p^2\ ^1S_0$	[41 982 380]	[85 766 000]		2.3 – 1	2.9+14	C	84, 99*
2.2788^{C}	$1s2s\ ^3S_1$	$2s2p\ ^1P^o_1$	[41 568 880]	[85 452 000]					84
2.2736^{C}	$1s2p\ ^3P^o_1$	$2p^2\ ^1S_0$	[41 782 100]	[85 766 000]					84
2.02866^{C}	$1s^2\ ^1S_0$	$1s3p\ ^3P^o_1$	0	[49 293 700]		1.1 – 2	5.9+12	E	99*
2.02635^{C}	$1s^2\ ^1S_0$	$1s3p\ ^1P^o_1$	0	[49 349 740]		1.40 – 1	7.58+13	C+	91, 99*
1.92636^{C}	$1s^2\ ^1S_0$	$1s4p\ ^3P^o_1$	0	[51 911 400]		3.8 – 3	2.3+12	E	99*
1.92548^{C}	$1s^2\ ^1S_0$	$1s4p\ ^1P^o_1$	0	[51 935 100]		5.18 – 2	3.11+13	C+	99*
1.88253^{C}	$1s^2\ ^1S_0$	$1s5p\ ^3P^o_1$	0	[53 119 900]		1.9 – 3	1.2+12	E	99*
1.88210^{C}	$1s^2\ ^1S_0$	$1s5p\ ^1P^o_1$	0	[53 132 000]		2.50 – 2	1.57+13	C+	99*

V XXIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3340^C	$3s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[51 948 740]	[51 978 720]		3.72 − 2	5.55+6	A	98*
3240^C	$3p\ ^2P^o_{1/2}$	$3d\ ^2D_{3/2}$	[51 947 810]	[51 978 660]		2.40 − 2	3.80+6	A	98*
987.36^C	$2s\ ^2S_{1/2}$	$2p\ ^2P^o_{3/2}$	[43 804 530]	[43 905 810]		2.10 − 2	3.58+7	A	98*
35.3940^C	$3d\ ^2D_{5/2}$	$4f\ ^2F^o_{7/2}$	[51 988 830]	[54 814 170]		5.82	3.88+12	A	98*
35.2943^C	$3p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[51 978 720]	[54 812 040]		2.23	1.99+12	A	98*
34.9769^C	$3s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[51 948 740]	[54 807 770]		6.56 − 1	8.93+11	A	98*
24.2027^C	$3d\ ^2D_{5/2}$	$5f\ ^2F^o_{7/2}$	[51 988 830]	[56 120 600]		8.94 − 1	1.28+12	A	98*
24.1500^C	$3p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[51 978 720]	[56 119 500]		5.04 − 1	9.61+11	A	98*
23.9890^C	$3s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[51 948 740]	[56 117 320]		1.63 − 1	4.72+11	A	98*
12.3716^C	$2p\ ^2P^o_{3/2}$	$3d\ ^2D_{5/2}$	[43 905 810]	[51 988 830]		2.51	1.82+13	A	98*
12.2336^C	$2s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[43 804 530]	[51 978 720]		5.88 − 1	6.55+12	A	98*
9.169071^C	$2p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[43 905 810]	[54 812 040]		4.40 − 1	5.81+12	A	98*
9.088232^C	$2s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[43 804 530]	[54 807 770]		1.39 − 1	2.80+12	A	98*
8.187534^C	$2p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[43 905 810]	[56 119 500]		1.60 − 1	2.65+12	A	98*
8.121636^C	$2s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[43 804 530]	[56 117 320]		5.64 − 2	1.43+12	A	98*
2.283024^C	$1s\ ^2S_{1/2}$	$2p\ ^2P^o_{1/2}$	0	[43 801 550]		2.80 − 1	1.79+14	A	98*
2.277603^C	1/2	3/2	0	[43 905 810]		5.60 − 1	1.80+14	A	98*
1.925009^C	$1s\ ^2S_{1/2}$	$3p\ ^2P^o_{1/2}$	0	[51 947 810]		5.32 − 2	4.78+13	A	98*
1.923864^C	1/2	3/2	0	[51 978 720]		1.06 − 1	4.79+13	A	98*
1.824559^C	$1s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	0	[54 807 770]		3.90 − 2	1.95+13	A	98*
1.781981^C	$1s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	0	[56 117 320]		1.87 − 2	9.83+12	A	98*

2.3.3. References for Comments and Tables for V Ions

[1] L. Iglesias, J. Res. Natl. Bur. Stand. **72A**, 295 (1968).
[2] J. -F. Wyart, Phys. Scr. **12**, 33 (1975).
[3] J. Sugar and C. Corliss, J. Chem. Phys. Ref. Data **14**, Suppl. 2 (1985).
[4] G. V. Shalimoff and J. G. Conway, J. Opt. Soc. Am. **68**, 267 (1978).
[5] A. H. Gabriel, B. C. Fawcett, and C. Jordan, Proc. Phys. Soc. **87**, 825 (1966).
[6] C. H. H. Van Deurzen, J. G. Conway, and S. P. Davis, J. Opt. Soc. Am. **64**, 498 (1974).
[7] J. O. Ekberg, Phys. Scr. **9**, 96 (1974).
[8] C. H. H. Van Deurzen, J. Opt. Soc. Am. **67**, 476 (1977).
[9] H. G. Berry, Phys. Scr. **13**, 36 (1976).
[10] C. H. H. Van Deurzen, J. Opt. Soc. Am. **67**, 1135 (1977).
[11] P. G. Kruger and S. G. Weissberg, Phys. Rev. **48**, 659 (1935).
[12] E. Alexander, U. Feldman, and B. S. Fraenkel, J. Opt. Soc. Am. **55**, 650 (1965).
[13] U. Feldman, B. S. Fraenkel, and S. Hoory, Astrophys. J. **142**, 719 (1965).
[14] A. H. Gabriel, B. C. Fawcett, and C. Jordan, Nature **206**, 390 (1965).
[15] W. J. Wagner and L. L. House, Astrophys. J. **166**, 683 (1971).
[16] J. O. Ekberg, Phys. Scr. **13**, 111 (1976).
[17] S. O. Kastner, A. M. Crooker, W. E. Behring, and L. Cohen, Phys. Rev. A **16**, 577 (1977).
[18] B. C. Fawcett, N. J. Peacock, and R. D. Cowan, J. Phys. B **1**, 295 (1968).
[19] S. G. Weissberg and P. G. Kruger, Phys. Rev. **49**, 872 (1936).
[20] R. Smitt, L. A. Svensson, and M. Outred, Phys. Scr. **13**, 293 (1976).
[21] B. C. Fawcett and A. H. Gabriel, Proc. Phys. Soc. **88**, 262 (1966).
[22] G. E. Bromage, Astron. Astrophys. Suppl. Series **41**, 79 (1980).
[23] B. Edlén, Z. Phys. **104**, 407 (1937).
[24] B. C. Fawcett, R. D. Cowan, and R. W. Hayes, J. Phys. B **5**, 2143 (1972).
[25] W. Lotz, J. Opt. Soc. Am. **57**, 873 (1967).
[26] B. C. Fawcett and N. J. Peacock, Proc. Phys. Soc. **91**, 973 (1967).
[27] B. C. Fawcett, J. Phys. B **3**, 1732 (1970).
[28] B. Edlén, Z. Phys. **104**, 188 (1937).
[29] B. C. Fawcett, R. D. Cowan, and R. W. Hayes, Supplementary Publication No. SUP 70005, unpublished (1972).
[30] B. C. Fawcett, A. H. Gabriel, and P. A. H. Saunders, Proc. Phys. Soc. **90**, 863 (1967).
[31] B. C. Fawcett, J. Phys. B **4**, 1577 (1971).
[32] P. G. Kruger and H. S. Pattin, Phys. Rev. **52**, 621 (1937).
[33] U. Litzén and A. Redfors, Phys. Lett. A **127**, 88 (1988).
[34] A. Redfors and U. Litzén, J. Opt. Soc. Am. B **6**, 1447 (1989).
[35] V. E. Levashov, A. N. Ryabtsev, and S. S. Churilov, Opt. Spectrosc. **69**, 20 (1990).
[36] S. S. Churilov and V. E. Levashov, Phys. Scr. **48**, 425 (1993).
[37] B. Edlén, Z. Phys. **103**, 536 (1936).
[38] B. C. Fawcett, R. D. Cowan, E. Y. Kononov, and R. W. Hayes, J. Phys. B **5**, 1255 (1972).
[39] U. Litzén and A. Redfors, Phys. Scr. **36**, 895 (1987).
[40] A. Redfors, Phys. Scr. **38**, 702 (1988).
[41] S. S. Churilov, V. E. Levashov, and J. F. Wyart, Phys. Scr. **40**, 625 (1989).
[42] M. Finkenthal, R. E. Bell, and H. W. Moos, Phys. Lett. **88A**, 165 (1982).
[43] J. Reader, V. Kaufman, J. Sugar, J. O. Ekberg, U. Feldman, C. M. Brown, J. F. Seely, and W. L. Rowan, J. Opt. Soc. Am. B **4**, 1821 (1987).
[44] B. Edlén, Z. Phys. **100**, 621 (1936).
[45] L. Cohen and W. E. Behring, J. Opt. Soc. Am. **66**, 899 (1976).
[46] U. Feldman and L. Cohen, J. Opt. Soc. Am. **57**, 1128 (1967).
[47] B. Edlén and F. Tyrén, Z. Phys. **101**, 206 (1936).
[48] U. Feldman and L. Cohen, Astrophys. J. **149**, 265 (1967).
[49] C. Jupén and U. Litzén, Phys. Scr. **30**, 112 (1984).
[50] C. Jupén and U. Litzén, Phys. Scr. **33**, 509 (1986).
[51] S. O. Kastner, W. E. Behring, and L. Cohen, Astrophys. J. **199**, 777 (1975).
[52] B. C. Fawcett, G. E. Bromage, and R. W. Hayes, Mon. Not. Roy. Astron. Soc. **186**, 113 (1979).
[53] C. Jupén, U. Litzén, V. Kaufman, and J. Sugar, Phys. Rev. A **35**, 116 (1987).
[54] M. Finkenthal, R. E. Bell, and H. W. Moos, J. Appl. Phys. **56**, 2012 (1984).
[55] B. C. Fawcett, J. Phys. B **4**, 981 (1971).
[56] G. A. Doschek, U. Feldman, R. D. Cowan, and L. Cohen, Astrophys. J. **188**, 417 (1974).
[57] V. Kaufman, J. Sugar, and D. Cooper, Phys. Scr. **25**, 623 (1982).
[58] U. Feldman, G. A. Doschek, R. D. Cowan, and L. Cohen, J. Opt. Soc. Am. **63**, 1445 (1973).
[59] B. C. Fawcett, Proc. Phys. Soc. **86**, 1087 (1965).
[60] L. Cohen, U. Feldman, and S. O. Kastner, J. Opt. Soc. Am. **58**, 331 (1968).
[61] K. T. Cheng, unpublished material (1981).
[62] W. C. Martin, unpublished material (1982).
[63] B. C. Fawcett, M. Galanti, and N. J. Peacock, J. Phys. B **7**, 1149 (1974).
[64] S. Goldsmith, U. Feldman, and L. Cohen, J. Opt. Soc. Am. **61**, 615 (1971).
[65] G. A. Doschek, U. Feldman, and L. Cohen, J. Opt. Soc. Am. **63**, 1463 (1973).
[66] B. C. Fawcett, M. Galanti, and N. J. Peacock, J. Phys. B **7**, L106 (1974).
[67] B. C. Fawcett and R. W. Hayes, Mon. Not. Roy. Astron. Soc. **170**, 185 (1975).
[68] G. E. Bromage and B. C. Fawcett, Mon. Not. Roy. Astron. Soc. **178**, 591 (1977).
[69] U. Feldman, G. A. Doschek, R. D. Cowan, and L. Cohen, Astrophys. J. **196**, 613 (1975).
[70] G. A. Doschek, U. Feldman, J. Davis, and R. D. Cowan, Phys. Rev. A **12**, 980 (1975).
[71] V. Kaufman, J. Sugar, and D. Cooper, Phys. Scr. **26**, 163 (1982).
[72] B. C. Fawcett, A. Ridgeley, and A. T. Hatter, J. Opt. Soc. Am. **70**, 1349 (1980).
[73] J. Sugar, V. Kaufman, and D. Cooper, Phys. Scr. **26**, 189 (1982).
[74] S. Goldsmith, U. Feldman, A. Crooker, and L. Cohen, J. Opt. Soc. Am. **62**, 260 (1972).
[75] B. Edlén, Phys. Scr. **31**, 345 (1985).
[76] G. E. Bromage and B. C. Fawcett, Mon. Not. Roy. Astron. Soc. **178**, 605 (1977).
[77] B. Edlén, Phys. Scr. **22**, 593 (1981).
[78] V. A. Boiko, S. A. Pikuz, U. I. Safronova, and A. Ya. Faenov, J. Phys. B **10**, 1253 (1977).
[79] V. A. Boiko, A. Ya. Faenov, and S. A. Pikuz, J. Quant. Spectrosc. Radiat. Transfer **19**, 11 (1978).
[80] G. E. Bromage, R. D. Cowan, B. C. Fawcett, and A. Ridgeley, J. Opt. Soc. Am. **68**, 48 (1978).
[81] Y. -K. Kim, D. H. Baik, P. Indelicato, and J. P. Desclaux, Phys. Rev. A **44**, 148 (1991).
[82] S. Goldsmith, U. Feldman, L. Oren, and L. Cohen, Astrophys. J. **174**, 209 (1972).
[83] E. V. Aglitskii, V. A. Boiko, S. A. Pikuz, and A. Y. Faenov, Sov. J. Quant. Electron. **4**, 956 (1975).
[84] L. A. Vainshtein and U. I. Safronova, Reprint No. 2, Acad. Nauk USSR, Inst. Spectrosc. Moscow (1985).
[85] E. V. Aglitskii, V. A. Boiko, S. M. Zakharov, S. A. Pikuz, and A. Y. Faenov, J.E.T.P. Letters **19**, 8 (1974).

[86] E. V. Aglitskii, V. A. Boiko, S. M. Zakharov, S. A. Pikuz, and A. Y. Faenov, Sov. J. Quant. Electron. **4**, 500 (1974).
[87] P. Beiersdorfer, M. H. Chen, R. E. Marrs, M. B. Schneider, and R. S. Walling, Phys. Rev. A **44**, 396 (1991).
[88] B. Edlén, Phys. Scr. **19**, 255 (1979).
[89] S. Morita and J. Fujita, Nucl. Instrum. Meth. B **9**, 713 (1985).
[90] E. V. Aglitsky, P. S. Antsiferov, S. L. Mandelstam, A. M. Panin, U. I. Safronova, S. A. Ulitin, and L. A. Vainshtein, Phys. Scr. **38**, 136 (1988).
[91] P. Beiersdorfer, M. Bitter, S. von Goeler, and K. W. Hill, Phys. Rev. A **40**, 150 (1989).
[92] K. T. Cheng, M. H. Chen, W. R. Johnson, and J. Sapirstein, Phys. Rev. A **50**, 247 (1994).
[93] K. T. Cheng, Private communication (1996).
[94] W. R. Johnson and G. Soff, Atom. Data Nucl. Data Tables **33**, 405 (1985).
[95] G. W. F. Drake, *Calculated transition frequencies for helium-like ions,* unpublished (1985).
[96] P. J. Mohr, Atom. Data Nucl. Data Tables **29**, 453 (1983).
[97] G. W. Erickson, J. Phys. Chem. Ref. Data **6**, 831 (1977).
[98] W. L. Wiese, M. W. Smith, and B. M. Glennon, Natl. Stand. Ref. Data Ser., Natl. Bur. Stand. (U.S.) **4**, Vol. I, U.S. Govt. Print. Office, Washington, D.C. (1966).
[99] G. A. Martin, J. R. Fuhr, and W. L. Wiese, J. Phys. Chem. Ref. Data **17**, Suppl. 3 (1988).
[100] S. M. Younger and A. W. Weiss, J. Res. Natl. Bur. Stand. (U.S.) **79A**, 629 (1975).
[101] G. A. Doschek, U. Feldman, and L. Cohen, J. Opt. Soc. Am. **65**, 463 (1975).
[102] V. E. Levashov and S. S. Churilov, Opt. Spectrosc. **65**, 143 (1988).
[103] S. Morita, J. Phys. Soc. Jpn. **52**, 2673 (1983).

2.4. Chromium

2.4.1. Brief Comments on Each Chromium Ion

Cr V

Ca I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^2\ \ ^3\mathrm{F}_2$

Ionization energy 560 200 ± 300 cm^{-1}
(69.46 ± 0.04 eV)

Ekberg [1] classified 134 lines due to the $3d4s-3d4p$, $3d4p-3d4d$, $3d4p-3d5s$, and $3d^2-3d4p$ transition arrays in the range of 433 – 1837 Å. The observations were made with a vacuum spark. An estimated wavelength uncertainty of ±0.01 Å was reported. The lines at 1042.544 Å, 818.803 Å, and 438.618 Å are blended. The $3d4s\ ^1\mathrm{D}_2-3d4p\ ^1\mathrm{D}^\circ_2$ and $3d4p\ ^3\mathrm{F}^\circ_2-3d5s\ ^3\mathrm{D}_3$ transitions at 1837.442 Å and 780.428 Å, respectively, are lower by about 0.06 Å than those calculated from the energy level differences.

The value for the ionization energy was derived by Ekberg [1] from the series $3d4s$ and $3d5s$.

Cr VI

K I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d\ \ ^2\mathrm{D}_{3/2}$

Ionization energy 731 020 ± 6 cm^{-1}
(90.6356 ± 0.0007 eV)

Alexander *et al.* [2] observed the $3d-nf$ $(n=5-10)$ doublets in the range of 144 – 176 Å. Gabriel *et al.* [3] found the $4f\ ^2\mathrm{F}^\circ$ term, replacing an earlier value reported by Kruger and Weissberg [4]. Gabriel *et al.* [5] identified the transitions from the levels of $3p^53d^2$ to the ground term in the range of 201 – 227 Å. Feldman and Fraenkel [6] observed 17 lines in the range of 161 – 174 Å, which were subsequently assigned to the $3p^63d-3p^53d4s$ inner-shell transitions by Cowan [7]. The first observation of the $4p-4d$ transitions was reported by Fawcett [8], who identified the $^2\mathrm{P}^\circ_{1/2,(3/2)}-{}^2\mathrm{D}_{3/2,(5/2)}$ lines at 942.75 Å and 957.01 Å. New and more extensive measurements were carried out by Ekberg [9] with a vacuum spark discharge. He identified 95 lines in the range of 144 – 2496 Å classified as transitions among 57 levels of the $3p^6ns$ $(n=4-6)$, $np\,(n=4-6)$, $nd\,(n=3-5)$, $nf\,(n=4-10)$, $ng\,(n=5,6)$, $nh\,(n=6,7)$, $3p^53d^2$, and $3d^53d4s$ configurations. We quote his results. Wavelengths in vacuum are given for all lines. The reported uncertainties are estimated to be ±0.004 Å and ±0.01 Å for wavelength ranges below 385 Å and above 420 Å, respectively.

The level values of 619 419 cm^{-1} and 618 491 cm^{-1} for the $3p^53d(^3\mathrm{D}^\circ)4s\ ^2\mathrm{D}^\circ_{3/2,5/2}$ levels in Ref. [9] are apparently misprints and have been interchanged.

The value for the ionization energy was derived by Ekberg [9] from the nh series.

Cr VII

Ar I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^6\ \ ^1\mathrm{S}_0$

Ionization energy 1 291 900 ± 600 cm^{-1}
(160.18 ± 0.07 eV)

The $3p^6-3p^5nl$ transitions were observed by Kruger and Weissberg [10] for $nl=4s,5s$, by Alexander *et al.* [2] for $nl=4d$, and by Alexander *et al.* [11], Feldman *et al.* [12] and Gabriel *et al.* [3,5] for $nl=3d$. Wagner and House [13] classified the $3p^53d-3p^54f$ transitions. New observations of the spectrum were reported by Ekberg [14], comprising 138 lines in the wavelength range of 92 – 1448 Å obtained with a vacuum spark discharge. Two lines at 92.128 Å and 92.969 Å are from unpublished work of Edlén. The new list contained transitions among 60 levels of the $3s^23p^5nl$ $(nl=3p,3d,4s,4p,4d,4f,5s,5d,6s)$ and $3s3p^6nl$ $(nl=3d,4p)$ configurations. The classification $3p^53d\ ^3\mathrm{P}^\circ_1-3p^5(^2\mathrm{P}^\circ_{3/2})4f\ ^2[\frac{3}{2}]_1$ for the line at 166.560 Å contains a misprint and has been changed to $3p^53d\ ^3\mathrm{P}^\circ_1-3p^5(^2\mathrm{P}^\circ_{3/2})4f\ ^2[\frac{3}{2}]_2$.

Classifications of inner-shell transitions were given by Kastner *et al.* [15] in the range of 71 – 102 Å with a similar light source. They identified five new lines, belonging to the $3s^23p^6-3s3p^6np$ $(n=4,7)$ transitions, with an estimated uncertainty of ±0.005 Å.

The value for the ionization energy was derived by Ekberg [14] by extrapolation. The same value may be derived from the 3-member ns series.

Cr VIII

Cl I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^5\ \ ^2\mathrm{P}^\circ_{3/2}$

Ionization energy 1 490 000 cm^{-1} (184.7 eV)

The transitions $3s^23p^5-3s3p^6$ were first identified by Weissberg and Kruger [16]. Smitt *et al.* [17] obtained the values 430.713±0.008 Å and 413.112±0.008 Å in a vacuum spark. The latter line was reobserved in a solar flare by Dere [18], but his wavelength of 413.00±0.03 Å is less accurate.

Gabriel *et al.* [3,5] identified the $3p^5-3p^4(^1\mathrm{D})3d$ transitions. Their wavelengths were remeasured by Fawcett and Gabriel [19], who also assigned six new lines in the range of 201 – 221 Å to this group. The designation of parent term has been changed from ^{1}D to ^{3}P for the upper levels $3p^4 3d$ ^{2}P and ^{2}D, as indicated by the calculated levels of Fe X by Bromage *et al.* [20].

The $3p^5$ ^{2}P° – $3p^4 4s$ ^{2}P doublet was first observed by Weissberg and Kruger [16] in the range of 132 – 135 Å. Edlén [21] observed lines in the range of 124 – 136 Å with vacuum sparks and identified not only the additional ^{2}P° – ^{2}D,^{2}S doublets but also the ^{2}P° – ^{4}P spin-forbidden transitions.

Fawcett *et al.* [22] observed six lines of the $3p^4 3d$ – $3p^4 4f$ array with an estimated uncertainty of ±0.02 Å and seven lines of $3p^5$ – $3p^4 4d$ with an estimated uncertainty of ±0.015 Å in the ranges of 143 – 147 Å and 102 – 107 Å, respectively. The wavelengths were measured in a laser-produced plasma.

The value for the ionization energy was derived by Lotz [23] by extrapolation.

Cr IX

S I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^4$ $^3P_2$

Ionization energy 1 688 000 cm^{-1} (209.3 eV)

Fawcett [8,24] identified the $3s^2 3p^4$ – $3s3p^5$ array in the range of 363 – 433 Å. Improved measurements with vacuum spark spectra were made by Smitt *et al.* [17] who extended the range of observations to 327 – 433 Å. In addition to the lines previously observed by Fawcett, they reported the $^1S_0$ – $^1P^\circ_1$ line at 418.925 Å and the spin-forbidden $^3P_2$ – $^1P^\circ_1$ line at 327.267 Å. Wavelengths are from Ref. [17]. Their uncertainty is estimated to be ±0.008 Å.

Gabriel *et al.* [5] and Fawcett and Gabriel [19] identified three lines each of the $3p^4$ – $3p^3 3d$ array with a vacuum spark. This work was extended by Fawcett [24], who measured a theta-pinch spectrum with an estimated uncertainty of ±0.05 Å in the range of 209 – 224 Å. He identified nine lines. Except for the $^3P_2$ – (^{4}S°) $^3D^\circ_3$ line at 210.61±0.02 Å remeasured by Davé *et al.* [25] in a tokamak plasma, Fawcett's results are given.

Eleven lines of the $3p^4$ – $3p^3 4s$ transition array in the range of 117 – 123 Å were identified by Edlén [26] in vacuum spark observations. It should be noted that the $3s^2 3p^4$ $^1S_0$ – $3s^2 3p^3$(^{2}P°)$4s$ $^1P^\circ_1$ line is given as 122.720 Å, and is longer by 0.014 Å than the calculated wavelength of 122.706 Å.

Fawcett *et al.* [22] identified seven lines in the range of 127 – 130 Å of the $3p^3 3d$ – $3p^3 4f$ array and six lines at 96 – 98 Å as $3p^4$ – $3p^3 4d$. Wavelengths of these transitions were measured in a laser-produced plasma with uncertainties estimated to be ±0.02 Å and ±0.015 Å, respectively. Additional identifications were given by Fawcett *et al.* [27]

The magnetic-dipole transition $3p^4$ ($^3P_2$ – $^1D_2$) at 3302.8 Å, which was identified by Jefferies *et al.* [28] from solar coronal observations, has been deleted because it does not fit with the level scheme adopted here within their estimated uncertainty.

The value for the ionization energy was derived by Lotz [23] by extrapolation.

Cr X

P I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^3$ $^4S^\circ_{3/2}$

Ionization energy 1 971 000 cm^{-1} (244.4 eV)

Sandlin *et al.* [29] and Feldman and Doschek [30] identified the magnetic-dipole transitions $3p^3$ $^4S^\circ_{3/2}$ – $^2P^\circ_{1/2,3/2}$ in the solar corona. The wavelengths of 1564.10 Å and 1489.04 Å are adopted from the latter article.

Fawcett and Peacock [31] and Fawcett [8,24] identified the $3s^2 3p^3$ – $3s3p^4$ transition array in the range of 333 – 427 Å. In the extended range of 333 – 448 Å, Smitt *et al.* [17] found 16 lines, including seven new lines, for this array in the vacuum spark discharge. Their results are given with an estimated uncertainty of ±0.008 Å.

Gabriel *et al.* [3,5] observed the $3p^3$ $^2D^\circ_{5/2}$ – $3p^2$(^{3}P)$3d$ $^2F_{7/2}$ transition at 216.72±0.05 Å. In their article, the parent term was designated as ^{1}D, instead of ^{3}P. Fawcett *et al.* [32] identified the $3p^3$ ^{4}S° – $3p^2$(^{3}P)$3d$ ^{4}P resonance transitions in the range of 223 – 226 Å. With a theta-pinch plasma, Fawcett [24] analyzed more fully the $3p^3$ – $3p^2 3d$ transitions in the range of 216 – 254 Å. The uncertainty of the wavelengths is estimated to be ±0.05 Å.

The $3p^2 3d$ – $3p^2 4f$ and $3p^3$ – $3p^2 4s$ transitions in the ranges of 115 – 117 Å and 106 – 114 Å were identified by Fawcett *et al.* [22] in a laser-produced plasma with an estimated uncertainty of ±0.015 Å.

The value for the ionization energy was obtained by Lotz [23] by extrapolation.

Cr XI

Si I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^2$ $^3P_0$

Ionization energy 2 184 000 cm^{-1} (270.8 eV)

Jefferies *et al.* [28] and Svensson [33] classified the line at 3996.8±0.4 Å measured by Jefferies [34] in the solar corona to the magnetic-dipole transition $3s^2 3p^2$ $^3P_2$ – $^1D_2$. Jefferies *et al.* also proposed the $^3P_1$ – $^1D_2$ transition for the line at 3167.0 Å, but this line has not been adopted here because it does not fit with the present level scheme. This M1 line was identified at 3178 Å by Magnant-Crifo [35] in the solar coronal spectrum. Sandlin *et al.* [29] identified a coronal line at 1440.01 Å as the $^3P_1$ – $^1S_0$ transition.

Fawcett [8,24] interpreted the $3s^23p^2-3s3p^3$ transition array in the range of 285 – 431 Å. Improved wavelengths with an estimated uncertainty of ±0.008 Å were given by Smitt *et al.* [17] for 14 lines, including the spin-forbidden transition $^3P_2-{}^1D_2^o$ at 339.446 Å, using a vacuum spark discharge. Recently, two additional $^3P_{2,1}$ – $^5S_2^o$ spin-forbidden transitions at 600.7±0.4 Å and 578.0±0.8 Å were identified by Träbert *et al.* [36] in a beam-foil spectrum. It should be noted that the $^1S_0-{}^1P_1^o$ line reported at 334.95 Å in Ref. [8] has been omitted because of the disagreement with the calculated wavelength of 336.11 Å.

Fawcett [24] provided classifications of 12 lines due to the $3p^2$ – $3p3d$ transitions in the range of 226 – 256 Å in theta-pinch plasma discharges. The uncertainty of the wavelengths is estimated to be ±0.05 Å.

The $3p3d$ – $3p4f$, $3p^2$ – $3p4s$ and $3p^2$ – $3p4d$ transitions in the ranges of ~105 Å, 98 – 101 Å and ~82 Å, respectively, were identified by Fawcett *et al.* [22] in a laser-produced plasma. Their measurements have an estimated uncertainty of ±0.015 Å. We have adopted their measurement only for the $3p^2$ – $3p4s$ transitions. For the other transitions, Kastner *et al.* [37] provided more comprehensive identifications than Fawcett *et al.* They also identified the two-electron transitions $3s3p^3$ $^1D_2^o$ – $3s^23p4f$ $^3G_3, {}^1F_3$ at 100.09 Å and 99.13 Å.

The value for the ionization energy was derived by Lotz [23] by extrapolation.

Cr XII

Al I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p$ $^2P_{1/2}^o$

Ionization energy 2 404 000 cm^{-1} (298.0 eV)

Jefferies *et al.* [28] identified the line at 8153.8 Å measured by Jefferies [34] in the solar corona to the magnetic-dipole transition $3s^23p$ $^2P_{1/2}^o$ – $^2P_{3/2}^o$.

Träbert *et al.* [36] observed the $3s^23p$ $^2P^o$ – $3s3p^2$ ^4P spin-forbidden transitions in beam-foil spectra, with estimated uncertainties ranging from 0.4 Å to 0.8 Å. The wavelength of 555.0±0.5 Å for the $^2P_{3/2}^o$ – $^4P_{1/2}$ line is shorter by 1 Å than the calculated one, 556.0 Å.

Gabriel *et al.* [5] and Fawcett *et al.* [32] identified the $3s^23p$ $^2P^o$– $3s^23d$ ^2D doublet. The $3s^23p$ – $3s3p^2$ array was given by Fawcett and Peacock [31]. These identifications were followed by Fawcett [8,24] who added the $3s3p^2$ ^4P – $3p^3$ $^4S^o$, the $3s^23p$ $^2P^o$ – $3s3p^2$ ^2S, and the $3s^23p$ $^2P_{1/2}^o$ – $3s3p^2$ $^2P_{3/2}$ lines. These results were revised and extended by Litzén and Redfors [38] and Redfors and Litzén [39] in observations of laser-produced plasmas in the range of 220 – 471 Å. They reported 46 transitions between levels in the $3s^23p$, $3s3p^2$, $3s^23d$, $3p^3$, and $3s3p3d$ configurations. Wavelengths were measured with an estimated uncertainty of ±0.02 Å. Two $3s3p^2$ – $3s3p(^3P^o)3d$ lines were reobserved by Levashov *et al.* [40] at 245.87 Å for $^4P_{3/2}$ – $^4P_{1/2}^o$ and at 246.27 Å for $^4P_{1/2}$– $^4D_{1/2}^o$.

The transition arrays $3p^3$, $3s3p3d$ – $3p^23d$, $3s3d^2$ were newly identified by Churilov and Levashov [41] in a laser-produced plasma with an estimated uncertainty of ±0.02 Å. We have adopted their results except for the energy levels of $3p^3$ $^2P_{1/2}^o$ and $^2D_{3/2}^o$, $3s3p(^1P^o)3d$ $^2P_{1/2}^o$ taken from Redfors and Litzén [39]. The line at 412.46 Å identified by Fawcett [24] as the $3s^23p$ $^2P_{3/2}^o$–$3s3p^2$ $^2D_{3/2}$ transition has been omitted, because this line was not observed by Redfors and Litzén.

The $3p$ $^2P^o$–$4d$ ^2D doublet was identified by Edlén [42] at ~76 Å. Fawcett *et al.* [43] identified the $3d$ ^2D–$4f$ $^2F^o$ doublet, the $3s3p3d$ $^4F^o$ – $3s3p4f$ ^4G, and $3s3p^2$ ^4P – $3s3p4s$ $^4P^o$ quartets in the range of 90 – 101 Å.

The value for the ionization energy was obtained by Lotz [23] by extrapolation.

Cr XIII

Mg I isoelectronic sequence

Ground state $1s^22s^22p^63s^2$ $^1S_0$

Ionization energy 2 862 000 cm^{-1} (354.8 eV)

Classifications of the $n = 3 - 3$ transitions were made in a series of articles of Fawcett *et al.* [22,32], Fawcett and Peacock [31], and Fawcett [8] for the transitions between levels in the $3s^2$, $3s3p$, $3s3d$, $3p^2$, and $3p3d$ configurations. Litzén and Redfors [44] reobserved the spectrum in the range of 228 – 635 Å in a laser-produced plasma and identified 42 lines, including 20 lines from the earlier works. Wavelengths were measured with an estimated uncertainty of ±0.02 Å. Their results are adopted here. However, the $3s3d$ $^1D_2$ – $3p3d$ $^1D_2^o$ line at 634.78 Å differs by about 0.05 Å from the calculated wavelength. Therefore, we have modified the upper $3p3d$ $^1D_2^o$ level to 819961 cm^{-1}. The $3p^2$ $^3P_0$ – $3p3d$ $^3D_1^o$ line at 269.47 Å is perturbed. The $3s^2$ $^1S_0$ – $3s3p$ $^3P_1^o$ transition at 482.17±0.02 Å and the $^1S_0$ – $^1P_1^o$ resonance transition at 328.267±0.004 Å were observed in a tokamak plasma by Peacock *et al.* [45]. Their mesurements are the most accurate for these lines, compared with the earlier observations in Refs. [18,25,44,46].

The $3p3d$ – $3d^2$ transitions were identified by Levashov and Churilov [47], Redfors [48] and more comprehensively by Churilov *et al.* [49] in the range of 252 – 353 Å in laser-produced plasmas. Wavelengths of Redfors given to the third decimal place are adopted except for a blended $3p3d$ $^3F_4^o$ – $3d^2$ $^3F_4$ line at 269.446 Å. For this line, we have adopted 269.411 Å from Ref. [49]. There appear to be some exceptions to the stated experimental uncertainty estimated to be ±0.02 Å in the identifications in Ref. [49]. The designations of the lower $3p3d$ $^3P_1^o$ and $^3D_1^o$ levels have been interchanged, according to the level scheme of Litzén and Redfors [44]. Futhermore, 25 cm^{-1}

is added to the $3d^2\ ^3\mathrm{P}_{1,2}$ levels, so that their wavelengths agree better with calculated ones. The line at 305.87 Å is blended and tentatively identified as the $3p3d\ ^3\mathrm{D}^\circ_2 - 3d^2\ ^3\mathrm{F}_3$ transition.

Edlén [42] first identified triplet systems of the $3s3p - 3s4s$, $3s3p - 3snd$ ($n = 4,5$), and $3s3d - 3snf$ ($n = 4,5$) transitions in the range of 53 – 92 Å, together with the $3s^2\ ^1\mathrm{S} - 3s4p\ ^1\mathrm{P}^\circ$ resonance line at 66.983 Å. Singlet systems were identified by Fawcett *et al.* [43] for the $3s3d - 3s4f$ transition at 97.25±0.01 Å and by Fawcett *et al.* [22] for the $3s3p - 3s4d$ and $3p^2 - 3s4f$ transitions at 76.17±0.015 Å and 82.79±0.015 Å. Fawcett *et al.* [43] also provided the $3p3d - 3p4f$ transitions with 10 lines in the range of 90 – 97 Å. Identifications of the $3s3d - 3snf$ ($n = 6,7$), $3p^2 - 3p4s$, $3s3p - 3sns$ ($n = 4-6$), $3s3p - 3snd$ ($n = 5,6$), $3p^2 - 3p4d$, $3s^2 - 3snp$ ($n = 5-7$), and $3s3p - 3p4p$ transitions in the range of 40 – 92 Å are taken from Fawcett *et al.* [27]

The value for the ionization energy was obtained by Lotz [23] by extrapolation.

Cr XIV

Na I isoelectronic sequence

Ground state $1s^22s^22p^63s\ ^2\mathrm{S}_{1/2}$

Ionization energy 3 098 520 ± 200 cm^{-1}
(384.171 ± 0.025 eV)

Fawcett *et al.* [32] and Fawcett and Peacock [31] identified five lines of the $3s - 3p$ and $3p - 3d$ transition arrays in the ranges of 389 – 412 Å and 289 – 302 Å, respectively, in a laser-produced plasma. These $n = 3-3$ arrays were remeasured in Refs. [18,22,45,50,51,52]. An isoelectronic comparison of the measured wavelengths, including the $3d - 4f$ doublet, with Dirac-Fock calculations was made by Reader *et al.* [53] for Ar^{7+} to Xe^{43+}, and least-squares adjusted wavelengths were derived. The overall uncertainty estimate is ±0.007 Å. Levels of the $2p^63p$, $2p^63d$, and $2p^64f$ configurations have been derived from these wavelengths.

Jupén *et al.* [54] identified the line at 281.67±0.05 Å measured by Buchet-Poulizac *et al.* [52] in a beam-foil spectrum, to the core-excited $2p^53s3p\ ^4\mathrm{D}_{7/2} - 2p^53s3d\ ^4\mathrm{F}^\circ_{9/2}$ transition.

The $4f\ ^2\mathrm{F}^\circ - 5g\ ^2\mathrm{G}$ and $4d\ ^2\mathrm{D} - 5f\ ^2\mathrm{F}^\circ$ doublets at ~205 Å and ~187 Å were identified by Lawson and Peacock [55]. Their observations were made in a laser-produced plasma with an estimated uncertainty of ±0.06 Å. The $4d\ ^2\mathrm{D}_{5/2} - 5f\ ^2\mathrm{F}^\circ_{7/2}$ line at 187.30 Å is blended.

Edlén [56] identified the transitions $3s - np$ ($n = 4,5$), $3p - 4s$, $3p - nd$ ($n = 4,5$), and $3d - nf$ ($n = 4-6$) in vacuum spark discharges. Except for the $3s - 4p$ and $3p - 4d$ transitions his results are quoted. The $3d - 4p$ lines at ~101 Å were identified by Fawcett *et al.* [43].

Identifications along Rydberg series have been taken from Fawcett *et al.* [27] for the $3d - nf$ ($n = 9,10$) and $3p - nd$ ($n = 10,11$) transitions and from Cohen and Behring [51] for the $3s - np$ ($n = 4, 6-9$), $3p - ns$ ($n = 5-7$), $3p - nd$ ($n = 4, 6-9$), $3d - 5p$ and $3d - nf$ ($n = 6-8$) transitions.

The inner-shell transitions $2p^63s^2\mathrm{S}_{1/2} - 2p^53s^2\ ^2\mathrm{P}^\circ_{3/2,1/2}$ at 21.770±0.005 Å and 21.467±0.005 Å were observed by Feldman and Cohen [57] with a low-inductance vacuum spark source.

The value for the ionization energy was derived by Edlén [58] using core polarization theory applied to the nf series.

Cr XV

Ne I isoelectronic sequence

Ground state $1s^22s^22p^6\ ^1\mathrm{S}_0$

Ionization energy 8 151 000 ± 5000 cm^{-1}
(1010.6 ± 0.6 eV)

Edlén and Tyrén [59], and Tyrén [60] identified the $2p^6 - 2p^53s$, $3d$ resonance lines in the range of 18.5 – 21.2 Å with a vacuum spark. Tyrén's wavelengths are quoted here. These lines were reobserved by Klapisch *et al.* [61] in a tokamak plasma and by McKenzie and Landecker [62] in the solar corona, both of whom also found the magnetic quadrupole $2p^6\ ^1\mathrm{S}_0 - 2p^53s\ (\frac{3}{2},\frac{1}{2})^\circ_2$ line. The wavelength of 21.213 Å is from Ref. [61]. In the wavelength range shorter than 17 Å, Tyrén also identified the $2s^22p^6 - 2s2p^63p$ and $2p^6 - 2p^54d$ transitions. Swartz *et al.* [63] found the $2p^6 - 2p^5nd$ ($n = 5,6$) transitions with a vacuum spark. The lines at 15.788 Å and 15.509 Å in Ref. [63] are omitted because the upper $2p^54s\ (\frac{3}{2},\frac{1}{2})^\circ_1$ and $(\frac{1}{2},\frac{1}{2})^\circ_1$ levels disagree with those of Jupén *et al.* [64].

The $3s - 3p$ and $3p - 3d$ arrays were observed by Jupén and Litzén [65,66] in laser-produced plasmas and by Buchet-Poulizac *et al.* [52] and Buchet *et al.* [67] in beam-foil spectra. Wavelengths in the range of 240 – 471 Å are taken mainly from Ref. [66] and additionally from Refs. [52,67]. The estimated uncertainty of the wavelengths range from ±0.02 Å to ±0.1 Å. The doubly classified line at 405.035 Å in Ref. [66] and two lines at 298.11 Å and 240.2 Å in Ref. [67] are compiled, although there appear discrepancies of −0.20 Å, 0.16 Å, and −0.12 Å between the observed and calculated wavelengths. But, the line at 453.40 Å in Ref. [67] is omitted, because it shows a large deviation of 1.65 Å from the calculated wavelength, 451.75 Å.

Kastner [68] identified a coronal line at 1696.26 Å as the $2p^53s(\frac{3}{2},\frac{1}{2})^\circ_1 - (\frac{1}{2},\frac{1}{2})^\circ_0$ transition. But it is excluded, because the splitting of the terms is inconsistent with that of Jupén *et al.* [64].

Finkenthal *et al.* [69] identified five lines in the range of 97 – 111 Å as the $2s^22p^53s - 2s2p^63s$ transitions in a tokamak plasma with a measurement uncertainty estimated to be ±0.02 Å. Three lines at 111.27 Å, 103.51 Å, and

102.18 Å of the $^1P^o_1$, $^3P^o_{1,2} - ^3S_1$ transitions are omitted, because the upper $^3S_1$ level values obtained from these lines are incompatible with each other.

The $3p - 4d$ transitions were first identified by Kastner *et al.* [70] and also by Fawcett *et al.* [71], together with the $3s - 4p$ and $3d - 4f$ transitions. More complete and improved measurements were reported by Jupén *et al.* [64] with a laser-produced plasma. They found 54 lines, including the $3p - 4s$ transitions, in the range of 57 – 79 Å, which are quoted here. The estimated wavelength uncertainty varies from ±0.005 to ±0.01 Å. The wavelengths of 74.029 Å and 63.016 Å in Ref. [64] have been changed to 74.209 Å and 63.061 Å because they appear to be misprints. We have adopted the energy levels of Jupén *et al.* for the $2s^22p^53l$ and $2s^22p^54l$ configurations, except for their predicted $2s^22p^5(^2P^o_{1/2,3/2})4f\ ^2[\frac{5}{2}]_2$ levels.

The ionization energy was derived [72] from the $2p^5nd\ ^3D_1$ series for the $n = 3 - 5$. The $n = 6$ term does not fit well to this series calculation.

Cr XVI

F I isoelectronic sequence

Ground state $1s^22s^22p^5\ ^2P^o_{3/2}$

Ionization energy 8 8450 000 cm^{-1} (1096.64 eV)

Hinnov *et al.* [73], Peacock *et al.* [45] and Finkenthal *et al.* [74] observed the magnetic-dipole $2s^22p^5\ ^2P^o_{3/2} - ^2P^o_{1/2}$ transition in tokamak discharges. The most accurate wavelength of 1410.60±0.02 Å is given by Peacock *et al.*

The $2s^22p^5\ ^2P^o - 2s2p^6\ ^2S$ doublet was observed by Fawcett [75], Doschek *et al.* [76] and Lawson and Peacock [55] in laser-produced plasmas, by Breton *et al.* [77], Sugar *et al.* [78] and Davé *et al.* [25] in tokamak plasmas, and by Buchet-Poulizac *et al.* [52] in a beam-foil spectrum. Wavelength values of 115.355 Å and 106.633 Å with an estimated uncertainty of ±0.005 Å are taken from the most accurate measurement of Sugar *et al.* [78].

Feldman *et al.* [79] reported observations with a low-inductance vacuum spark, in which the transitions $2s2p^6 - 2s2p^53s$, $2p^5 - 2p^43s$ and $2p^5 - 2p^43d$ in the range of 17 – 20 Å were identified, revising and extending the earlier work of Cohen *et al.* [80]. We give the Feldman *et al.* results with an uncertainty estimated to be ±0.01 Å. Four lines at 17.81 Å, 17.86 Å, 17.46 Å and 17.38 Å, identified in the $2p^5 - 2p^43d$ array in Ref. [80] have been excluded, because these lines were not confirmed by Feldman *et al.* [79]. Remeasurement of the $2p^5 - 2p^43s$, $3d$ transitions in the solar corona was made by McKenzie and Landecker [62], whose wavelengths agree with those in Ref. [79] within 0.006 Å.

Spector *et al.* [81] identified the forbidden transition $2p^5\ ^2P^o_{3/2} - 2p^4(^1D)4d\ ^2F_{5/2}$ at 13.528±0.005 Å in a laser-produced plasma. This line has been omitted, because it is an isolated identification.

For the ionization energy we use a value calculated by Cheng [82] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [83].

Cr XVII

O I isoelectronic sequence

Ground state $1s^22s^22p^4\ ^3P_2$

Ionization energy 9 576 300 cm^{-1} (1187.31 eV)

Four magnetic-dipole transitions within the ground configuration were identified in tokamak discharges. We adopted the following results: the $^3P_2 - ^3P_1$ and $^3P_1 - ^1S_0$ lines at 1656.3±0.2 Å and 493.8±0.3 Å of Hinnov *et al.* [73], the $^3P_1 - ^1D_2$ line at 1340.7±0.4 Å of Finkenthal *et al.* [74], and the $^3P_2 - ^1D_2$ line at 740.75±0.03 Å of Peacock *et al.* [45].

The $2s^22p^4 - 2s2p^5$ arrays were observed by Fawcett [75], Doschek *et al.* [76] and Lawson and Peacock [55] in laser-produced plasmas, by Breton *et al.* [77] Davé *et al.* [25], and Sugar *et al.* [78] in tokamak plasmas, and by Buchet-Poulizac *et al.* [52] in a beam-foil spectrum. The measurement of Lawson and Peacock in the range of 94 – 148 Å is the most comprehensive and their wavelengths are adopted here except for four strong lines comprising the $2s^22p^4\ ^3P - 2s2p^5\ ^3P^o$ triplet and the $^1D_2 - ^1P^o_1$ transition, remeasured by Sugar *et al.* [78] with an uncertainty of ±0.005 Å. The estimated uncertainty of the wavelengths in Ref. [55] is ±0.03 Å. They also found the $2s2p^5\ ^1P^o_1 - 2p^6\ ^1S_0$ transition at 129.78 Å, identified first by Doschek *et al.* [84], and the $^3P^o_1 - ^1S_0$ transition at 97.20 Å.

The $2p^4 - 2p^33s$ array at ~18 Å was identified by Doschek *et al.* [85]. Wavelengths with an uncertainty estimated to be ±0.01 Å were measured in laser-produced plasmas. Some lines are doubly classified.

An analysis of the $2p^4 - 2p^33d$ arrays at ~16 Å containing eight lines was made by Fawcett and Hayes [86] with a laser-produced plasma. The estimated uncertainty of the wavelengths is ±0.01 Å.

Spector *et al.* [81] identified the $2p^4\ ^1D_2 - 3p^3(^2D^o)4d\ ^1D^o_2,^3F^o_3$ transitions at 12.909±0.005 Å and 12.779±0.005 Å in a laser-produced plasma.

For the ionization energy we use a value calculated by Cheng [82] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [83].

Cr XVIII

N I isoelectronic sequence

Ground state $1s^22s^22p^3$ $^4S^\circ_{3/2}$

Ionization energy 10 438 000 cm^{-1} (1294.15 eV)

Hinnov *et al.* [73] and Denne and Hinnov [87] identified the magnetic-dipole transitions within the ground configuration with seven lines in the range of 378 – 4039 Å in tokamak plasmas.

Fawcett [75] first identified the $2s^22p^3$ $^2D^\circ$ – $2s2p^4$ ^2D,^2P doublets in a laser-produced plasma. Extended analyses were carried out by Doschek *et al.* [76] and Feldman *et al.* [88]. Remeasurements of this array were made by Breton *et al.* [77] and Davé *et al.* [25] in tokamak plasmas, by Lawson and Peacock [55] in a laser-produced plasma, and by Buchet-Poulizac *et al.* [52] in a beam-foil spectrum. Wavelengths are from the comprehensive measurements of Lawson and Peacock, who identified 20 lines in the range of 90 – 150 Å, including the spin-forbidden transitions from the $^2D_{3/2}$, $^2S_{1/2}$ and $^2P_{3/2}$ terms to the ground $^4S^\circ_{3/2}$. The estimated uncertainty of the wavelengths is ±0.03 Å. Recently, Sugar *et al.* [78] obtained wavelengths with an uncertainty of ±0.005 Å for nine lines of the $2s^22p^3$ – $2s2p^4$ transition arrays in the range of 104.9 – 150.0 Å and gave new level values. Their results are adopted to supercede the results of Ref. [55]. For the transitions at 149.94, 147.79, and 119.62 Å in Ref. [55], the wavelengths differ by about ±0.06 Å from the recalculated ones using the level values adopted from Ref. [78].

Lawson and Peacock [55] also identified seven lines in the range of 93 – 157 Å of the $2s2p^4 - 2p^5$ array, including the $^2D - {}^2P^\circ$ doublet in the earlier works of Fawcett and Hayes [86] and Doschek *et al.* [84].

Fawcett and Hayes [86] and McKenzie and Landecker [62] identified the $2p^3$ – $2p^23d$ transitions at 15.60 Å in a laser-produced plasma and at 15.519±0.01 Å in the solar corona, respectively.

For the ionization energy we use a value calculated by Cheng [82] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [83].

Cr XIX

C I isoelectronic sequence

Ground state $1s^22s^22p^2$ $^3P_0$

Ionization energy 11 259 900 cm^{-1} (1396.05 eV)

The magnetic-dipole transitions within the ground configuration were observed in tokamak plasmas by Hinnov and Suckewer [89], Hinnov *et al.* [73], Denne and Hinnov [87], and Finkenthal *et al.* [74]. Wavelengths adopted here are taken from Ref. [73] for the $^3P_{1,(0)} - {}^3P_{2,(1)}$ lines at 2885.4 Å and 2090.9 Å and $^3P_1 - {}^1S_0$ at 398.4 Å and from Ref. [87] for the $^3P_{2,1}$ – $^1D_2$ lines at 979.1 Å and 731.1 Å.

Feldman *et al.* [88] and Fawcett and Hayes [86] identified the $2s^22p^2$ – $2s2p^3$ arrays in laser-produced plasmas and Breton *et al.* [77] reobserved them in a tokamak plasma. Fawcett and Hayes also reported the $2s2p^3$ $^3D^\circ$ – $2p^4$ ^3P triplet. Tabulated wavelengths are taken from a more extensive analysis with a laser-produced plasma of Lawson and Peacock [55], who gave identifications for 39 lines due to the $2s^22p^2$ – $2s2p^3$ and $2s2p^3$ – $2p^4$ transitions in the range of 95 – 202 Å. The uncertainties of the wavelengths are estimated to be ±0.03 Å below 180 Å and ±0.06 Å above 180 Å. Some lines were recently reobserved by Buchet-Poulizac *et al.* [52] in beam-foil spectra and by Davé *et al.* [25] and Sugar *et al.* [78] in tokamak plasmas. In Ref. [78], wavelengths with an uncertainty of ±0.005 Å are given for 10 lines of the $2s^22p^2$ – $2s2p^3$ array in the range of 109.6 – 165.5 Å, and also the energy levels are derived. Their results are adopted here. The $2s2p^3$ $^5S^\circ_2$ – $2p^4$ $^3P_2$ transition at 95.62 Å in Ref. [55] is questionable and has been omitted, because the lower $^5S^\circ_2$ level is inconsistent with that of Edlén [90].

The TFR group *et al.* [91] observed four lines of inner-shell transitions $1s^22s^22p^2$ – $1s2s^22p^3$ at ~ 2.2 Å.

For the ionization energy we use a value calculated by Cheng [82] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [83].

Cr XX

B I isoelectronic sequence

Ground state $1s^22s^22p$ $^2P^\circ_{1/2}$

Ionization energy 12 061 300 cm^{-1} (1495.41 eV)

The magnetic-dipole transition $^2P^\circ_{1/2}$ – $^2P^\circ_{3/2}$ within the ground configuration was observed in tokamak plasmas by Hinnov and Suckewer [89], Hinnov *et al.* [73] and Finkenthal *et al.* [74]. The wavelength of 1205.9±0.3 Å adopted here is from Ref. [73].

The $2s^22p$ – $2s2p^2$ arrays were identified by Doschek *et al.* [92] and Fawcett and Hayes [86] in laser-produced plasmas and more fully by Breton *et al.* [77] in a tokamak plasma. Extensive measurements of both the $2s^22p - 2s2p^2$ and the $2s2p^2 - 2p^3$ arrays were made with a laser-produced plasma by Lawson and Peacock [55], who classified 28 lines in the range of 116 – 272 Å. Their results are adopted here except for new results of Sugar *et al.* [78] who remeasured seven lines of the $2s^22p$–$2s2p^2$ array in the range of 116.0 – 175.5 Å with an uncertainty of ±0.005 Å. The uncertainties of the wavelengths in Ref. [55] are estimated to be ±0.03 Å below 180 Å and ±0.06 Å above 180 Å. A recent reobservation of the $2s^22p$ – $2s2p^2$ arrays in a tokamak plasma are reported by Davé *et al.* [25]. The designation of the two levels $2s2p^2\ ^2\text{P}_{1/2}$ and $^2\text{S}_{1/2}$ has been interchanged, according to Edlén [93] and to the percentage composition given by Sugar and Corliss [72].

The $2s^22p - 2s^24l$ ($l = s,d$) transitions at ~11 Å were identified by Spector *et al.* [81] in a laser-produced plasma with an estimated uncertainty of ±0.005 Å. They also identified two lines due to the $2s2p^2 - 2s2p3d$ transitions. Burkhalter *et al.* [94] extended the identifications to 24 lines in the range of 14.0–14.7 Å with a similar light source but there are many blends and the match to the calculation is not very good. We give their wavelengths with an estimated uncertainty of ±0.003 Å.

The TFR group *et al.* [91] observed four lines of the inner-shell transitions $1s^22s^22p - 1s2s^22p^2$ at ~2.2 Å.

For the ionization energy we use a value calculated by Cheng [82] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [83].

Cr XXI

Be I isoelectronic sequence

Ground state $1s^22s^2\ ^1\text{S}_0$

Ionization energy 13 185 400 cm^{-1} (1634.78 eV)

The $2s^2\ ^1\text{S}_0 - 2s2p\ ^3\text{P}^\circ_1$ transition was observed in the solar corona by Widing [95], Sandlin *et al.* [96], and Dere [18]. Dere's wavelength of 293.15±0.03 Å is given in this compilation. The resonance transition $2s^2\ ^1\text{S}_0 - 2s2p\ ^1\text{P}^\circ_1$ was observed by Breton *et al.* [77], Hinnov [97], and Sugar *et al.* [78] in tokamak plasmas and by Lawson and Peacock [55] in a laser-produced plasma. The wavelength of 149.907±0.005 Å and the energy levels were taken from Sugar *et al.* Davé *et al.* [25] reobserved both lines at 293.24±0.02 Å and 149.87±0.02 Å in a tokamak plasma, but both are blended. Lawson and Peacock also identified the $2s2p - 2p^2$ transitions, including the intercombination line $^3\text{P}^\circ_2 - {}^1\text{D}_2$, in the range of 154 – 260 Å. The uncertainties of the wavelengths are estimated to be ±0.03 Å below 180 Å and ±0.06 Å above 180 Å.

The $n = 2-3$ transition arrays in the range of 13–14 Å were first identified by Fawcett and Hayes [86] and more extensively by Boiko *et al.* [98, 99] in laser-produced plasmas. Some of the lines are given as unresolved blended lines. Except for the line at 13.55±0.01 Å of Fawcett and Hayes, the estimated uncertainty of the wavelengths is ±0.003 Å. Remeasurements were made by Spector *et al.* [81] and Burkhalter *et al.* [94] but their wavelengths do not fit with the level scheme of Boiko *et al.* It should be noted that the designation of the $2s^2\ ^1\text{S}_0 - 2s3p\ ^1\text{P}^\circ_1$ line at 13.123 Å from Ref. [99] has been changed to $2s^2\ ^1\text{S}_0 - 2s3p\ ^3\text{P}^\circ_1$, according to the identification of Bromage *et al.* [100] for the V and Fe ions.

The TFR group *et al.* [91] identified the inner-shell transitions $1s^22s2p - 1s2s2p^2$ and $1s^22s^2 - 1s2s^22p$ in the range of 2.20 – 2.22 Å.

For the ionization energy we use a value calculated by Cheng [82] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [83].

Cr XXII

Li I isoelectronic sequence

Ground state $1s^22s\ ^2\text{S}_{1/2}$

Ionization energy 13 882 000 ± 2900 cm^{-1}
(1721.4 ± 0.4 eV)

The resonance transitions were identified by Widing and Purcell [101], Sandlin *et al.* [96], and Dere [18] from solar coronal observations. They were also measured by Lawson and Peacock [55] in a laser-produced plasma, by Grandin *et al.* [102] in a beam-foil spectrum, and by Hinnov [97], Davé *et al.* [25], Knize *et al.* [103], Hinnov *et al.* [104], Sugar *et al.* [78], and Knize [105] in tokamak plasmas. Wavelengths of 279.733±0.005 Å and 223.017±0.005 Å for the $2s\ ^2\text{S}_{1/2} - 2p\ ^2\text{P}^\circ_{1/2,3/2}$ lines are from the more accurate measurement of Sugar *et al.* [78]. Levels of the $2p$ configuration, however, are derived from the smoothed wavelengths of Kim *et al.* [106].

The first identification of the $n = 2-3$ doublets was made with a low-inductance vacuum spark by Goldsmith *et al.* [107], from which the $2p\ ^2\text{P}^\circ_{3/2,1/2} - 3s\ ^2\text{S}_{1/2}$ doublet at 13.549±0.005 Å and 13.393±0.005 Å are quoted here. Observations with an estimated uncertainty of ±0.003 Å in the range of 9.4 – 13.3 Å were carried out with a laser-produced plasma by Aglitskii *et al.* [108], improving on the results for the $2s - 3p$, $4p$ and $2p - 3d$, $4d$ doublets of Goldsmith *et al.* Vainshtein and Safronova [109] calculated energy levels of the $1s^2nl$ configurations with $n = 2-5$, and $l = s, p$, and d. Their energy levels are adjusted to the $1s^22p\ ^2\text{P}^\circ_{1/2,3/2}$ levels of Kim *et al.* by subtracting 120 cm^{-1}.

The $1s^22p - 1s2p^2$ and $1s^22s - 1s2s2p$ inner-shell transitions were observed at ~2.2 Å in tokamak discharges by the TFR group *et al.* [91], and by Bryzgunov *et al.* [110]. Apicella *et al.* [111] remeasured the $1s^22s\ ^2\text{S}_{1/2} - 1s2s2p\ ^2\text{P}^\circ_{1/2}$ line as well as the $1s^2nl - 1s2pnl$ ($nl = 3s, 3p, 3d, 4p$) transitions. Except for the $1s^23p\ ^2\text{P}^\circ_{3/2} - 1s2p3p\ ^2\text{D}_{5/2}$ line, they are given as the aggregates of emission lines. Vainshtein and Safronova also calculated wavelengths of the $1s^22s - 1s2s2p$, $1s^22p - 1s2p^2$, and $1s^22p - 1s2s^2$ transitions. We use their results to derive these autoionizing levels.

The ionization energy was determined by Edlén [112] from the $2p - nd$ series.

Cr XXIII

He I isoelectronic sequence

Ground state $1s^2\ ^1S_0$

Ionization energy 60 345 500 cm^{-1} (7481.889 eV)

Grandin *et al.* [102] observed the $1s2s\ ^3S_1 - 1s2p\ ^3P^\circ_2$ transition at 325.36±0.5 Å in a beam-foil spectrum.

The TFR group *et al.* [91] identified the forbidden transitions $1s^2\ ^1S_0 - 1s2s\ ^3S_1$ at 2.2035 Å, $1s^2\ ^1S_0 - 1s2p\ ^3P^\circ_{1,2}$ at 2.1927 Å and 2.1886 Å, and the resonance line $1s^2\ ^1S_0 - 1s2p\ ^1P^\circ_1$ at 2.1818 Å. For the resonance line, the more accurate wavelength of 2.18193±0.00015 Å was obtained from a tokamak plasma observation of Beiersdorfer *et al.* [113], who also identified the $1s^2\ ^1S_0 - 1snp\ ^1P^\circ_1$ ($n = 4, 5$) transitions at 1.76342 Å and 1.72357 Å. Other measurements of these lines in Refs. [110,111,114,115,116] are less accurate.

Cheng *et al.* [117] give calculated total energies for the ground and n=2 singlet states of selected He-like ions. We use a later calculation of both singlet and triplet states by Cheng [118] for all elements from Ti through Cu and Kr for the $n = 1$ and 2 configurations. With these data and the binding energy of the H-like ions [119] we obtain the value for the ionization energy of the He-like ions. For the $1s3l$ states we use the level values from Drake [120].

The levels $1s4l$ and $5l$ calculated by Vainshtein and Safronova [109] have been tabulated after increasing them by 1300 cm^{-1} to correspond with the values of lower n by Drake. All wavelengths have been derived from differences of the adopted energy levels.

The $1s2s - 2s2p$, $1s2p - 2s^2$, and $1s2p - 2p^2$ transitions were identified by Bitter *et al.* [121] with five lines near 2.51 Å. We have adopted the calculated wavelengths of Vainshtein and Safronova [109] without correction for transitions from the $n = 2$ doubly excited states.

Cr XXIV

H I isoelectronic sequence

Ground state $1s\ ^2S_{1/2}$

Ionization energy 63 675 850 ± 20 cm^{-1}
(7894.802 ± 0.002 eV)

Decaux *et al.* [122] first observed the $1s\ ^2S - 3p\ ^2P^\circ$ resonance transitions in a tokamak plasma.

We have tabulated the wavelengths calculated from the theoretical energy levels of Johnson and Soff [119] for the $n = 2$ shell whose estimated uncertainty is ±10cm^{-1}. Their energy differences are in close agreement with those of Mohr [123]. The levels for $n = 3 - 5$ have been calculated by Erickson [124]. We use his values for the binding energies subtracted from the binding energy of the ground state obtained by Johnson and Soff.

Transition probabilities and oscillator strengths were obtained by scaling the data tabulated for hydrogen spectra by Wiese *et al.* [125]. The scaling was actually performed for the line strengths S, which for a hydrogen-like ion of nuclear charge Z are reduced according to $S_Z = Z^{-2} S_H$, so that

$$S_{\text{Cr XXIV}} = S_H(24)^{-2} = S_H/576.$$

The f and A values were then obtained from the usual numerical conversion formulas, given for example in Ref. [126]. For these conversions the very accurate wavelengths listed in the first column of the Cr XXIV table were used, in which relativistic and QED effects in the energies were taken into account. Relativistic effects in the line strengths are only of the order of 1 – 3% for Cr XXIV, according to the work by Younger and Weiss [127], and have been neglected.

The value for the ionization energy is from Johnson and Soff [119].

2.4.2. Spectroscopic Data for Cr V through Cr XXIV

Cr V

Wavelength (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
1837.442	$3d4s\ ^1D_2$	$3d4p\ ^1D^o_2$	171 698.1	226 119.8	15	1.1	4.3+8	D	1°, 126*
1728.497	$3d4s\ ^1D_2$	$3d4p\ ^3F^o_2$	171 698.1	229 551.7	5				1
1705.968	2	3	171 698.1	230 316.3	2				1
1705.629	$3d4s\ ^3D_2$	$3d4p\ ^1D^o_2$	167 491.0	226 119.8	4				1
1655.639	$3d4s\ ^3D_3$	$3d4p\ ^3D^o_2$	168 089.5	228 489.1	4	3.4 − 1	1.6+8	D	1°, 126*
1652.595	2	1	167 491.0	228 001.8	4	3.1 − 1	2.5+8	D	1°, 126*
1644.053	1	1	167 176.4	228 001.8	6	6.0 − 1	5.0+8	D	1°, 126*
1639.403	2	2	167 491.0	228 489.1	7	1.0	4.9+8	D	1°, 126*
1638.495	3	3	168 089.5	229 120.8	8	1.9	6.8+8	D	1°, 126*
1630.989	1	2	167 176.4	228 489.1	5				1
1622.607	2	3	167 491.0	229 120.8	3	2.0 − 1	7.4+7	D	1°, 126*
1611.330	$3d4s\ ^3D_2$	$3d4p\ ^3F^o_2$	167 491.0	229 551.7	3	4.5 − 2	2.3+7	D	1°, 126*
1607.035	3	3	168 089.5	230 316.3	3	2.2 − 1	8.3+7	D	1°, 126*
1603.191	1	2	167 176.4	229 551.7	12	1.3	7.0+8	D	1°, 126*
1591.721	2	3	167 491.0	230 316.3	13	1.9	7.3+8	D	1°, 126*
1579.696	3	4	168 089.5	231 392.9	15	2.9	8.6+8	D	1°, 126*
1519.030	$3d4s\ ^1D_2$	$3d4p\ ^1F^o_3$	171 698.1	237 529.5	13	2.3	9.5+8	D	1°, 126*
1497.966	$3d4s\ ^3D_3$	$3d4p\ ^3P^o_2$	168 089.5	234 846.4	12	1.3	7.5+8	D	1°, 126*
1489.711	2	1	167 491.0	234 618.4	10	6.5 − 1	6.6+8	D	1°, 126*
1484.666	2	2	167 491.0	234 846.4	7	3.7 − 1	2.2+8	D	1°, 126*
1482.757	1	1	167 176.4	234 618.4	7	3.6 − 1	3.5+8	D	1°, 126*
1481.651	1	0	167 176.4	234 668.5	7	3.3 − 1	1.0+9	D	1°, 126*
1477.769	1	2	167 176.4	234 846.4	1				1
1465.861	$3d4s\ ^1D_2$	$3d4p\ ^1P^o_1$	171 698.1	239 917.5	12	1.0	1.1+9	D	1°, 126*
1263.501	$3d4p\ ^1F^o_3$	$3d4d\ ^1F_3$	237 529.5	316 674.9	10				1
1259.986	$3d4p\ ^1P^o_1$	$3d4d\ ^1P_1$	239 917.5	319 284.0	7				1
1210.499	$3d4p\ ^1P^o_1$	$3d4d\ ^3S_1$	239 917.5	322 528.1	7				1
1204.126	$3d4p\ ^3P^o_2$	$3d4d\ ^3D_1$	234 846.4	317 893.8	4				1
1201.556	0	1	234 668.5	317 893.8	5				1
1200.834	1	1	234 618.4	317 893.8	4				1
1196.042	1	2	234 618.4	318 227.6	9				1
1193.950	2	3	234 846.4	318 601.7	10				1
1146.668	$3d4p\ ^3F^o_4$	$3d4d\ ^3D_3$	231 392.9	318 601.7	3				1
1140.489	$3d4p\ ^3P^o_2$	$3d4d\ ^3S_1$	234 846.4	322 528.1	6				1
1138.177	0	1	234 668.5	322 528.1	2				1
1137.529	1	1	234 618.4	322 528.1	6				1
1134.768	$3d4p\ ^3F^o_4$	$3d4d\ ^3G_4$	231 392.9	319 516.8	3	3.4 − 1	2.0+8	D	1°, 126*
1127.631	4	5	231 392.9	320 074.4	12	7.2	3.5+9	D	1°, 126*
1126.090	3	3	230 316.3	319 119.1	2	8.4 − 1	6.1+8	D	1°, 126*
1121.066	3	4	230 316.3	319 516.8	12	3.6	2.1+9	D	1°, 126*
1116.478	2	3	229 551.7	319 119.1	10				1
1122.255	$3d4p\ ^3D^o_3$	$3d4d\ ^3D_2$	229 120.8	318 227.6	1				1
1118.518	2	1	228 489.1	317 893.8	1				1
1117.559	3	3	229 120.8	318 601.7	9				1
1114.350	2	2	228 489.1	318 227.6	8				1
1112.452	1	1	228 001.8	317 893.8	7				1
1109.731	2	3	228 489.1	318 601.7	1				1
1108.322	1	2	228 001.8	318 227.6	1				1
1118.157	$3d4p\ ^1P^o_1$	$3d4d\ ^1D_2$	239 917.5	329 350.3	7				1
1106.250	$3d4p\ ^3D^o_3$	$3d4d\ ^3G_4$	229 120.8	319 516.8	2	2.0	1.2+9	D	1°, 126*
1103.390	2	3	228 489.1	319 119.1	3	3.1 − 1	2.4+8	D	1°, 126*
1104.296	$3d4p\ ^1D^o_2$	$3d4d\ ^1F_3$	226 119.8	316 674.9	6				1
1089.079	$3d4p\ ^1F^o_3$	$3d4d\ ^1D_2$	237 529.5	329 350.3	1				1
1073.367	$3d4p\ ^1D^o_2$	$3d4d\ ^1P_1$	226 119.8	319 284.0	2				1

Cr V – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1062.933	$3d4p\ ^3F^o_4$	$3d4d\ ^3F_3$	231 392.9	325 472.5					1
1058.298	4	4	231 392.9	325 884.2	5				1
1054.991	3	2	230 316.3	325 104.1					1
1050.901	3	3	230 316.3	325 472.5	4				1
1046.542	2	2	229 551.7	325 104.1	2				1
1046.364	3	4	230 316.3	325 884.2	3				1
1042.544	2	3	229 551.7	325 472.5	3				1
1060.651	$3d4p\ ^1F^o_3$	$3d4d\ ^1G_4$	237 529.5	331 811.2	8				1
1048.236	$3d4p\ ^3P^o_2$	$3d4d\ ^3P_1$	234 846.4	330 245.1	2				1
1047.494	1	0	234 618.4	330 084.8	1				1
1046.294	0	1	234 668.5	330 245.1	2				1
1045.733	1	1	234 618.4	330 245.1	1				1
1045.044	2	2	234 846.4	330 536.8	7				1
1042.544	1	2	234 618.4	330 536.8	3				1
1035.037	$3d4p\ ^3D^o_2$	$3d4d\ ^3F_2$	228 489.1	325 104.1	1				1
1033.452	3	4	229 120.8	325 884.2	5				1
1031.105	2	3	228 489.1	325 472.5	5				1
1029.842	1	2	228 001.8	325 104.1	4				1
1002.024	$3d4p\ ^3F^o_2$	$3d4d\ ^1D_2$	229 551.7	329 350.3					1
997.709	$3d4p\ ^3D^o_3$	$3d4d\ ^1D_2$	229 120.8	329 350.3					1
986.035	$3d4p\ ^3D^o_3$	$3d4d\ ^3P_2$	229 120.8	330 536.8	5				1
982.736	2	1	228 489.1	330 245.1	4				1
979.934	2	2	228 489.1	330 536.8					1
979.590	1	0	228 001.8	330 084.8					1
978.064	1	1	228 001.8	330 245.1					1
968.703	$3d4p\ ^1D^o_2$	$3d4d\ ^1D_2$	226 119.8	329 350.3	7				1
842.195	$3d4p\ ^1P^o_1$	$3d5s\ ^1D_2$	239 917.5	358 653.8	2				1
837.157	$3d4p\ ^1F^o_3$	$3d5s\ ^3D_2$	237 529.5	356 981.3					1
832.309	3	3	237 529.5	357 675.9					1
825.600	$3d4p\ ^1F^o_3$	$3d5s\ ^1D_2$	237 529.5	358 653.8	7				1
819.153	$3d4p\ ^3P^o_0$	$3d5s\ ^3D_1$	234 668.5	356 744.8					1
818.803	1	1	234 618.4	356 744.8					1
818.803	2	2	234 846.4	356 981.3					1
817.246	1	2	234 618.4	356 981.3	1				1
814.148	2	3	234 846.4	357 675.9	3				1
791.872	$3d4p\ ^3F^o_4$	$3d5s\ ^3D_3$	231 392.9	357 675.9	6				1
789.492	3	2	230 316.3	356 981.3	5				1
786.210	2	1	229 551.7	356 744.8	3				1
780.428	2	3	229 551.7	357 675.9	1				1
779.209	$3d4p\ ^3F^o_3$	$3d5s\ ^1D_2$	230 316.3	358 653.8					1
778.253	$3d4p\ ^3D^o_2$	$3d5s\ ^3D_2$	228 489.1	356 981.3	3				1
777.873	3	3	229 120.8	357 675.9	6				1
776.743	1	1	228 001.8	356 744.8	1				1
775.308	1	2	228 001.8	356 981.3					1
774.079	2	3	228 489.1	357 675.9					1
768.251	$3d4p\ ^3D^o_2$	$3d5s\ ^1D_2$	228 489.1	358 653.8					1
764.151	$3d4p\ ^1D^o_2$	$3d5s\ ^3D_2$	226 119.8	356 981.3					1
754.521	$3d4p\ ^1D^o_2$	$3d5s\ ^1D_2$	226 119.8	358 653.8	5				1
668.097C	$3d^2\ ^1G_4$	$3d4s\ ^1D_2$	22 019.2	171 698.1		E2	9.6+3	E	126*
660.284C	$3d^2\ ^3P_2$	$3d4s\ ^3D_2$	16 041.0	167 491.0		E2	1.8+3	E	126*
660.067C	1	1	15 676.6	167 176.4		E2	2.6+3	E	126*
657.898C	0	2	15 491.8	167 491.0		E2	1.2+3	E	126*
657.685C	2	3	16 041.0	168 089.5		E2	2.3+3	E	126*
656.112C	1	3	15 676.6	168 089.5		E2	1.2+3	E	126*
630.875C	$3d^2\ ^1D_2$	$3d4s\ ^1D_2$	13 188.0	171 698.1		E2	6.8+3	E	126*

Cr V – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
601.145^{C}	$3d^2\ ^3F_4$	$3d4s\ ^3D_2$	1 141.7	167 491.0		E2	2.7+3	E	126*
599.994^{C}	3	1	508.2	167 176.4		E2	4.3+3	E	126*
598.990^{C}	4	3	1 141.7	168 089.5		E2	1.0+4	E	126*
598.864^{C}	3	2	508.2	167 491.0		E2	6.5+3	E	126*
598.171^{C}	2	1	0.0	167 176.4		E2	8.8+3	E	126*
597.047^{C}	2	2	0.0	167 491.0		E2	3.8+3	E	126*
596.725^{C}	3	3	508.2	168 089.5		E2	2.9+3	E	126*
594.921^{C}	2	3	0.0	168 089.5		E2	2.7+10	E	126*
529.742	$3d^2\ ^1S_0$	$3d4p\ ^1P^\circ_1$	51 146.4	239 917.5	6				1
470.976	$3d^2\ ^3P_1$	$3d4p\ ^3D^\circ_1$	15 676.6	228 001.8	1				1
470.697	2	2	16 041.0	228 489.1	2				1
470.567	0	1	15 491.8	228 001.8	3	4.9 − 2	4.9+8	D	1°, 126*
469.893	1	2	15 676.6	228 489.1	4	8.1 − 2	4.9+8	D	1°, 126*
469.311	2	3	16 041.0	229 120.8	5	9.0 − 2	3.9+8	D	1°, 126*
469.634	$3d^2\ ^1D_2$	$3d4p\ ^1D^\circ_2$	13 188.0	226 119.8	7	3.8 − 1	2.3+9	D	1°, 126*
464.015	$3d^2\ ^1G_4$	$3d4p\ ^1F^\circ_3$	22 019.2	237 529.5	10	8.1 − 1	3.6+9	D	1°, 126*
457.504	$3d^2\ ^3P_2$	$3d4p\ ^3P^\circ_1$	16 041.0	234 618.4	4	1.1 − 1	1.2+9	D	1°, 126*
457.028	2	2	16 041.0	234 846.4	6	4.2 − 1	2.7+9	D	1°, 126*
456.743	1	1	15 676.6	234 618.4	3	8.7 − 2	9.2+8	D	1°, 126*
456.637	1	0	15 676.6	234 668.5	4	1.0 − 1	3.3+9	D	1°, 126*
456.357	0	1	15 491.8	234 618.4	4	8.9 − 2	9.5+8	D	1°, 126*
456.272	1	2	15 676.6	234 846.4	5	1.0 − 1	6.7+8	D	1°, 126*
451.607	$3d^2\ ^1D_2$	$3d4p\ ^3P^\circ_1$	13 188.0	234 618.4	1				1
451.141	2	2	13 188.0	234 846.4	1				1
446.672	$3d^2\ ^3P_2$	$3d4p\ ^1P^\circ_1$	16 041.0	239 917.5	1				1
445.751	$3d^2\ ^1D_2$	$3d4p\ ^1F^\circ_3$	13 188.0	237 529.5	2	3.9 − 2	1.9+8	D	1°, 126*
442.243	$3d^2\ ^3F_2$	$3d4p\ ^1D^\circ_2$	0.0	226 119.8	2				1
441.056	$3d^2\ ^1D_2$	$3d4p\ ^1P^\circ_1$	13 188.0	239 917.5	5	2.0 − 1	2.3+9	D	1°, 126*
438.618	$3d^2\ ^3F_4$	$3d4p\ ^3D^\circ_3$	1 141.7	229 120.8	10				1
438.618	3	2	508.2	228 489.1	10				1
438.618	2	1	0.0	228 001.8	10				1
437.655	2	2	0.0	228 489.1	3	1.9 − 1	1.3+9	D	1°, 126*
437.420	3	3	508.2	229 120.8	4	2.7 − 1	1.4+9	D	1°, 126*
436.601	$3d^2\ ^3F_3$	$3d4p\ ^3F^\circ_2$	508.2	229 551.7	4	3.0 − 1	2.1+9	D	1°, 126*
436.351	4	3	1 141.7	230 316.3	4	4.8 − 1	2.4+9	D	1°, 126*
435.636	2	2	0.0	229 551.7	5	4.0 − 2	2.8+8	D	1°, 126*
435.143	3	3	508.2	230 316.3	5	5.7 − 2	2.9+8	D	1°, 126*
434.306	4	4	1 141.7	231 392.9	7	3.8 − 1	1.5+9	D	1°, 126*
434.180	2	3	0.0	230 316.3	1				1
433.119	3	4	508.2	231 392.9	2				1

Cr VI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2495.708	$3p^6(^1S)4d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2F^o_{7/2}$	402 888.6	442 945.4	5				9
2176.648	$3p^6(^1S)5p\ ^2P^o_{3/2}$	$3p^6(^1S)5d\ ^2D_{5/2}$	488 561.9	534 489.7	8				9
2136.433	1/2	3/2	487 589.5	534 381.7	6				9
2044.777	$3p^6(^1S)5g\ ^2G_{9/2}$	$3p^6(^1S)6h\ ^2H^o_{9/2}$	572 274.4	621 162.9	9				9
2044.777	9/2	11/2	572 274.4	621 162.9	9				9
2044.777	7/2	9/2	572 272.3	621 162.9	9				9
1933.955	$3p^6(^1S)5f\ ^2F^o_{7/2}$	$3p^6(^1S)6g\ ^2G_{9/2}$	568 993.0	620 700.5	3				9
1932.783	5/2	7/2	568 957.4	620 696.3	2				9
1924.089	$3p^6(^1S)4f\ ^2F^o_{7/2}$	$3p^6(^1S)5d\ ^2D_{5/2}$	482 517.1	534 489.7	5				9
1907.462	5/2	3/2	481 956.0	534 381.7	4				9
1455.282	$3p^6(^1S)4s\ ^2S_{1/2}$	$3p^6(^1S)4p\ ^2P^o_{1/2}$	227 857.9	296 573.2	15				9
1417.659	1/2	3/2	227 857.9	298 396.7	16				9
1360.504	$3p^6(^1S)5p\ ^2P^o_{3/2}$	$3p^6(^1S)6s\ ^2S_{1/2}$	488 561.9	562 064.1	5				9
1342.741	1/2	1/2	487 589.5	562 064.1	4				9
1281.439	$3p^6(^1S)5g\ ^2G_{9/2}$	$3p^6(^1S)7h\ ^2H^o_{9/2}$	572 274.4	650 310.8	5				9
1281.439	9/2	11/2	572 274.4	650 310.8	5				9
1281.439	7/2	9/2	572 272.3	650 310.8	5				9
1264.746	$3p^6(^1S)4d\ ^2D_{5/2}$	$3p^6(^1S)4f\ ^2F^o_{5/2}$	402 888.6	481 956.0	4				9
1261.128	3/2	5/2	402 661.7	481 956.0	7				9
1255.832	5/2	7/2	402 888.6	482 517.1	8				9
1177.469	$3p^6(^1S)4d\ ^2D_{3/2}$	$3p^6(^1S)5p\ ^2P^o_{1/2}$	402 661.7	487 589.5	5				9
1167.222	5/2	3/2	402 888.6	488 561.9	6				9
1164.146	3/2	3/2	402 661.7	488 561.9	2				9
1114.114	$3p^6(^1S)4f\ ^2F^o_{7/2}$	$3p^6(^1S)5g\ ^2G_{9/2}$	482 517.1	572 274.4	8				9
1107.225	5/2	7/2	481 956.0	572 272.3	7				9
1103.926	$3p^6(^1S)4d\ ^2D_{3/2}$	$3p^5(^2P^o)3d^2(^3P)\ ^2P^o_{1/2}$	402 661.7	493 247.1	2				9
1086.681	5/2	3/2	402 888.6	494 911.2	2				9
959.093	$3p^6(^1S)4p\ ^2P^o_{3/2}$	$3p^6(^1S)4d\ ^2D_{3/2}$	298 396.7	402 661.7	10				9
957.009	3/2	5/2	298 396.7	402 888.6	14				8, 9°
942.610	1/2	3/2	296 573.2	402 661.7	13				8, 9°
773.223	$3p^5(^2P^o)3d^2(^3F)\ ^2F^o_{7/2}$	$3p^6(^1S)5g\ ^2G_{9/2}$	442 945.4	572 274.4	3				9
756.786	5/2	7/2	440 135.2	572 272.3	2				9
723.675	$3p^6(^1S)4f\ ^2F^o_{7/2}$	$3p^6(^1S)6g\ ^2G_{9/2}$	482 517.1	620 700.5	1				9
720.771	5/2	7/2	481 956.0	620 696.3	1				9
614.028	$3p^6(^1S)4p\ ^2P^o_{3/2}$	$3p^6(^1S)5s\ ^2S_{1/2}$	298 396.7	461 253.0	4				9
607.239	1/2	1/2	296 573.2	461 253.0	3				9
602.011	$3p^6(^1S)4d\ ^2D_{5/2}$	$3p^6(^1S)5f\ ^2F^o_{7/2}$	402 888.6	568 993.0					9
562.572	$3p^5(^2P^o)3d^2(^3F)\ ^2F^o_{7/2}$	$3p^6(^1S)6g\ ^2G_{9/2}$	442 945.4	620 700.5					9
423.559	$3p^6(^1S)4p\ ^2P^o_{3/2}$	$3p^6(^1S)5d\ ^2D_{5/2}$	298 396.7	534 489.7					9
420.499	1/2	3/2	296 573.2	534 381.7					9
385.015	$3p^6(^1S)4s\ ^2S_{1/2}$	$3p^6(^1S)5p\ ^2P^o_{1/2}$	227 857.9	487 589.5					9
383.575	1/2	3/2	227 857.9	488 561.9					9
337.185	$3p^6(^1S)3d\ ^2D_{3/2}$	$3p^6(^1S)4p\ ^2P^o_{1/2}$	0	296 573.2	12				9
336.184	5/2	3/2	940	298 396.7	14				9
335.123	3/2	3/2	0	298 396.7	7				9
280.879	$3p^6(^1S)3d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1G)\ ^2F^o_{5/2}$	940	356 962	2	2.8 − 3	4.0+7	D	9°, 126*
280.143	3/2	5/2	0	356 962	4	4.0 − 2	5.7+8	D−	9°, 126*
279.154	5/2	7/2	940	359 165	5	5.8 − 2	6.2+8	D−	9°, 126*
269.776	$3p^6(^1S)3d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1D)\ ^2F^o_{7/2}$	940	371 618	10	2.3 − 1	2.7+9	D−	9°, 126*
264.732	5/2	5/2	940	378 677	2	1.1 − 2	1.8+8	E	9°, 126*
264.078	3/2	5/2	0	378 677	9	1.6 − 1	2.6+9	D−	9°, 126*

Cr VI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
227.689	$3p^6(^1S)3d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2F^o_{5/2}$	940	440 135.2	5	2.2 − 1	4.6+9	E	9°, 126*
227.202	3/2	5/2	0	440 135.2	11	3.1	6.6+10	D−	5, 9°, 126*
226.241	5/2	7/2	940	442 945.4	12	4.4	7.2+10	D−	5, 9°, 126*
207.892	$3p^6(^1S)3d\ ^2D_{5/2}$	$3p^6(^1S)4f\ ^2F^o_{5/2}$	940	481 956.0	6				9
207.651	5/2	7/2	940	482 517.1	12				5, 9°
207.489	3/2	5/2	0	481 956.0	11				5, 9°
205.084	$3p^6(^1S)3d\ ^2D_{5/2}$	$3p^6(^1S)5p\ ^2P^o_{3/2}$	940	488 561.9	12				9
205.084	3/2	1/2	0	487 589.5	12				9
204.682	3/2	3/2	0	488 561.9	6				9
202.739	$3p^6(^1S)3d\ ^2D_{3/2}$	$3p^5(^2P^o)3d^2(^3P)\ ^2P^o_{1/2}$	0	493 247.1	10	1.4	1.2+11	D−	9°, 126*
202.442	5/2	3/2	940	494 911.2	11	2.6	1.0+11	D−	9°, 126*
202.057	3/2	3/2	0	494 911.2	6	2.8 − 1	1.2+10	E	9°, 126*
201.606	$3p^6(^1S)3d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2D^o_{5/2}$	940	496 958	12	9.6	2.6+11	D−	3, 5, 9°, 126*
201.388	5/2	3/2	940	497 495	8	6.6 − 1	2.7+10	E	3, 5, 9°, 126*
201.224	3/2	5/2	0	496 958	9	6.8 − 1	1.8+10	E	3, 5, 9°, 126*
201.007	3/2	3/2	0	497 495	11	6.0	2.5+11	D−	3, 5, 9°, 126*
176.037	$3p^6(^1S)3d\ ^2D_{5/2}$	$3p^6(^1S)5f\ ^2F^o_{7/2}$	940	568 993.0	8				2, 9°
175.756	3/2	5/2	0	568 957.4	7				2, 9°
174.175	$3p^6(^1S)3d\ ^2D_{3/2}$	$3p^6(^1S)6p\ ^2P^o_{1/2}$	0	574 135	2				9
173.973	5/2	3/2	940	575 742	1				9
172.841	$3p^6(^1S)3d\ ^2D_{3/2}$	$3p^53d(^3P^o)4s\ ^2P^o_{1/2}$	0	578 566	4	1.0 − 1	1.2+10	D	6, 7, 9°, 126*
172.487	5/2	3/2	940	580 697	5	1.9 − 1	1.1+10	D	6, 7, 9°, 126*
172.204	3/2	3/2	0	580 697	1	2.8 − 2	1.6+9	E	6, 7, 9°, 126*
171.400	$3p^6(^1S)3d\ ^2D_{5/2}$	$3p^53d(^3F^o)4s\ ^4F^o_{7/2}$	940	584 371	3				6, 7, 9°
170.569	3/2	5/2	0	586 273	2				6, 7, 9°
169.435	$3p^6(^1S)3d\ ^2D_{5/2}$	$3p^53d(^3F^o)4s\ ^2F^o_{7/2}$	940	591 137	7	5.6 − 1	1.6+10	D	6, 7, 9°, 126*
168.355	5/2	5/2	940	594 926	1	2.7 − 2	1.1+9	E	6, 7, 9°, 126*
168.088	3/2	5/2	0	594 926	6	5.2 − 1	2.0+10	D	6, 7, 9°, 126*
164.833	$3p^6(^1S)3d\ ^2D_{5/2}$	$3p^53d(^3D^o)4s\ ^4D^o_{7/2}$	940	607 615	2				6, 7, 9°
164.564	5/2	5/2	940	608 631	2				6, 7, 9°
164.301	3/2	5/2	0	608 631					6, 7, 9°
164.159	3/2	3/2	0	609 166	1				6, 7, 9°
163.801	$3p^6(^1S)3d\ ^2D_{3/2}$	$3p^53d(^1D^o)4s\ ^2D^o_{5/2}$	0	610 497	2				9
163.514	3/2	3/2	0	611 568	2				9
163.014	$3p^6(^1S)3d\ ^2D_{5/2}$	$3p^53d(^1F^o)4s\ ^2F^o_{5/2}$	940	614 385	4				9
162.764	3/2	5/2	0	614 385	2				9
162.565	5/2	7/2	940	616 079	6	2.6 − 1	8.3+9	D	9°, 126*
161.930	$3p^6(^1S)3d\ ^2D_{5/2}$	$3p^53d(^3D^o)4s\ ^2D^o_{3/2}$	940	618 491		4.7 − 2	3.0+9	E	6, 7, 9°, 126*
161.687	5/2	5/2	940	619 419	5	4.0 − 1	1.7+10	D	6, 7, 9°, 126*
161.687	3/2	3/2	0	618 491	5	2.2 − 1	1.4+10	D	6, 7, 9°, 126*
161.908	$3p^6(^1S)3d\ ^2D_{5/2}$	$3p^6(^1S)6f\ ^2F^o_{5/2}$	940	618 583	2				9
161.836	5/2	7/2	940	618 849	5				2, 9°
161.659	3/2	5/2	0	618 583	5				2, 9°
154.418	$3p^6(^1S)3d\ ^2D_{5/2}$	$3p^6(^1S)7f\ ^2F^o_{7/2}$	940	648 533	4				2, 9°
154.197	3/2	5/2	0	648 521	3				2, 9°
149.918	$3p^6(^1S)3d\ ^2D_{5/2}$	$3p^6(^1S)8f\ ^2F^o_{7/2}$	940	667 973	2				2, 9°
149.706	3/2	5/2	0	667 973	1				2, 9°
146.980	$3p^6(^1S)3d\ ^2D_{5/2}$	$3p^6(^1S)9f\ ^2F^o_{7/2}$	940	681 307	1				2, 9°
146.776	3/2	5/2	0	681 307					2, 9°
144.961	$3p^6(^1S)3d\ ^2D_{5/2}$	$3p^6(^1S)10f\ ^2F^o_{7/2}$	940	690 781					2, 9°
144.81	3/2	5/2	0	690 781	1				2

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Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1448.457	$3s^23p^5(^2P^o_{1/2})4s\ ^2[\frac{1}{2}]^o_1$	$3s^23p^54p\ ^3P_2$	682 610.2	751 649.3	3				14
1426.644	$3s^23p^5(^2P^o_{1/2})4s\ ^2[\frac{1}{2}]^o_0$	$3s^23p^54p\ ^3D_1$	678 534.7	748 629.3	7				14
1393.366	$3s^23p^5(^2P^o_{1/2})4s\ ^2[\frac{1}{2}]^o_1$	$3s^23p^54p\ ^1P_1$	682 610.2	754 378.9	5				14
1319.885	$3s^23p^5(^2P^o_{1/2})4s\ ^2[\frac{1}{2}]^o_1$	$3s^23p^54p\ ^1D_2$	682 610.2	758 374.4	7				14
1312.307	$3s^23p^5(^2P^o_{3/2})4s\ ^2[\frac{3}{2}]^o_1$	$3s^23p^54p\ ^3D_1$	672 427.7	748 629.3	7				14
1307.696	2	2	668 858.6	745 328.9	6				14
1302.551	2	3	668 858.6	745 631.1	9				14
1207.866	$3s^23p^5(^2P^o_{3/2})4s\ ^2[\frac{3}{2}]^o_2$	$3s^23p^54p\ ^3P_2$	668 858.6	751 649.3	7				14
1181.920	1	0	672 427.7	757 035.8	3				14
1198.481	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_2$	$3s^23p^5(^2P^o_{1/2})4f\ ^2[\frac{5}{2}]_3$	873 565.5	957 004.6	2				14
1193.492	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_3$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_4$	865 155.8	948 943.9	4				14
1193.492	2	3	864 129.5	947 917.4	4				14
1190.867	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{7}{2}]^o_4$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{9}{2}]_5$	860 444.3	944 416.8	2				14
1186.561	3	4	861 198.4	945 475.7	1				14
1189.640	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{5}{2}]^o_3$	$3s^23p^5(^2P^o_{1/2})4f\ ^2[\frac{7}{2}]_4$	873 146.1	957 205.1	1				14
1170.143	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_2$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{5}{2}]_3$	859 407.1	944 866.7	1				14
1163.947	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{1}{2}]^o_1$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{3}{2}]_2$	857 234.5	943 149.1					14
1163.516	$3s^23p^5(^2P^o_{3/2})4s\ ^2[\frac{3}{2}]^o_1$	$3s^23p^54p\ ^1D_2$	672 427.7	758 374.4	1				14
936.492	$3s^23p^54p\ ^1D_2$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_3$	758 374.4	865 155.8					14
926.520	$3s^23p^54p\ ^3P_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_1$	758 572.1	866 502.8	2				14
881.012	$3s^23p^54p\ ^3P_2$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_3$	751 649.3	865 155.8	4				14
871.296	$3s^23p^54p\ ^1D_2$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{5}{2}]^o_3$	758 374.4	873 146.1	5				14
870.980	$3s^23p^54p\ ^3D_3$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{7}{2}]^o_4$	745 631.1	860 444.3	7				14
863.043	2	3	745 328.9	861 198.4	6				14
869.615	$3s^23p^54p\ ^3P_1$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_2$	758 572.1	873 565.5	2				14
844.989	0	1	757 035.8	875 380.5	1				14
820.239	2	2	751 649.3	873 565.5	1				14
865.800	$3s^23p^54p\ ^3D_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_2$	748 629.3	864 129.5	4				14
841.747	2	2	745 328.9	864 129.5	2				14
836.644	3	3	745 631.1	865 155.8	2				14
848.517	$3s^23p^54p\ ^1P_1$	$3s^23p^5(^2P^o_{1/2})4d\ ^2[\frac{5}{2}]^o_2$	754 378.9	872 231.6	3				14
821.788	$3s^23p^54p\ ^3S_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{1}{2}]^o_0$	734 605.3	856 292.2	1				14
815.474	1	1	734 605.3	857 234.5	2				14
801.277	$3s^23p^54p\ ^3S_1$	$3s^23p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_2$	734 605.3	859 407.1	3				14
741.889	$3s^23p^53d\ ^1P^o_1$	$3s3p^63d\ ^1D_2$	493 035.4	627 826.7	2				14
453.183	$3s^23p^53d\ ^1F^o_3$	$3s3p^63d\ ^3D_3$	389 226.2	609 887.8	5				14
450.314	$3s^23p^53d\ ^3D^o_2$	$3s3p^63d\ ^3D_1$	386 616.6	608 679.6	2				14
449.386	2	2	386 616.6	609 142.7	5				14
448.729	1	1	385 828.3	608 679.6	5				14
447.882	2	3	386 616.6	609 887.8	3				14
447.792	1	2	385 828.3	609 142.7	3				14
441.680	3	2	382 737.4	609 142.7	2				14
440.244	3	3	382 737.4	609 887.8	8				14
441.584	$3s^23p^53d\ ^1D^o_2$	$3s3p^63d\ ^3D_2$	382 682.3	609 142.7	4				14
440.121	2	3	382 682.3	609 887.8					14
419.104	$3s^23p^53d\ ^1F^o_3$	$3s3p^63d\ ^1D_2$	389 226.2	627 826.7	5				14

Cr VII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
414.582	$3s^23p^53d\ ^3D^o_2$	$3s3p^63d\ ^1D_2$	386 616.6	627 826.7	6				14
408.019	3	2	382 737.4	627 826.7	6				14
407.918	$3s^23p^53d\ ^1D^o_2$	$3s3p^63d\ ^1D_2$	382 682.3	627 826.7	7				14
407.138	$3s^23p^53d\ ^3F^o_2$	$3s3p^63d\ ^3D_1$	363 060.9	608 679.6	8				14
406.369	2	2	363 060.9	609 142.7	4				14
401.658	3	2	360 171.9	609 142.7	9				14
400.452	3	3	360 171.9	609 887.8	3				14
396.288	4	3	357 543.7	609 887.8	10				14
380.897	$3s^23p^53d\ ^3P^o_2$	$3s3p^63d\ ^3D_1$	346 137.1	608 679.6					14
380.219	2	2	346 137.1	609 142.7	5				14
379.153	2	3	346 137.1	609 887.8	9				14
376.073	1	1	342 773.5	608 679.6	4				14
375.425	1	2	342 773.5	609 142.7	7				14
377.687	$3s^23p^53d\ ^3F^o_2$	$3s3p^63d\ ^1D_2$	363 060.9	627 826.7	1				14
355.012	$3s^23p^53d\ ^3P^o_2$	$3s3p^63d\ ^1D_2$	346 137.1	627 826.7					14
291.738	$3s^23p^6\ ^1S_0$	$3s^23p^53d\ ^3P^o_1$	0.0	342 773.5	2				14
280.823	$3s^23p^53d\ ^1F^o_3$	$3s^23p^54p\ ^3D_2$	389 226.2	745 328.9	2				14
280.571	3	3	389 226.2	745 631.1					14
275.926	$3s^23p^53d\ ^1F^o_3$	$3s^23p^54p\ ^3P_2$	389 226.2	751 649.3	1				14
275.792	$3s^23p^53d\ ^3D^o_3$	$3s^23p^54p\ ^3D_2$	382 737.4	745 328.9					14
275.635	1	1	385 828.3	748 629.3	1				14
275.563	3	3	382 737.4	745 631.1					14
275.756	$3s^23p^53d\ ^1D^o_2$	$3s^23p^54p\ ^3D_2$	382 682.3	745 328.9					14
273.269	2	1	382 682.3	748 629.3	1				14
273.952	$3s^23p^53d\ ^3D^o_2$	$3s^23p^54p\ ^3P_2$	386 616.6	751 649.3					14
271.070	3	2	382 737.4	751 649.3	6				14
269.397	1	0	385 828.3	757 035.8	2				14
268.852	2	1	386 616.6	758 572.1	4				14
270.897	$3s^23p^53d\ ^1F^o_3$	$3s^23p^54p\ ^1D_2$	389 226.2	758 374.4	6				14
269.038	$3s^23p^53d\ ^1D^o_2$	$3s^23p^54p\ ^1P_1$	382 682.3	754 378.9	4				14
266.172	$3s^23p^53d\ ^1D^o_2$	$3s^23p^54p\ ^1D_2$	382 682.3	758 374.4					14
261.598	$3s^23p^53d\ ^3F^o_2$	$3s^23p^54p\ ^3D_2$	363 060.9	745 328.9	2				14
259.636	3	2	360 171.9	745 328.9	9				14
259.432	3	3	360 171.9	745 631.1	3				14
259.360	2	1	363 060.9	748 629.3	5				14
257.676	4	3	357 543.7	745 631.1	10				14
259.181	$3s^23p^6\ ^1S_0$	$3s^23p^53d\ ^3D^o_1$	0.0	385 828.3	8	2.8 − 3	9.3+7	E	14°, 126*
257.422	$3s^23p^53d\ ^3P^o_2$	$3s^23p^54p\ ^3S_1$	346 137.1	734 605.3	4				14
255.210	1	1	342 773.5	734 605.3	4				14
254.177	0	1	341 179.3	734 605.3	2				14
255.545	$3s^23p^53d\ ^3F^o_2$	$3s^23p^54p\ ^1P_1$	363 060.9	754 378.9	3				14
255.447	$3s^23p^53d\ ^3F^o_3$	$3s^23p^54p\ ^3P_2$	360 171.9	751 649.3					14
252.837	2	1	363 060.9	758 572.1					14
251.124	$3s^23p^53d\ ^3F^o_3$	$3s^23p^54p\ ^1D_2$	360 171.9	758 374.4	2				14
250.311	$3s^23p^53d\ ^3P^o_2$	$3s^23p^54p\ ^3D_3$	346 137.1	745 631.1	3				14
245.431	0	1	341 179.3	748 629.3	2				14
246.599	$3s^23p^53d\ ^3P^o_2$	$3s^23p^54p\ ^3P_2$	346 137.1	751 649.3	4				14
244.565	1	2	342 773.5	751 649.3	1				14
242.461	2	1	346 137.1	758 572.1	1				14
241.393	1	0	342 773.5	757 035.8	2				14
242.953	$3s^23p^53d\ ^3P^o_1$	$3s^23p^54p\ ^1P_1$	342 773.5	754 378.9	2				14
242.579	$3s^23p^53d\ ^3P^o_2$	$3s^23p^54p\ ^1D_2$	346 137.1	758 374.4	4				14

Cr VII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
202.828	$3s^23p^6\ ^1S_0$	$3s^23p^53d\ ^1P^\circ_1$	0.0	493 035.4	14	3.09	1.67+11	C	3,5,11,12,14°,126*
179.776	$3s^23p^53d\ ^1F^\circ_3$	$3s^23p^5(^2P^\circ_{3/2})4f\ ^2[\frac{9}{2}]_4$	389 226.2	945 475.7	3				14
179.682	$3s^23p^53d\ ^3D^\circ_2$	$3s^23p^5(^2P^\circ_{3/2})4f\ ^2[\frac{3}{2}]_2$	386 616.6	943 149.1	1				14
178.851	$3s^23p^53d\ ^1D^\circ_2$	$3s^23p^5(^2P^\circ_{3/2})4f\ ^2[\frac{3}{2}]_1$	382 682.3	941 811					14
177.895	$3s^23p^53d\ ^3D^\circ_3$	$3s^23p^5(^2P^\circ_{3/2})4f\ ^2[\frac{5}{2}]_3$	382 737.4	944 866.7	4				14
176.053	2	2	386 616.6	954 623	5				14
175.812	1	2	385 828.3	954 623	4				13,14°
177.694	$3s^23p^53d\ ^3D^\circ_3$	$3s^23p^5(^2P^\circ_{3/2})4f\ ^2[\frac{9}{2}]_4$	382 737.4	945 475.7	4				14
176.916	$3s^23p^53d\ ^1D^\circ_2$	$3s^23p^5(^2P^\circ_{3/2})4f\ ^2[\frac{7}{2}]_3$	382 682.3	947 917.4	3				14
176.613	$3s^23p^53d\ ^3D^\circ_3$	$3s^23p^5(^2P^\circ_{3/2})4f\ ^2[\frac{7}{2}]_4$	382 737.4	948 943.9	8				13,14°
176.295	$3s^23p^53d\ ^1F^\circ_3$	$3s^23p^5(^2P^\circ_{1/2})4f\ ^2[\frac{7}{2}]_3$	389 226.2	956 454	1				14
175.315	$3s^23p^53d\ ^3D^\circ_2$	$3s^23p^5(^2P^\circ_{1/2})4f\ ^2[\frac{5}{2}]_3$	386 616.6	957 004.6	7				13,14°
174.286	$3s^23p^53d\ ^1D^\circ_2$	$3s^23p^5(^2P^\circ_{1/2})4f\ ^2[\frac{7}{2}]_3$	382 682.3	956 454	6				13,14°
174.070	$3s^23p^53d\ ^3D^\circ_3$	$3s^23p^5(^2P^\circ_{1/2})4f\ ^2[\frac{7}{2}]_4$	382 737.4	957 205.1	1				14
170.982	$3s^23p^53d\ ^3F^\circ_2$	$3s^23p^5(^2P^\circ_{3/2})4f\ ^2[\frac{7}{2}]_3$	363 060.9	947 917.4	6				13,14°
170.139	3	3	360 171.9	947 917.4	2				14
169.842	3	4	360 171.9	948 943.9	1				14
169.084	4	4	357 543.7	948 943.9	1				14
170.850	$3s^23p^53d\ ^3F^\circ_3$	$3s^23p^5(^2P^\circ_{3/2})4f\ ^2[\frac{9}{2}]_4$	360 171.9	945 475.7	8				13,14°
170.393	4	5	357 543.7	944 416.8	10				13,14°
170.086	4	4	357 543.7	945 475.7	1				14
168.523	$3s^23p^53d\ ^3F^\circ_2$	$3s^23p^5(^2P^\circ_{1/2})4f\ ^2[\frac{7}{2}]_3$	363 060.9	956 454	3				14
167.496	3	4	360 171.9	957 205.1	5				14
167.496	$3s^23p^53d\ ^3P^\circ_2$	$3s^23p^5(^2P^\circ_{3/2})4f\ ^2[\frac{3}{2}]_2$	346 137.1	943 149.1	5				13,14°
166.936	1	1	342 773.5	941 811	3				13,14°
166.560	1	2	342 773.5	943 149.1	4				13,14°
166.488	0	1	341 179.3	941 811	2				13,14°
167.020	$3s^23p^53d\ ^3P^\circ_2$	$3s^23p^5(^2P^\circ_{3/2})4f\ ^2[\frac{5}{2}]_3$	346 137.1	944 866.7	7				13,14°
148.714	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^\circ_{3/2})4s\ ^2[\frac{3}{2}]^\circ_1$	0.0	672 427.7	10	1.3 − 1	1.3+10	D	10,14°,126*
146.497	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^\circ_{1/2})4s\ ^2[\frac{1}{2}]^\circ_1$	0.0	682 610.2	12	2.9 − 1	3.0+10	D	10,14°,126*
116.654	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^\circ_{3/2})4d\ ^2[\frac{1}{2}]^\circ_1$	0.0	857 234.5	1				14
115.407	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^\circ_{3/2})4d\ ^2[\frac{3}{2}]^\circ_1$	0.0	866 502.8	8				2,14°
114.235	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^\circ_{1/2})4d\ ^2[\frac{3}{2}]^\circ_1$	0.0	875 380.5	8				2,14°
105.139	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^\circ_{3/2})5s\ ^2[\frac{3}{2}]^\circ_1$	0.0	951 122	3				10,14°
104.127	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^\circ_{1/2})5s\ ^2[\frac{1}{2}]^\circ_1$	0.0	960 366	3				10,14°
101.565	$3s^23p^6\ ^1S_0$	$3s3p^64p\ ^3P^\circ_1$	0.0	984 590	1				15
100.593	$3s^23p^6\ ^1S_0$	$3s3p^64p\ ^1P^\circ_1$	0.0	994 105	2				14°,15
96.760	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^\circ_{3/2})5d\ ^2[\frac{3}{2}]^\circ_1$	0.0	1 033 485	2				14
95.917	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^\circ_{1/2})5d\ ^2[\frac{3}{2}]^\circ_1$	0.0	1 042 568	1				14
92.969	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^\circ_{3/2})6s\ ^2[\frac{3}{2}]^\circ_1$	0.0	1 075 627	1				14
92.128	$3s^23p^6\ ^1S_0$	$3s^23p^5(^2P^\circ_{1/2})6s\ ^2[\frac{1}{2}]^\circ_1$	0.0	1 085 446					14
81.980	$3s^23p^6\ ^1S_0$	$3s3p^65p\ ^3P^\circ_1$	0.0	1 219 810	1				15

Cr VII – Continued

Wavelength (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
81.491	$3s^23p^6\ ^1S_0$	$3s3p^65p\ ^1P^o_1$	0.0	1 227 130	4				15
74.875	$3s^23p^6\ ^1S_0$	$3s3p^66p\ ^1P^o_1$	0.0	1 335 560	1				15
71.744	$3s^23p^6\ ^1S_0$	$3s3p^67p\ ^1P^o_1$	0.0	1 393 840					15

Cr VIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
430.713	$3s^23p^5\ ^2P^o_{1/2}$	$3s3p^6\ ^2S_{1/2}$	9 892	242 065		7.0 − 2	1.2+9	C−	8, 16, 17°, 31, 126*
413.112	3/2	1/2	0	242 065		1.43 − 1	2.79+9	C−	8, 16, 17°, 18, 31, 126*
221.41	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)3d\ ^2S_{1/2}$	9 892	461 540		5.40 − 1	3.68+10	C−	19°, 126*
216.67	3/2	1/2	0	461 540		1.3	9.5+10	C−	19°, 126*
213.03	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)3d\ ^2P_{3/2}$	9 892	479 310					19
211.42	1/2	1/2	9 892	482 910					19
208.63	3/2	3/2	0	479 310					3, 5, 19°
207.07	3/2	1/2	0	482 910					19
205.65	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)3d\ ^2D_{3/2}$	9 892	496 170		3.66	1.44+11	C	3, 5, 19°, 126*
205.01	3/2	5/2	0	487 780		5.76	1.52+11	C	3, 5, 19°, 126*
201.54	3/2	3/2	0	496 170		1.6 − 1	6.8+9	D	19°, 126*
147.49^L	$3s^23p^4(^3P)3d\ ^4F_{7/2}$	$3s^23p^4(^3P)4f\ ^4G^o_{9/2}$							22°, 27
147.20^L	9/2	11/2							22°, 27
146.63^L	5/2	7/2							22°, 27
147.30^L	$3s^23p^4(^1D)3d\ ^2G_{9/2}$	$3s^23p^4(^1D)4f\ ^2H^o_{11/2}$							22°, 27
146.37^L	$3s^23p^4(^3P)3d\ ^4F_{7/2}$	$3s^23p^4(^3P)4f\ ^2G^o_{9/2}$							22°, 27
143.17^L	$3s^23p^4(^3P)3d\ ^4D_{7/2}$	$3s^23p^4(^3P)4f\ ^4F^o_{9/2}$							22°, 27
135.892	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^3P)4s\ ^4P_{5/2}$	0	735 880					21
134.942	3/2	3/2	0	741 060					21
135.185	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)4s\ ^2P_{3/2}$	9 892	749 640	8				16$^\triangle$, 21°
134.076	1/2	1/2	9 892	755 740	3				16$^\triangle$, 21°
133.395	3/2	3/2	0	749 640	5				16$^\triangle$, 21°
132.321	3/2	1/2	0	755 740	10				16$^\triangle$, 21°
131.638	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)4s\ ^2D_{3/2}$	9 892	769 550					21
129.998	3/2	5/2	0	769 240					21
125.728	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1S)4s\ ^2S_{1/2}$	9 892	805 260					21
124.184	3/2	1/2	0	805 260					21
106.68	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)4d\ ^2D_{3/2}$	9 892	947 300					22°, 27
105.69	3/2	5/2	0	946 200					22°, 27
103.92	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)4d\ ^2P_{1/2}$	9 892	972 200					22°, 27
103.03	3/2	3/2	0	970 600					22°, 27
103.48	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^1D)4d\ ^2S_{1/2}$	0	966 400					22°, 27
103.36	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)4d\ ^2D_{3/2}$	9 892	977 400					22°, 27
102.45	3/2	5/2	0	976 100					22°, 27

Cr IX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3301.1^{C}	$3s^23p^4\ ^3P_2$	$3s^23p^4\ ^1D_2$	0	30 284		M1	3.0+1	D−	126*
1693.9^{C}	$3s^23p^4\ ^3P_1$	$3s^23p^4\ ^1S_0$	7 821	66 855		M1	3.3+2	E	126*
432.440	$3s^23p^4\ ^3P_1$	$3s3p^5\ ^3P^o_2$	7 821	239 068	4				8, 17°, 24
424.146	0	1	9 549	245 317	4				8, 17°, 24
421.057	1	1	7 821	245 317	5				8, 17°, 24
418.290	2	2	0	239 068	6	1.9 − 1	1.4+9	E	8, 17°, 24, 126*
414.602	1	0	7 821	249 016	5				8, 17°, 24
407.637	2	1	0	245 317	5				8, 17°, 24
418.925	$3s^23p^4\ ^1S_0$	$3s3p^5\ ^1P^o_1$	66 855	305 561	4b				17
363.271	$3s^23p^4\ ^1D_2$	$3s3p^5\ ^1P^o_1$	30 284	305 561	5	3.4 − 1	5.7+9	D	8, 17°, 24, 126*
327.267	$3s^23p^4\ ^3P_2$	$3s3p^5\ ^1P^o_1$	0	305 561					17
223.87	$3s^23p^4\ ^3P_1$	$3s^23p^3(^2D^o)3d\ ^3P^o_2$	7 821	454 510					19, 24°
220.02	2	2	0	454 510		3.3	9.2+10	E	19, 24°, 126*
215.97	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)3d\ ^1D^o_2$	30 284	493 310		3.8	1.1+11	D	19, 24°, 126*
215.04	$3s^23p^4\ ^1S_0$	$3s^23p^3(^2D^o)3d\ ^1P^o_1$	66 855	531 880		2.6	1.3+11	D	24°, 126*
211.97	$3s^23p^4\ ^3P_1$	$3s^23p^3(^4S^o)3d\ ^3D^o_2$	7 821	479 570					5, 24°
211.32	0	1	9 549	482 760					5, 24°
210.61	2	3	0	474 810					5, 24, 25°
208.53	2	2	0	479 570					24
209.44	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)3d\ ^1F^o_3$	30 284	507 750		6.5	1.4+11	D	5, 24°, 126*
180.57^{L}	$3s^23p^33d\ ^3G^o_5$	$3s^23p^34p\ ^3F_4$							27
176.86^{L}	$3s^23p^33d\ ^5D^o_4$	$3s^23p^34p\ ^5P_3$							27
$131.08^{T,L}$	$3s^23p^3(^2D^o)3d\ ^1G^o_4$	$3s^23p^3(^2D^o)4f\ ^1H_5$							27
129.99^{L}	$3s^23p^3(^2P^o)3d\ ^3F^o_4$	$3s^23p^3(^2P^o)4f\ ^3G_5$							22°, 27
129.77^{L}	$3s^23p^3(^2D^o)3d\ ^3G^o_5$	$3s^23p^3(^2D^o)4f\ ^3H_6$							22°, 27
127.95^{L}	$3s^23p^33d\ ^5D^o_4$	$3s^23p^34f\ ^5F_5$							22°, 27
127.88^{L}	3	4							22°, 27
127.53^{L}	$3s^23p^3(^2D^o)3d\ ^3F^o_4$	$3s^23p^3(^2D^o)4f\ ^3G_5$							22°, 27
127.42^{L}	3	4							22°, 27
127.31^{L}	2	3							22°, 27
123.226	$3s^23p^4\ ^3P_0$	$3s^23p^3(^4S^o)4s\ ^3S^o_1$	9 549	821 100					26
122.964	1	1	7 821	821 100	1				26
121.781	2	1	0	821 100	2				26
122.720	$3s^23p^4\ ^1S_0$	$3s^23p^3(^2P^o)4s\ ^1P^o_1$	66 855	881 810	1				26
121.293	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)4s\ ^1D^o_2$	30 284	854 730	3				26
119.569	$3s^23p^4\ ^3P_0$	$3s^23p^3(^2D^o)4s\ ^3D^o_1$	9 549	845 900					26
119.320	1	1	7 821	845 900	1				26
119.269	1	2	7 821	846 260	2				26
118.165	2	2	0	846 260	1				26
117.942	2	3	0	847 870	3				26
117.435	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2P^o)4s\ ^1P^o_1$	30 284	881 810	1				26
98.08	$3s^23p^4\ ^3P_0$	$3s^23p^3(^4S^o)4d\ ^3D^o_1$	9 549	1 029 100					22°, 27
97.97	1	2	7 821	1 028 500					22°, 27
97.19	2	3	0	1 028 900					22°, 27
96.55	$3s^23p^4\ ^1S_0$	$3s^23p^34d\ ^1P^o_1$	66 855	1 102 600					22°, 27
96.48	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)4d\ ^1D^o_2$	30 284	1 066 800					22°, 27
96.17	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)4d\ ^1F^o_3$	30 284	1 070 100					22°, 27
94.33	$3s^23p^4\ ^3P_1$	$3s^23p^3(^2D^o)4d\ ^3D^o_2$	7 821	1 067 900					27

Cr x

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3725.8^{C}	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^3\ ^2P^o_{1/2}$	37 103	63 935		M1	2.6+1	C	126*
3608.2^{C}	5/2	3/2	39 450	67 157		M1	2.7+1	C	126*
3326.4^{C}	3/2	3/2	37 103	67 157		M1	6.2+1	C	126*
2694.4^{C}	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^3\ ^2D^o_{3/2}$	0	37 103		M1	1.1+1	D	126*
1564.10	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^3\ ^2P^o_{1/2}$	0	63 935		M1	6.0+1	D	29△, 30°, 126*
1489.04	3/2	3/2	0	67 157		M1	1.2+2	D	29△, 30°, 126*
449.479^{C}	$3s^23p^3\ ^2P^o_{3/2}$	$3s3p^4\ ^2D_{3/2}$	67 157	289 637		4.0 − 4	3.3+6	E	126*
447.529	3/2	5/2	67 157	290 606	2	7.6 − 2	4.1+8	D	17°, 126*
443.062	1/2	3/2	63 935	289 637		2.8 − 2	2.4+8	D	17°, 126*
427.551	$3s^23p^3\ ^4S^o_{3/2}$	$3s3p^4\ ^4P_{5/2}$	0	233 890	7	1.9 − 1	1.2+9	D	8, 17°, 24, 31, 126*
416.690	3/2	3/2	0	239 987	5	1.3 − 1	1.3+9	D	8, 17°, 24, 126*
411.655	3/2	1/2	0	242 922	4	6.8 − 2	1.3+9	D	17°, 24, 126*
399.707	$3s^23p^3\ ^2D^o_{5/2}$	$3s3p^4\ ^2D_{3/2}$	39 450	289 637	3	6.6 − 3	7.1+7	E	17°, 126*
398.150	5/2	5/2	39 450	290 606	10	3.1 − 1	2.1+9	D	8, 17°, 24, 126*
395.984	3/2	3/2	37 103	289 637	9	2.3 − 1	2.4+9	D	8, 17°, 126*
394.473^{C}	3/2	5/2	37 103	290 606		4.8 − 3	3.4+7	E	126*
375.584	$3s^23p^3\ ^2P^o_{3/2}$	$3s3p^4\ ^2P_{3/2}$	67 157	333 412					17
371.086	1/2	3/2	63 935	333 412					17
365.718	1/2	1/2	63 935	337 370	2				17
355.112	$3s^23p^3\ ^2P^o_{3/2}$	$3s3p^4\ ^2S_{1/2}$	67 157	348 760	3				8, 17°
351.092	1/2	1/2	63 935	348 760					8, 17°
340.181	$3s^23p^3\ ^2D^o_{5/2}$	$3s3p^4\ ^2P_{3/2}$	39 450	333 412	7				8, 17°, 24
337.490	3/2	3/2	37 103	333 412	1				17
333.035	3/2	1/2	37 103	337 370	4				8, 17°, 24
254.15	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^2P_{3/2}$	39 450	432 830					24
252.75	3/2	3/2	37 103	432 830					24
247.67	3/2	1/2	37 103	440 870					24
248.41^{C}	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^4P_{5/2}$	39 450	442 010		3.2 − 2	5.7+8	E	126*
246.97^{C}	3/2	5/2	37 103	442 010		8.8 − 3	1.6+8	E	126*
244.14^{C}	3/2	1/2	37 103	446 710		6.0 − 3	3.4+8	E	126*
244.19^{C}	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2D_{5/2}$	67 157	476 680		3.1 − 1	5.8+9	D	126*
244.10^{C}	3/2	3/2	67 157	476 820		3.7 − 3	1.0+8	E	126*
242.20^{C}	1/2	3/2	63 935	476 820		1.8 − 1	5.0+9	D	126*
233.80	$3s^23p^3\ ^2P^o_{1/2}$	$3s^23p^2(^1D)3d\ ^2P_{1/2}$	63 935	491 650					24
232.96	3/2	3/2	67 157	496 430		1.4	4.4+10	E	24°, 126*
231.21	1/2	3/2	63 935	496 430		4.0 − 1	1.2+10	E	24°, 126*
228.71	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)3d\ ^2D_{5/2}$	39 450	476 680		2.1	4.5+10	D	24°, 126*
228.64^{C}	5/2	3/2	39 450	476 820		2.5 − 1	8.1+9	D	126*
227.49^{C}	3/2	5/2	37 103	476 680		8.4 − 2	1.8+9	D	126*
227.42	3/2	3/2	37 103	476 820		1.6	5.2+10	D	24°, 126*
226.24	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)3d\ ^4P_{5/2}$	0	442 010		3.4	7.3+10	D	24°, 32, 126*
224.74	3/2	3/2	0	444 960		2.3	7.6+10	D	24°, 32, 126*
223.86	3/2	1/2	0	446 710		1.2	7.7+10	D	24°, 32, 126*
221.18	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^3P)3d\ ^2D_{5/2}$	67 157	519 280					24
220.42	3/2	3/2	67 157	520 820					24
218.88	1/2	3/2	63 935	520 820					24
218.83^{C}	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)3d\ ^2P_{3/2}$	39 450	496 430		2.9 − 2	1.0+9	E	126*
217.71^{C}	3/2	3/2	37 103	496 430		2.1 − 2	7.4+8	E	126*
216.72	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^2F_{7/2}$	39 450	500 880		5.0	9.0+10	E	3, 5, 24°, 126*
209.78^{C}	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2D_{5/2}$	0	476 680		4.4 − 3	1.1+8	E	126*
117.09^{L}	$3s^23p^2(^1D)3d\ ^2G_{9/2}$	$3s^23p^24f\ ^2H^o_{11/2}$							22°, 27
116.75^{L}	7/2	9/2							22°, 27

Cr x – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
115.29^{L}	$3s^23p^23d\ ^4F_{9/2}$	$3s^23p^24f\ ^4G^o_{11/2}$							22°, 27
113.70	$3s^23p^3\ ^2P^o_{1/2}$	$3s^23p^2(^3P)4s\ ^2P_{1/2}$	63 935	943 300					22°, 27
113.31	$3/2$	$3/2$	67 157	949 800					22°, 27
111.16	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)4s\ ^2D_{5/2}$	67 157	967 000					22°, 27
111.02	$3/2$	$3/2$	67 157	967 800					22°, 27
110.37	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^2(^3P)4s\ ^2P_{1/2}$	37 103	943 300					22°, 27
109.84	$5/2$	$3/2$	39 450	949 800					22°, 27
107.80	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)4s\ ^2D_{5/2}$	39 450	967 000					22°, 27
107.45	$3/2$	$3/2$	37 103	967 800					22°, 27
107.70	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)4s\ ^4P_{1/2}$	0	928 500					22°, 27
107.14	$3/2$	$3/2$	0	933 400					22°, 27
106.49	$3/2$	$5/2$	0	939 100					22°, 27

Cr XI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3996.8	$3s^23p^2\ ^3P_2$	$3s^23p^2\ ^1D_2$	11 980	36 994		M1	2.6+1	E	28°, 33, 34, 126*
3177.9^{C}	1	2	5 536	36 994		M1	1.8+1	E	126*
2874.2^{C}	$3s3p^3\ ^3D^o_3$	$3s3p^3\ ^3P^o_2$	243 916	278 698		M1	3.2+1	E	126*
2799.3^{C}	1	0	242 346	278 059		M1	4.2+1	E	126*
2773.3^{C}	1	1	242 346	278 394		M1	4.2+1	E	126*
2758.4^{C}	2	2	242 456	278 698		M1	2.5+1	E	126*
1440.01	$3s^23p^2\ ^3P_1$	$3s^23p^2\ ^1S_0$	5 536	74 980		M1	3.7+2	E	29°, 126*
1001^{C}	$3s3p^3\ ^5S^o_2$	$3s3p^3\ ^3P^o_1$	178 470	278 394		M1	1.3+2	E	126*
997.7^{C}	2	2	178 470	278 698		M1	2.4+2	E	126*
600.7	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^5S^o_2$	11 980	178 470					36
578.0	1	2	5 536	178 470					36
519.12^{C}	$3s3p^3\ ^3D^o_3$	$3s^23p3d\ ^3D^o_3$	243 916	436 550		M1	4.1+1	E	126*
491.608^{C}	$3s^23p^2\ ^1S_0$	$3s3p^3\ ^3P^o_1$	74 980	278 394		1.1 − 3	9.7+6	E	126*
483.274^{C}	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^3D^o_3$	36 994	243 916		7.5 − 3	3.1+7	E	126*
434.092^{C}	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3D^o_1$	11 980	242 346		7.0 − 4	8.3+6	E	126*
433.885^{C}	2	2	11 980	242 456		1.0 − 2	7.4+7	D−	126*
431.154	2	3	11 980	243 916		1.9 − 1	9.8+8	D	8, 17°, 24, 126*
422.282	1	1	5 536	242 346		2.4 − 2	3.0+8	D−	17°, 126*
422.083	1	2	5 536	242 456		1.4 − 1	1.0+9	D	8, 17°, 24, 126*
412.629	0	1	0	242 346		6.3 − 2	8.3+8	D	17°, 126*
375.356^{C}	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3P^o_1$	11 980	278 394		5.0 − 2	8.0+8	D	126*
374.927	2	2	11 980	278 698		2.4 − 1	2.3+9	D	17°, 24, 126*
366.942	1	0	5 536	278 059		6.0 − 2	3.0+9	C−	17°, 126*
366.491	1	1	5 536	278 394		7.2 − 2	1.2+9	D	17°, 126*
366.085	1	2	5 536	278 698		4.2 − 2	4.1+8	D	17°, 126*
359.203^{C}	0	1	0	278 394		5.5 − 2	9.5+8	D	126*
370.959	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^1D^o_2$	36 994	306 570					17°, 24
339.446	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^1D^o_2$	11 980	306 570					17
298.059	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^1P^o_1$	36 994	372 498					8, 17°, 24
290.323	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3S^o_1$	11 980	356 424					8, 17°, 24, 25
284.988	1	1	5 536	356 424					8, 17°, 24, 25
280.572	0	1	0	356 424					17
256.32	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^1D^o_2$	36 994	427 090					24
250.28^{C}	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^3D^o_3$	36 994	436 550		6.5 − 2	1.0+9	E	126*
245.70	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^3P^o_2$	11 980	418 980					24
241.87	1	2	5 536	418 980					24
235.03	0	1	0	425 480					24
240.76	$3s^23p^2\ ^1S_0$	$3s^23p3d\ ^1P^o_1$	74 980	490 330		1.2	4.8+10	D	24°, 126*
237.24	$3s^23p^2\ ^3P_1$	$3s^23p3d\ ^1D^o_2$	5 536	427 090					24
235.74	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^3D^o_2$	11 980	436 210					24
235.53	2	3	11 980	436 550		3.2	5.5+10	D	24°, 32, 126*
233.26	1	1	5 536	434 240					24
232.18	1	2	5 536	436 210					24
230.29	0	1	0	434 240					24
226.45	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^1F^o_3$	36 994	478 590		3.2	6.0+10	C	24°, 32, 126*
214.31^{C}	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^1F^o_3$	11 980	478 590		6.5 − 2	1.4+9	E	126*
203.94^{C}	$3s^23p^2\ ^3P_0$	$3s^23p3d\ ^1P^o_1$	0	490 330		4.9 − 3	2.6+8	E	126*
117.13	$3s^23p3d\ ^1P^o_1$	$3s^23p4f\ ^1D_2$	490 330	1 344 100					37
115.13	$3s^23p3d\ ^1F^o_3$	$3s^23p4f\ ^1G_4$	478 590	1 347 200					37
105.65^{L}	$3s^23p3d\ ^3F^o_3$	$3s^23p4f\ ^3G_4$							22, 27, 37°
105.26^{L}	4	5							22, 27, 37°

Cr XI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
100.90	$3s^2 3p^2\ ^1D_2$	$3s^2 3p4s\ ^1P^o_1$	36 994	1 028 100					22°, 27
100.13	$3s^2 3p^2\ ^3P_2$	$3s^2 3p4s\ ^3P^o_1$	11 980	1 010 700					22°, 27
99.67	1	0	5 536	1 008 800					22°, 27
99.48	1	1	5 536	1 010 700					22°, 27
99.10	2	2	11 980	1 021 100					22°, 27
98.94	0	1	0	1 010 700					22°, 27
98.47	1	2	5 536	1 021 100					22°, 27
100.09^T	$3s3p^3\ ^1D^o_2$	$3s^2 3p4f\ ^3G_3$	306 570	1 305 700?					37
99.13^T	$3s3p^3\ ^1D^o_2$	$3s^2 3p4f\ ^1F_3$	306 570	1 315 400?					37
83.31	$3s^2 3p^2\ ^1S_0$	$3s^2 3p4d\ ^1P^o_1$	74 980	1 275 300					37
82.05	$3s^2 3p^2\ ^1D_2$	$3s^2 3p4d\ ^1F^o_3$	36 994	1 255 800					22, 27, 37°
81.55	$3s^2 3p^2\ ^3P_2$	$3s^2 3p4d\ ^3D^o_3$	11 980	1 238 200					22, 27, 37°
81.23	1	2	5 536	1 236 600					37
81.02	0	1	0	1 234 300					37
81.18	$3s^2 3p^2\ ^3P_2$	$3s^2 3p4d\ ^3F^o_3$	11 980	1 243 800					37

Cr XII

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
8153.8	$3s^23p\ ^2P^o_{1/2}$	$3s^23p\ ^2P^o_{3/2}$	0	12 261		M1	1.55+1	C	28°, 34, 126*
605.400^C	$3s3p^2\ ^2P_{3/2}$	$3p^3\ ^4S^o_{3/2}$	339 251	504 431		6.4 − 3	3.0+7	E	126*
555.0	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^4P_{1/2}$	12 261	192 120					36
541.0	3/2	3/2	12 261	196 911					36
523.26	3/2	5/2	12 261	203 349					36
520.83	1/2	1/2	0	192 120					36
508.3	1/2	3/2	0	196 911					36
474.030^C	$3s3p^2\ ^2P_{3/2}$	$3p^3\ ^2P^o_{1/2}$	339 251	550 208		4.0 − 2	6.0+8	D	126*
470.868	3/2	3/2	339 251	551 641		2.7 − 1	2.0+9	D	39°, 126*
460.775	1/2	1/2	333 196	550 208		1.6 − 1	2.5+9	D	39°, 126*
457.781^C	1/2	3/2	333 196	551 641		2.8 − 3	2.2+7	E	126*
428.544^C	$3s^23d\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2F^o_{5/2}$	409 741	643 089		3.7 − 2	2.2+8	E	126*
426.532^C	3/2	5/2	408 640	643 089		2.1 − 1	1.3+9	E	126*
411.430^C	5/2	7/2	409 741	652 796		3.5 − 1	1.7+9	E	126*
425.26	$3s3p(^3P^o)3d\ ^4D^o_{5/2}$	$3p^2(^3P)3d\ ^4F_{7/2}$	604 331	839 496					41
422.899^C	$3s3p^2\ ^2S_{1/2}$	$3p^3\ ^2P^o_{1/2}$	313 745	550 208		1.5 − 2	2.8+8	E	126*
420.352^C	1/2	3/2	313 745	551 641		1.6 − 1	1.5+9	D	126*
420.396^C	$3s3p^2\ ^2D_{5/2}$	$3p^3\ ^2D^o_{3/2}$	255 566	493 437		6.6 − 2	6.2+8	E	126*
418.406	3/2	3/2	254 428	493 437		2.0 − 1	1.9+9	E	39°, 126*
417.006	5/2	5/2	255 566	495 368		3.7 − 1	2.4+9	E	39°, 126*
415.041^C	3/2	5/2	254 428	495 368		3.4 − 2	2.2+8	E	126*
412.938^C	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2D_{3/2}$	12 261	254 428		9.6 − 3	9.4+7	E	126*
410.989	3/2	5/2	12 261	255 566		2.2 − 1	1.5+9	D	8, 24, 31, 39°, 126*
393.028	1/2	3/2	0	254 428		1.5 − 1	1.7+9	D	8, 24, 39°, 126*
408.89	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	$3p^2(^3P)3d\ ^4F_{7/2}$	594 946	839 496					41
405.46	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	$3p^2(^3P)3d\ ^2F_{7/2}$	704 993	951 626					41
362.87	$3s3p(^3P^o)3d\ ^4F^o_{9/2}$	$3p^2(^3P)3d\ ^4F_{7/2}$	563 915	839 496					41
361.15	7/2	5/2	558 684	835 577					41
357.12	9/2	9/2	563 915	843 933					41
356.80	3/2	3/2							41
356.28	5/2	5/2	554 899	835 577					41
356.11	7/2	7/2	558 684	839 496					41
347.204^C	$3s^23d\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	409 741	697 756		1.5 − 2	2.1+8	E	126*
345.882^C	3/2	3/2	408 640	697 756		1.8 − 2	2.6+8	E	126*
347.17	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	$3p^2(^3P)3d\ ^2D_{5/2}$	704 993	993 036					41
345.40	5/2	3/2	707 142	996 661					41
345.57	$3s3p(^3P^o)3d\ ^2F^o_{7/2}$	$3p^2(^1S)3d\ ^2D_{5/2}$	652 796	942 162					41
341.36	5/2	3/2	643 089	936 050					41
344.723^C	$3s3p^2\ ^4P_{5/2}$	$3p^3\ ^2D^o_{3/2}$	203 349	493 437		1.1 − 2	1.5+8	E	126*
331.876^C	1/2	3/2	192 120	493 437		3.4 − 3	5.3+7	E	126*
339.38	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	$3p^2(^3P)3d\ ^4P_{5/2}$	603 995	898 650					41
339.23	5/2	3/2	604 331	899 116					41
338.689	$3s^23d\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	409 741	704 993		2.8	2.0+10	E	39°, 126*
336.246^C	5/2	5/2	409 741	707 142		9.0 − 2	8.9+8	E	126*
335.017	3/2	5/2	408 640	707 142		2.0	2.0+10	E	39°, 126*
338.116	$3s3p^2\ ^2D_{3/2}$	$3p^3\ ^2P^o_{1/2}$	254 428	550 208		3.4 − 1	1.0+10	D	39°, 126*
337.772	5/2	3/2	255 566	551 641		5.5 − 1	8.0+9	D	39°, 126*
336.459^C	3/2	3/2	254 428	551 641		6.8 − 2	1.0+9	D	126*
334.64	$3s3p(^3P^o)3d\ ^2F^o_{7/2}$	$3p^2(^3P)3d\ ^2F_{7/2}$	652 796	951 626					41
327.39	5/2	5/2	643 089	948 525					41
332.126	$3s3p^2\ ^4P_{5/2}$	$3p^3\ ^4S^o_{3/2}$	203 349	504 431		9.0 − 1	1.4+10	D	8, 24, 38°, 39, 126*
325.177	3/2	3/2	196 911	504 431		6.4 − 1	9.9+9	D	8, 24, 38°, 39, 126*
320.191	1/2	3/2	192 120	504 431		3.2 − 1	5.2+9	D	8, 24, 38°, 39, 126*

Cr XII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
331.687	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2S_{1/2}$	12 261	313 745		6.8 – 2	2.1+9	D	8, 24, 39°, 126*
318.722	1/2	1/2	0	313 745		3.4 – 1	1.1+10	D	8, 24, 39°, 126*
316.466	$3s^23d\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2P^o_{3/2}$	409 741	725 710					39
316.466	3/2	1/2	408 640	724 656		7.6 – 1	2.5+10	D	39°, 126*
312.949	$3s^23d\ ^2D_{3/2}$	$3s3p(^1P^o)3d\ ^2D^o_{3/2}$	408 640	728 200					39
312.949	5/2	5/2	409 741	729 281		1.4	1.5+10	E	39°, 126*
311.875^C	3/2	5/2	408 640	729 281		4.0 – 2	4.6+8	E	126*
311.587	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2P_{1/2}$	12 261	333 196		4.8 – 1	1.6+10	D	8, 24, 31, 39°, 126*
305.816	3/2	3/2	12 261	339 251		1.55	2.76+10	C–	8, 24, 31, 39°, 126*
300.120	1/2	1/2	0	333 196		3.8 – 1	1.4+10	D	39°, 126*
294.758	1/2	3/2	0	339 251		3.14 – 1	6.0+9	C–	24, 39°, 126*
307.35	$3s3p(^3P^o)3d\ ^2D^o_{5/2}$	$3p^2(^1S)3d\ ^2D_{5/2}$	616 790	942 162					41
305.84	$3s3p(^1P^o)3d\ ^2F^o_{5/2}$	$3s3d^2\ ^2G_{7/2}$	707 142	1 034 110					41
303.75	7/2	9/2	704 993	1 034 211					41
301.19	$3s3p(^3P^o)3d\ ^2D^o_{3/2}$	$3p^2(^3P)3d\ ^2F_{5/2}$	616 498	948 525					41
298.64	5/2	7/2	616 790	951 626					41
294.655^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	255 566	594 946		3.8 – 2	4.9+8	E	126*
288.44	$3s3p(^1P^o)3d\ ^2D^o_{5/2}$	$3s3d^2\ ^2F_{7/2}$	729 281	1 075 974					41
288.18	3/2	5/2	728 200	1 075 203					41
287.003^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	255 566	603 995		1.5 – 2	1.5+8	E	126*
286.13	$3s3p(^1P^o)3d\ ^2P^o_{3/2}$	$3s3d^2\ ^2F_{5/2}$	725 710	1 075 203					41
284.35	$3p^3\ ^2D^o_{5/2}$	$3p^2(^3P)3d\ ^2P_{3/2}$	495 368	847 047					41
281.905^C	$3s3p^2\ ^4P_{3/2}$	$3p^3\ ^2P^o_{3/2}$	196 911	551 641		1.0 – 2	2.1+8	E	126*
278.148^C	1/2	3/2	192 120	551 641		4.4 – 3	9.4+7	E	126*
278.936^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	339 251	697 756		4.4 – 1	9.6+9	D	126*
274.303^C	1/2	3/2	333 196	697 756		3.4 – 2	7.6+8	D	126*
276.818	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2D^o_{5/2}$	255 566	616 790					39
276.191	3/2	3/2	254 428	616 498					39
273.48	$3s3p(^3P^o)3d\ ^4D^o_{3/2}$	$3s3d^2\ ^4F_{5/2}$	604 158	969 815					41
273.23	5/2	7/2	604 331	970 307					41
272.36	7/2	9/2	603 995	971 156					41
271.820^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2F^o_{5/2}$	339 251	707 142		8.0 – 3	1.2+8	E	126*
266.41	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	$3s3d^2\ ^4F_{7/2}$	594 946	970 307					41
260.429	$3s3p^2\ ^2S_{1/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	313 745	697 756		1.3	3.2+10	D	39°, 126*
260.13	$3p^3\ ^2P^o_{3/2}$	$3p^2(^1S)3d\ ^2D_{3/2}$	551 641	936 050					41
259.467^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	339 251	724 656		1.42 – 1	7.0+9	C–	126*
255.456	1/2	1/2	333 196	724 656		1.3 – 1	6.7+9	D	39°, 126*
254.768	1/2	3/2	333 196	725 710					39
258.049^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2F^o_{5/2}$	255 566	643 089		1.0 – 1	1.7+9	E	126*
257.282	3/2	5/2	254 428	643 089		6.8 – 1	1.1+10	E	39°, 126*
251.744	5/2	7/2	255 566	652 796		1.0	1.3+10	E	39°, 126*
257.112	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2D^o_{3/2}$	339 251	728 200					39
256.370	3/2	5/2	339 251	729 281		3.0	5.0+10	E	39°, 126*
253.168	1/2	3/2	333 196	728 200					39
255.365^C	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	203 349	594 946		2.0 – 1	3.4+9	D	126*
251.223	3/2	5/2	196 911	594 946		1.1	2.0+10	D	39°, 126*
247.065	1/2	3/2	192 120	596 837					39
245.87	3/2	1/2	196 911	603 600		4.4 – 1	2.4+10	D	39, 40°, 126*
243.025^C	1/2	1/2	192 120	603 600		2.2 – 2	1.2+9	D	126*

Cr XII – Continued

Wavelength (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
252.276	$3s^23p\ ^2P^o_{3/2}$	$3s^23d\ ^2D_{3/2}$	12 261	408 640		2.5 − 1	6.6+9	D	32, 39°, 126*
251.578	3/2	5/2	12 261	409 741		1.9	3.4+10	D	5, 24, 25, 32, 39°, 126*
244.708	1/2	3/2	0	408 640		1.1	3.0+10	D	5, 24, 32, 39°, 126*
249.572	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	203 349	603 995		2.62	3.5+10	C−	39°, 126*
249.374	5/2	5/2	203 349	604 331		1.2	2.2+10	D	39°, 126*
246.27	1/2	1/2	192 120	598 172		6.0 − 1	3.3+10	D	39, 40°, 126*
245.469	3/2	5/2	196 911	604 331		6.0 − 1	1.1+10	D	39°, 126*
245.469	3/2	3/2	196 911	604 158					39
243.362^C	$3s3p^2\ ^2S_{1/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	313 745	724 656		2.6 − 1	1.5+10	D	126*
222.496^C	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)3d\ ^2F^o_{7/2}$	203 349	652 796		1.1 − 2	1.9+8	E	126*
222.491	$3s3p^2\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	255 566	704 993		1.4	2.3+10	E	39°, 126*
221.447^C	5/2	5/2	255 566	707 142		5.9 − 2	1.3+9	E	126*
220.890	3/2	5/2	254 428	707 142		1.0	2.3+10	E	39°, 126*
212.663^C	$3s3p^2\ ^2D_{3/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	254 428	724 656		2.2 − 3	1.6+8	E	126*
199.345^C	$3s3p^2\ ^4P_{5/2}$	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	203 349	704 993		7.2 − 3	1.5+8	E	126*
197.771^C	$3s3p^2\ ^4P_{1/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	192 120	697 756		3.6 − 3	1.6+8	E	126*
101.46	$3s^23d\ ^2D_{5/2}$	$3s^24f\ ^2F^o_{7/2}$	409 741	1 395 400					43
101.39	3/2	5/2	408 640	1 395 000					43
96.50^L	$3s3p3d\ ^4F^o_{7/2}$	$3s3p4f\ ^4G_{9/2}$							43
96.35^L	5/2	7/2							43
96.11^L	9/2	11/2							43
90.86	$3s3p^2\ ^4P_{5/2}$	$3s3p4s\ ^4P^o_{5/2}$	203 349	1 303 900					43
76.488	$3s^23p\ ^2P^o_{3/2}$	$3s^24d\ ^2D_{5/2}$	12 261	1 319 660					42
75.815	1/2	3/2	0	1 319 000					42

Cr XIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
634.78	$3s3d\ ^1D_2$	$3p3d\ ^1D^\circ_2$	662 428	819 961		1.8 − 1	6.0+8	D	44°, 126*
560.18	$3s3p\ ^1P^\circ_1$	$3p^2\ ^1D_2$	304 629	483 144		3.0 − 1	1.3+9	E	22, 27, 44°, 126*
514.01	$3s3p\ ^1P^\circ_1$	$3p^2\ ^3P_2$	304 629	499 174					44
482.17	$3s^2\ ^1S_0$	$3s3p\ ^3P^\circ_1$	0	207 399		1.9 − 3	1.8+7	E	45°, 46, 126*
464.92^C	$3s3d\ ^3D_3$	$3p3d\ ^3F^\circ_2$	590 063	805 156		2.0 − 3	1.3+7	E	126*
462.95	2	2	589 150	805 156		1.1 − 1	6.8+8	D	44°, 126*
461.69	1	2	588 562	805 156		4.5 − 1	2.8+9	D	8, 44°, 126*
451.69	3	3	590 063	811 454		1.5 − 1	6.9+8	C	44°, 126*
449.83	2	3	589 150	811 454		7.5 − 1	3.5+9	C	8, 44°, 126*
437.32	3	4	590 063	818 730		1.20	4.64+9	C	8, 44°, 126*
387.40	$3s3d\ ^1D_2$	$3p3d\ ^1F^\circ_3$	662 428	920 560		2.3	1.5+10	D	44°, 126*
380.70	$3s3d\ ^3D_3$	$3p3d\ ^3P^\circ_2$	590 063	852 734					44
366.48	1	1	588 562	861 427					44
378.79	$3s3d\ ^3D_2$	$3p3d\ ^3D^\circ_1$	589 150	853 150					44
369.22	3	3	590 063	860 904		9.1 − 1	6.4+9	C	8, 44°, 126*
367.98^C	2	3	589 150	860 904		1.9 − 1	1.3+9	C	126*
366.77	2	2	589 150	861 799					44
377.65	$3s3p\ ^1P^\circ_1$	$3p^2\ ^1S_0$	304 629	569 421		3.3 − 1	1.5+10	C	8, 44°, 126*
375.11	$3s3p\ ^3P^\circ_2$	$3p^2\ ^1D_2$	216 557	483 144		1.3 − 1	1.3+9	E	44°, 126*
362.66	1	2	207 399	483 144		6.3 − 2	6.4+8	E	44°, 126*
371.30	$3s3d\ ^1D_2$	$3p3d\ ^1P^\circ_1$	662 428	931 754		6.5 − 1	1.1+10	D	44°, 126*
368.10	$3s3p\ ^3P^\circ_2$	$3p^2\ ^3P_1$	216 557	488 223		3.7 − 1	6.1+9	C	31, 44°, 126*
364.00	1	0	207 399	482 122		3.0 − 1	1.5+10	C	31, 44°, 126*
356.10	1	1	207 399	488 223		2.3 − 1	4.0+9	C	31, 44°, 126*
353.84	2	2	216 557	499 174		9.5 − 1	1.0+10	D	31, 44°, 126*
351.15	0	1	203 444	488 223		3.1 − 1	5.6+9	C	31, 44°, 126*
342.73	1	2	207 399	499 174		3.0 − 1	3.4+9	D	31, 44°, 126*
352.736	$3p3d\ ^1P^\circ_1$	$3d^2\ ^1D_2$	931 754	1 215 243					48°, 49
336.308	$3p3d\ ^1F^\circ_3$	$3d^2\ ^1G_4$	920 560	1 217 906		2.86	1.88+10	C−	47, 48°, 49, 126*
328.267	$3s^2\ ^1S_0$	$3s3p\ ^1P^\circ_1$	0	304 629		9.02 − 1	1.86+10	B	18, 25, 31, 32, 44△, 45°, 126*
310.55	$3p^2\ ^1D_2$	$3p3d\ ^3F^\circ_2$	483 144	805 156					44
306.448	$3p3d\ ^3P^\circ_1$	$3d^2\ ^3F_2$	861 427	1 187 767					48
297.631	2	3	852 734	1 188 753					48
305.87^T	$3p3d\ ^3D^\circ_2$	$3d^2\ ^3F_3$	861 799	1 188 753					47
303.960	3	4	860 904	1 189 901					47, 48°, 49
298.853	1	2	853 150	1 187 767					47, 48°, 49
296.89	$3p^2\ ^1D_2$	$3p3d\ ^1D^\circ_2$	483 144	819 961		8.5 − 1	1.3+10	E	44°, 126*
282.84	$3p^2\ ^3P_2$	$3p3d\ ^3P^\circ_2$	499 174	852 734					8, 44°
274.34	1	2	488 223	852 734					44
267.95	1	1	488 223	861 427					44
279.84	$3p3d\ ^3P^\circ_1$	$3d^2\ ^3P_1$	861 427	1 218 751					49
273.23	2	1	852 734	1 218 751					49
272.61	2	2	852 734	1 219 532					49
279.48	$3s3p\ ^1P^\circ_1$	$3s3d\ ^1D_2$	304 629	662 428		2.1	3.5+10	D	22, 27, 44°, 126*
278.86	$3p3d\ ^3D^\circ_3$	$3d^2\ ^3P_2$	860 904	1 219 532					49
273.74	1	0	853 150	1 218 447					49
276.44	$3p^2\ ^3P_2$	$3p3d\ ^3D^\circ_3$	499 174	860 904		1.8	2.2+10	D	44°, 126*
275.77	2	2	499 174	861 799					44
269.47	0	1	482 122	853 150					44
276.00	$3p^2\ ^1S_0$	$3p3d\ ^1P^\circ_1$	569 421	931 754		7.3 − 1	2.1+10	C	8, 44°, 126*

Cr XIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
269.411	$3p3d\ ^3F^o_4$	$3d^2\ ^3F_4$	818 730	1 189 901					47, 48, 49°
265.042	3	3	811 454	1 188 753					47, 48°, 49
261.359	2	2	805 156	1 187 767					47, 48°, 49
268.81^{C}	$3s3p\ ^3P^o_2$	$3s3d\ ^3D_1$	216 557	588 562		1.7 − 2	5.2+8	D	126*
268.38	2	2	216 557	589 150		2.6 − 1	4.8+9	C	44°, 126*
267.74	2	3	216 557	590 063		1.43	1.9+10	C	8, 22, 27, 32, 44°, 126*
262.36	1	1	207 399	588 562		2.6 − 1	8.4+9	C	22, 27, 32, 44°, 126*
261.95	1	2	207 399	589 150		7.8 − 1	1.5+10	C	8, 22, 27, 32, 44°, 126*
259.66	0	1	203 444	588 562		3.5 − 1	1.2+10	C	22, 27, 32, 44°, 126*
264.73	$3p^2\ ^1D_2$	$3p3d\ ^3D^o_3$	483 144	860 904					44
252.983	$3p3d\ ^1D^o_2$	$3d^2\ ^1D_2$	819 961	1 215 243					48°, 49
228.62	$3p^2\ ^1D_2$	$3p3d\ ^1F^o_3$	483 144	920 560		1.0	1.8+10	E	44°, 126*
222.911^{C}	$3p^2\ ^1D_2$	$3p3d\ ^1P^o_1$	483 144	931 754		6.5 − 3	2.9+8	E	126*
97.25	$3s3d\ ^1D_2$	$3s4f\ ^1F^o_3$	662 428	1 690 860					43
96.86	$3p3d\ ^1F^o_3$	$3p4f\ ^1G_4$	920 560	1 953 000					43
93.42	$3p3d\ ^3D^o_3$	$3p4f\ ^3F_4$	860 904	1 931 340					43
92.61	$3p3d\ ^3D^o_3$	$3p4f\ ^3D_3$	860 904	1 940 700					43
92.37	2	2	861 799	1 944 400					43
92.16	$3p3d\ ^3P^o_1$	$3p4f\ ^3D_1$	861 427	1 946 500					43
92.01	0	1	859 662	1 946 500					43
91.855	$3s3d\ ^3D_3$	$3s4f\ ^3F^o_4$	590 063	1 678 740					27, 42°
91.792	2	3	589 150	1 678 570					27, 42°
91.749	1	2	588 562	1 678 490					27, 42°
91.30	$3s3p\ ^1P^o_1$	$3s4s\ ^1S_0$	304 629	1 400 000					27
90.85	$3p3d\ ^1D^o_2$	$3p4f\ ^3F_3$	819 961	1 920 670					43
90.17	$3p3d\ ^3F^o_3$	$3p4f\ ^3G_4$	811 454	1 920 470					43
90.02	2	3	805 156	1 916 020					43
89.99	4	5	818 730	1 929 970					43
86.78	$3p^2\ ^3P_2$	$3p4s\ ^3P^o_2$	499 174	1 652 000					27
85.566	$3s3p\ ^3P^o_2$	$3s4s\ ^3S_1$	216 557	1 385 260					42
84.898	1	1	207 399	1 385 260					42
84.616	0	1	203 444	1 385 260					42
82.79	$3p^2\ ^1D_2$	$3s4f\ ^1F^o_3$	483 144	1 690 860					22°, 27
76.17	$3s3p\ ^1P^o_1$	$3s4d\ ^1D_2$	304 629	1 617 480					22°, 27, 43
73.31	$3p^2\ ^1D_2$	$3p4d\ ^1F^o_3$	483 144	1 847 000					27
72.88	$3p^2\ ^3P_2$	$3p4d\ ^3D^o_3$	499 174	1 871 000					27
72.57	1	2	488 223	1 866 000					27
72.27	0	1	482 122	1 866 000					27
72.13	$3p^2\ ^1D_2$	$3p4d\ ^3F^o_3$	483 144	1 870 000					27
71.86	$3p^2\ ^3P_2$	$3p4d\ ^3P^o_2$	499 174	1 891 000					27
71.435	$3s3p\ ^3P^o_2$	$3s4d\ ^3D_2$	216 557	1 616 450					42
71.398	2	3	216 557	1 617 160					27, 42°
70.973	1	1	207 399	1 616 210					42
70.973	1	2	207 399	1 616 450					27, 42°
70.792	0	1	203 444	1 616 210					27, 42°
66.983	$3s^2\ ^1S_0$	$3s4p\ ^1P^o_1$	0	1 492 920		3.38 − 1	1.67+11	E	27, 42°, 126*
65.968	$3s3d\ ^3D_3$	$3s5f\ ^3F^o_4$	590 063	2 105 950					27, 42°
65.39^{T}	$3s3p\ ^3P^o_2$	$3p4p\ ^3D_3$	216 557	1 746 000?					27
65.13	$3s3p\ ^3P^o_2$	$3p4p\ ^3P_2$	216 557	1 752 000					27

Cr XIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
65.04	$3s3p\ ^3P^o_2$	$3p4p\ ^3S_1$	216 557	1 754 000					27
57.24	$3s3d\ ^3D_3$	$3s6f\ ^3F^o_4$	590 063	2 337 000					27
57.24	$3s3p\ ^3P^o_2$	$3s5s\ ^3S_1$	216 557	1 963 000					27
56.96	1	1	207 399	1 963 000					27
56.37	$3s3p\ ^1P^o_1$	$3s5d\ ^1D_2$	304 629	2 079 000					27
53.765	$3s3p\ ^3P^o_2$	$3s5d\ ^3D_3$	216 557	2 076 500					27, 42°
53.506	1	2	207 399	2 076 350					27, 42°
53.39	0	1	203 444	2 076 000					27
53.02	$3s3d\ ^3D_3$	$3s7f\ ^3F^o_4$	590 063	2 476 000					27
49.59	$3s^2\ ^1S_0$	$3s5p\ ^1P^o_1$	0	2 017 000		1.09 – 1	9.9+10	C	27°, 126*
49.03	$3s3p\ ^3P^o_2$	$3s6s\ ^3S_1$	216 557	2 256 000					27
47.55	$3s3p\ ^3P^o_2$	$3s6d\ ^3D_3$	216 557	2 320 000					27
47.34	1	2	207 399	2 320 000					27
47.26	0	1	203 444	2 319 000					27
43.75	$3s^2\ ^1S_0$	$3s6p\ ^1P^o_1$	0	2 286 000					27
40.92	$3s^2\ ^1S_0$	$3s7p\ ^1P^o_1$	0	2 444 000					27

Cr XIV

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
823.99^C	$2p^64p\ ^2P^o_{3/2}$	$2p^64d\ ^2D_{3/2}$	1 579 180	1 700 540		1.8 − 1	4.5+8	C	126*
818.73^C	3/2	5/2	1 579 180	1 701 320		1.7	2.8+9	C	126*
789.27^C	1/2	3/2	1 573 840	1 700 540		9.6 − 1	2.6+9	C	126*
416.23^C	$2p^65d\ ^2D_{3/2}$	$2p^66p\ ^2P^o_{1/2}$	2 210 730	2 450 980		5.2 − 1	1.0+10	C	126*
414.97^C	5/2	3/2	2 211 080	2 452 060		9.36 − 1	9.1+9	C	126*
414.37^C	3/2	3/2	2 210 730	2 452 060		1.0 − 1	1.0+9	D	126*
412.047^S	$2p^63s\ ^2S_{1/2}$	$2p^63p\ ^2P^o_{1/2}$	0	242 690		2.74 − 1	5.37+9	B	18, 31, 45, 50, 52, 53°, 126*
389.862^S	1/2	3/2	0	256 500		5.84 − 1	6.41+9	B	18, 31, 45, 50, 52, 53°, 126*
400.49^C	$2p^65f\ ^2F^o_{5/2}$	$2p^66d\ ^2D_{3/2}$	2 235 295	2 484 990		2.7 − 1	2.8+9	C	126*
400.37^C	7/2	5/2	2 235 440	2 485 210		3.8 − 1	2.7+9	C	126*
400.14^C	5/2	5/2	2 235 295	2 485 210		2.0 − 2	1.4+8	D	126*
367.04^C	$2p^65p\ ^2P^o_{3/2}$	$2p^66s\ ^2S_{1/2}$	2 152 020	2 424 470		6.4 − 1	1.6+10	C	126*
363.40^C	1/2	1/2	2 149 290	2 424 470		3.24 − 1	8.2+9	C	126*
347.19^C	$2p^65d\ ^2D_{5/2}$	$2p^66f\ ^2F^o_{5/2}$	2 211 080	2 499 105		1.9 − 1	1.7+9	D	126*
347.01^C	5/2	7/2	2 211 080	2 499 260		3.6	2.5+10	C	126*
346.77^C	3/2	5/2	2 210 730	2 499 105		2.6	2.4+10	C	126*
301.819^S	$2p^63p\ ^2P^o_{3/2}$	$2p^63d\ ^2D_{3/2}$	256 500	587 825		1.26 − 1	2.3+9	B	31, 51, 52, 53°, 126*
300.287^S	3/2	5/2	256 500	589 515		1.14	1.41+10	B	22, 27, 31, 32, 51, 52, 53°, 126*
289.742^S	1/2	3/2	242 690	587 825		6.58 − 1	1.31+10	B	18, 22, 27, 31, 32, 51, 52, 53°, 126*
300.33^C	$2p^65p\ ^2P^o_{3/2}$	$2p^66d\ ^2D_{3/2}$	2 152 020	2 484 990		8.8 − 2	1.6+9	D	126*
300.13^C	3/2	5/2	2 152 020	2 485 210		8.0 − 1	9.7+9	C	126*
297.89^C	1/2	3/2	2 149 290	2 484 990		4.42 − 1	8.3+9	C	126*
287.19^C	$2p^65s\ ^2S_{1/2}$	$2p^66p\ ^2P^o_{1/2}$	2 102 780	2 450 980		1.6 − 1	6.3+9	C	126*
286.30^C	1/2	3/2	2 102 780	2 452 060		3.10 − 1	6.3+9	C	126*
281.67^L	$2p^53s3p\ ^4D_{7/2}$	$2p^53s3d\ ^4F^o_{9/2}$							52, 54°
241.67^C	$2p^65f\ ^2F^o_{5/2}$	$2p^67d\ ^2D_{3/2}$	2 235 295	2 649 080		4.8 − 2	1.4+9	D	126*
241.49^C	7/2	5/2	2 235 440	2 649 530		6.9 − 2	1.3+9	D	126*
241.41^C	5/2	5/2	2 235 295	2 649 530		3.4 − 3	6.5+7	E	126*
239.23^C	$2p^65d\ ^2D_{5/2}$	$2p^67p\ ^2P^o_{3/2}$	2 211 080	2 629 090		1.61 − 1	4.71+9	C	126*
239.03^C	3/2	1/2	2 210 730	2 629 090		9.2 − 2	5.3+9	C	126*
239.03^C	3/2	3/2	2 210 730	2 629 090		1.8 − 2	5.2+8	D	126*
223.65^C	$2p^65d\ ^2D_{5/2}$	$2p^67f\ ^2F^o_{5/2}$	2 211 080	2 658 215		5.0 − 2	1.1+9	D	126*
223.61^C	5/2	7/2	2 211 080	2 658 280		1.0	1.7+10	C	126*
223.47^C	3/2	5/2	2 210 730	2 658 215		6.8 − 1	1.5+10	C	126*
222.84^C	$2p^64d\ ^2D_{3/2}$	$2p^65p\ ^2P^o_{1/2}$	1 700 540	2 149 290		3.3 − 1	2.2+10	C	126*
221.88^C	5/2	3/2	1 701 320	2 152 020		5.9 − 1	2.0+10	C	126*
221.49^C	3/2	3/2	1 700 540	2 152 020		6.4 − 2	2.2+9	D	126*
217.38^C	$2p^65p\ ^2P^o_{3/2}$	$2p^67s\ ^2S_{1/2}$	2 152 020	2 612 050		1.2 − 1	8.8+9	C	126*
216.09^C	1/2	1/2	2 149 290	2 612 050		6.28 − 2	4.49+9	C	126*
216.97^C	$2p^64f\ ^2F^o_{5/2}$	$2p^65d\ ^2D_{3/2}$	1 749 830	2 210 730		1.1 − 1	4.0+9	C	126*
216.92^C	7/2	5/2	1 750 080	2 211 080		1.61 − 1	3.80+9	C	126*
216.80^C	5/2	5/2	1 749 830	2 211 080		7.8 − 3	1.9+8	D	126*
205.01	$2p^64f\ ^2F^o_{7/2}$	$2p^65g\ ^2G_{9/2}$	1 750 080	2 237 860					55
204.91	5/2	7/2	1 749 830	2 237 850					55
201.18^C	$2p^65p\ ^2P^o_{3/2}$	$2p^67d\ ^2D_{3/2}$	2 152 020	2 649 080		3.2 − 2	1.3+9	D	126*
201.00^C	3/2	5/2	2 152 020	2 649 530		2.9 − 1	7.9+9	C	126*
200.08^C	1/2	3/2	2 149 290	2 649 080		1.5 − 1	6.3+9	C	126*
190.99^C	$2p^64p\ ^2P^o_{3/2}$	$2p^65s\ ^2S_{1/2}$	1 579 180	2 102 780		4.52 − 1	4.12+10	C	126*
189.06^C	1/2	1/2	1 573 840	2 102 780		2.28 − 1	2.13+10	C	126*

Cr XIV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
188.25^{C}	$2p^65d\ ^2D_{5/2}$	$2p^68p\ ^2P^o_{3/2}$	2 211 080	2 742 280		6.0 − 2	2.8+9	C	126^*
188.13^{C}	$_{3/2}$	$_{1/2}$	2 210 730	2 742 280		3.4 − 2	3.2+9	D	126^*
188.13^{C}	$_{3/2}$	$_{3/2}$	2 210 730	2 742 280		6.8 − 3	3.1+8	D	126^*
187.30	$2p^64d\ ^2D_{5/2}$	$2p^65f\ ^2F^o_{7/2}$	1 701 320	2 235 440		4.1	9.6+10	C	$55^{\circ}, 126^*$
187.27^{C}	$_{5/2}$	$_{5/2}$	1 701 320	2 235 295		2.1 − 1	6.7+9	D	126^*
187.02	$_{3/2}$	$_{5/2}$	1 700 540	2 235 295		2.9	9.3+10	C	$55^{\circ}, 126^*$
170.12^{C}	$2p^63s\ ^2S_{1/2}$	$2p^63d\ ^2D_{3/2}$	0	587 825		E2	5.5+5	C	126^*
169.63^{C}	$_{1/2}$	$_{5/2}$	0	589 515		E2	5.5+5	C	126^*
165.74^{C}	$2p^65p\ ^2P^o_{3/2}$	$2p^68d\ ^2D_{5/2}$	2 152 020	2 755 380		1.4 − 1	5.7+9	C	126^*
165.71^{C}	$_{3/2}$	$_{3/2}$	2 152 020	2 755 500		1.6 − 2	9.5+8	D	126^*
164.96^{C}	$_{1/2}$	$_{3/2}$	2 149 290	2 755 500		7.86 − 2	4.81+9	C	126^*
158.34^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^65d\ ^2D_{3/2}$	1 579 180	2 210 730		9.2 − 2	6.2+9	D	126^*
158.25^{C}	$_{3/2}$	$_{5/2}$	1 579 180	2 211 080		8.4 − 1	3.7+10	C	126^*
157.01^{C}	$_{1/2}$	$_{3/2}$	1 573 840	2 210 730		4.8 − 1	3.3+10	C	126^*
149.07^{C}	$2p^64s\ ^2S_{1/2}$	$2p^65p\ ^2P^o_{1/2}$	1 478 480	2 149 290		1.4 − 1	2.1+10	C	126^*
148.47^{C}	$_{1/2}$	$_{3/2}$	1 478 480	2 152 020		2.88 − 1	2.18+10	C	126^*
133.26^{C}	$2p^64d\ ^2D_{3/2}$	$2p^66p\ ^2P^o_{1/2}$	1 700 540	2 450 980		5.6 − 2	1.0+10	C	126^*
133.20^{C}	$_{5/2}$	$_{3/2}$	1 701 320	2 452 060		9.6 − 2	9.2+9	C	126^*
133.06^{C}	$_{3/2}$	$_{3/2}$	1 700 540	2 452 060		1.1 − 2	1.0+9	D	126^*
125.35^{C}	$2p^64d\ ^2D_{5/2}$	$2p^66f\ ^2F^o_{5/2}$	1 701 320	2 499 105		5.1 − 2	3.6+9	D	126^*
125.32^{C}	$_{5/2}$	$_{7/2}$	1 701 320	2 499 260		1.0	5.4+10	C	126^*
125.22^{C}	$_{3/2}$	$_{5/2}$	1 700 540	2 499 105		7.2 − 1	5.0+10	C	126^*
118.30^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^66s\ ^2S_{1/2}$	1 579 180	2 424 470		8.8 − 2	2.1+10	C	126^*
117.56^{C}	$_{1/2}$	$_{1/2}$	1 573 840	2 424 470		4.4 − 2	1.1+10	C	126^*
110.40^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^66d\ ^2D_{3/2}$	1 579 180	2 484 990		3.3 − 2	4.5+9	D	126^*
110.37^{C}	$_{3/2}$	$_{5/2}$	1 579 180	2 485 210		3.0 − 1	2.8+10	C	126^*
109.75^{C}	$_{1/2}$	$_{3/2}$	1 573 840	2 484 990		1.7 − 1	2.3+10	C	126^*
107.79^{C}	$2p^64d\ ^2D_{5/2}$	$2p^67p\ ^2P^o_{3/2}$	1 701 320	2 629 090		3.7 − 2	5.3+9	D	126^*
107.69^{C}	$_{3/2}$	$_{1/2}$	1 700 540	2 629 090		2.0 − 2	5.7+9	D	126^*
107.69^{C}	$_{3/2}$	$_{3/2}$	1 700 540	2 629 090		4.0 − 3	5.7+8	E	126^*
104.50^{C}	$2p^64d\ ^2D_{5/2}$	$2p^67f\ ^2F^o_{5/2}$	1 701 320	2 658 215		2.0 − 2	2.1+9	D	126^*
104.50^{C}	$_{5/2}$	$_{7/2}$	1 701 320	2 658 280		4.1 − 1	3.1+10	C	126^*
104.42^{C}	$_{3/2}$	$_{5/2}$	1 700 540	2 658 215		2.9 − 1	3.0+10	C	126^*
102.83^{C}	$2p^64s\ ^2S_{1/2}$	$2p^66p\ ^2P^o_{1/2}$	1 478 480	2 450 980		4.8 − 2	1.5+10	C	126^*
102.71^{C}	$_{1/2}$	$_{3/2}$	1 478 480	2 452 060		9.2 − 2	1.4+10	C	126^*
101.42	$2p^63d\ ^2D_{3/2}$	$2p^64p\ ^2P^o_{1/2}$	587 825	1 573 840		1.49 − 1	4.83+10	C	$43^{\circ}, 51^{\triangle}, 126^*$
101.05	$_{5/2}$	$_{3/2}$	589 515	1 579 180		2.7 − 1	4.4+10	C	$43^{\circ}, 51^{\triangle}, 126^*$
100.87^{C}	$_{3/2}$	$_{3/2}$	587 825	1 579 180		3.0 − 2	4.9+9	D	126^*
99.473^{C}	$2p^64f\ ^2F^o_{7/2}$	$2p^68d\ ^2D_{5/2}$	1 750 080	2 755 380		4.6 − 3	5.1+8	E	126^*
99.448^{C}	$_{5/2}$	$_{5/2}$	1 749 830	2 755 380		2.3 − 4	2.5+7	E	126^*
99.436^{C}	$_{5/2}$	$_{3/2}$	1 749 830	2 755 500		3.1 − 3	5.2+8	E	126^*
96.818^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^67s\ ^2S_{1/2}$	1 579 180	2 612 050		3.4 − 2	1.2+10	D	126^*
96.320^{C}	$_{1/2}$	$_{1/2}$	1 573 840	2 612 050		1.7 − 2	6.0+9	D	126^*
96.065^{C}	$2p^64d\ ^2D_{5/2}$	$2p^68p\ ^2P^o_{3/2}$	1 701 320	2 742 280		1.8 − 2	3.3+9	D	126^*
95.993^{C}	$_{3/2}$	$_{1/2}$	1 700 540	2 742 280		1.0 − 2	3.7+9	D	126^*
95.993^{C}	$_{3/2}$	$_{3/2}$	1 700 540	2 742 280		2.0 − 3	3.6+8	E	126^*
93.467^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^67d\ ^2D_{3/2}$	1 579 180	2 649 080		1.6 − 2	3.0+9	D	126^*
93.427^{C}	$_{3/2}$	$_{5/2}$	1 579 180	2 649 530		1.4 − 1	1.8+10	C	126^*
93.002^{C}	$_{1/2}$	$_{3/2}$	1 573 840	2 649 080		8.2 − 2	1.6+10	C	126^*
86.183^{C}	$2p^63d\ ^2D_{5/2}$	$2p^64f\ ^2F^o_{5/2}$	589 515	1 749 830		2.6 − 1	3.9+10	D	126^*
86.164^{S}	$_{5/2}$	$_{7/2}$	589 515	1 750 080		5.3	5.9+11	C	$27, 53^{\circ}, 56, 126^*$
86.059^{S}	$_{3/2}$	$_{5/2}$	587 825	1 749 830		3.5	5.3+11	C	$27, 53^{\circ}, 56, 126^*$

Cr XIV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
85.020^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^68d\ ^2D_{5/2}$	1 579 180	2 755 380		8.28 − 2	1.27+10	C	126*
85.011^{C}	3/2	3/2	1 579 180	2 755 500		9.2 − 3	2.1+9	D	126*
84.627^{C}	1/2	3/2	1 573 840	2 755 500		4.64 − 2	1.08+10	C	126*
81.838	$2p^63p\ ^2P^o_{3/2}$	$2p^64s\ ^2S_{1/2}$	256 500	1 478 480					51△, 56°
80.916	1/2	1/2	242 690	1 478 480					27, 51△, 56°
69.247	$2p^63p\ ^2P^o_{3/2}$	$2p^64d\ ^2D_{3/2}$	256 500	1 700 540		1.1 − 1	3.8+10	D	51°, 56, 126*
69.213	3/2	5/2	256 500	1 701 320		9.96 − 1	2.31+11	C	27, 51°, 56, 126*
68.594	1/2	3/2	242 690	1 700 540		5.58 − 1	1.98+11	C	27, 51°, 56, 126*
64.042^{C}	$2p^63d\ ^2D_{3/2}$	$2p^65p\ ^2P^o_{1/2}$	587 825	2 149 290		2.4 − 2	1.9+10	D	126*
64.005	5/2	3/2	589 515	2 152 020		4.3 − 2	1.7+10	D	22, 27, 51°, 126*
63.931^{C}	3/2	3/2	587 825	2 152 020		4.8 − 3	1.9+9	E	126*
63.539	$2p^63s\ ^2S_{1/2}$	$2p^64p\ ^2P^o_{1/2}$	0	1 573 840		1.37 − 1	1.13+11	C+	27, 51°, 56, 126*
63.324	1/2	3/2	0	1 579 180		2.58 − 1	1.07+11	C+	27, 51°, 56, 126*
60.761^{C}	$2p^63d\ ^2D_{5/2}$	$2p^65f\ ^2F^o_{5/2}$	589 515	2 235 295		4.9 − 2	1.5+10	D	126*
60.756	5/2	7/2	589 515	2 235 440		9.72 − 1	2.19+11	C	27, 51△, 56°, 126*
60.699	3/2	5/2	587 825	2 235 295		6.80 − 1	2.05+11	C	27, 51△, 56°, 126*
54.164	$2p^63p\ ^2P^o_{3/2}$	$2p^65s\ ^2S_{1/2}$	256 500	2 102 780		5.2 − 2	5.9+10	C	27, 51°, 126*
53.760	1/2	1/2	242 690	2 102 780		2.60 − 2	3.0+10	C	27, 51°, 126*
53.690^{C}	$2p^63d\ ^2D_{5/2}$	$2p^66p\ ^2P^o_{3/2}$	589 515	2 452 060		1.5 − 2	8.5+9	D	126*
53.672^{C}	3/2	1/2	587 825	2 450 980		8.4 − 3	9.8+9	D	126*
53.641^{C}	3/2	3/2	587 825	2 452 060		1.6 − 3	9.5+8	E	126*
52.367^{C}	$2p^63d\ ^2D_{5/2}$	$2p^66f\ ^2F^o_{5/2}$	589 515	2 499 105		1.8 − 2	7.3+9	D	126*
52.363	5/2	7/2	589 515	2 499 260		3.7 − 1	1.1+11	C	27, 51△, 56°, 126*
52.321	3/2	5/2	587 825	2 499 105		2.6 − 1	1.0+11	C	51°, 126*
51.171^{C}	$2p^63p\ ^2P^o_{3/2}$	$2p^65d\ ^2D_{3/2}$	256 500	2 210 730		3.6 − 2	2.3+10	D	126*
51.162	3/2	5/2	256 500	2 211 080		3.3 − 1	1.4+11	C	27, 51△, 56°, 126*
50.812	1/2	3/2	242 690	2 210 730		1.9 − 1	1.2+11	C	27, 51△, 56°, 126*
49.030^{C}	$2p^63d\ ^2D_{5/2}$	$2p^67p\ ^2P^o_{3/2}$	589 515	2 629 090		6.6 − 3	4.7+9	D	126*
48.989^{C}	3/2	1/2	587 825	2 629 090		3.9 − 3	5.4+9	E	126*
48.989^{C}	3/2	3/2	587 825	2 629 090		8.0 − 4	5.6+8	E	126*
48.340^{C}	$2p^63d\ ^2D_{5/2}$	$2p^67f\ ^2F^o_{5/2}$	589 515	2 658 215		9.0 − 3	4.2+9	D	126*
48.338	5/2	7/2	589 515	2 658 280		1.78 − 1	6.3+10	C	27, 51°, 126*
48.300	3/2	5/2	587 825	2 658 215		1.24 − 1	5.9+10	C	51°, 126*
46.527	$2p^63s\ ^2S_{1/2}$	$2p^65p\ ^2P^o_{1/2}$	0	2 149 290		4.4 − 2	6.7+10	C	51△, 56°, 126*
46.468	1/2	3/2	0	2 152 020		8.4 − 2	6.6+10	C	51△, 56°, 126*
46.452^{C}	$2p^63d\ ^2D_{5/2}$	$2p^68p\ ^2P^o_{3/2}$	589 515	2 742 280		4.3 − 3	3.3+9	E	126*
46.415^{C}	3/2	1/2	587 825	2 742 280		2.4 − 3	3.7+9	E	126*
46.415^{C}	3/2	3/2	587 825	2 742 280		4.8 − 4	3.7+8	E	126*
46.125	$2p^63p\ ^2P^o_{3/2}$	$2p^66s\ ^2S_{1/2}$	256 500	2 424 470		2.0 − 2	3.1+10	D	27, 51°, 126*
45.835	1/2	1/2	242 690	2 424 470		1.0 − 2	1.6+10	D	27, 51°, 126*
46.039	$2p^63d\ ^2D_{5/2}$	$2p^68f\ ^2F^o_{7/2}$	589 515	2 761 590					27, 51°
44.873^{C}	$2p^63p\ ^2P^o_{3/2}$	$2p^66d\ ^2D_{3/2}$	256 500	2 484 990		1.7 − 2	1.4+10	D	126*
44.869	3/2	5/2	256 500	2 485 210		1.51 − 1	8.3+10	C	27, 51°, 126*
44.597	1/2	3/2	242 690	2 484 990		8.44 − 2	7.1+10	C	27, 51°, 126*
44.59	$2p^63d\ ^2D_{5/2}$	$2p^69f\ ^2F^o_{7/2}$	589 515	2 832 000					27
43.60	$2p^63d\ ^2D_{5/2}$	$2p^610f\ ^2F^o_{7/2}$	589 515	2 883 000					27
42.453	$2p^63p\ ^2P^o_{3/2}$	$2p^67s\ ^2S_{1/2}$	256 500	2 612 050		1.1 − 2	2.0+10	D	51°, 126*
42.205^{C}	1/2	1/2	242 690	2 612 050		5.2 − 3	9.8+9	D	126*
41.796^{C}	$2p^63p\ ^2P^o_{3/2}$	$2p^67d\ ^2D_{3/2}$	256 500	2 649 080		9.6 − 3	9.0+9	D	126*
41.788	3/2	5/2	256 500	2 649 530		8.36 − 2	5.3+10	C	27, 51°, 126*
41.556	1/2	3/2	242 690	2 649 080		4.6 − 2	4.5+10	C	27, 51°, 126*

Cr XIV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
40.800	$2p^63s\ ^2S_{1/2}$	$2p^66p\ ^2P^o_{1/2}$	0	2 450 980		1.9 – 2	3.9+10	D	51°, 126*
40.782	$_{1/2}$	$_{3/2}$	0	2 452 060		3.8 – 2	3.9+10	C	27, 51°, 126*
40.018	$2p^63p\ ^2P^o_{3/2}$	$2p^68d\ ^2D_{5/2}$	256 500	2 755 380		5.2 – 2	3.6+10	C	27, 51°, 126*
40.016^{C}	$_{3/2}$	$_{3/2}$	256 500	2 755 500		5.6 – 3	6.0+9	D	126*
39.796	$_{1/2}$	$_{3/2}$	242 690	2 755 500		2.90 – 2	3.05+10	C	27, 51°, 126*
38.899	$2p^63p\ ^2P^o_{3/2}$	$2p^69d\ ^2D_{5/2}$	256 500	2 827 260					27, 51°
38.679	$_{1/2}$	$_{3/2}$	242 690	2 828 070					27, 51°
38.1	$2p^63p\ ^2P^o_{3/2}$	$2p^610d\ ^2D_{5/2}$	256 500	2 880 000					27
38.036	$2p^63s\ ^2S_{1/2}$	$2p^67p\ ^2P^o_{3/2}$	0	2 629 090					27, 51°
38.036	$_{1/2}$	$_{1/2}$	0	2 629 090					51
37.60	$2p^63p\ ^2P^o_{3/2}$	$2p^611d\ ^2D_{5/2}$	256 500	2 916 000					27
36.466	$2p^63s\ ^2S_{1/2}$	$2p^68p\ ^2P^o_{3/2}$	0	2 742 280					27, 51°
36.466	$_{1/2}$	$_{1/2}$	0	2 742 280					51
35.450	$2p^63s\ ^2S_{1/2}$	$2p^69p\ ^2P^o_{3/2}$	0	2 820 870					27, 51°
35.450	$_{1/2}$	$_{1/2}$	0	2 820 870					51
21.770	$2p^63s\ ^2S_{1/2}$	$2p^53s^2\ ^2P^o_{3/2}$	0	4 593 500					57
21.467	$_{1/2}$	$_{1/2}$	0	4 658 300					57

Cr XV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1764.5[C]	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_0$	4 727 500	4 784 174		M1	5.2+3	D+	126*
702.96[C]	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_0$	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	4 784 174	4 926 429		4.2 − 3	1.9+7	E	126*
471.30	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_2$	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	4 714 294	4 926 429	2	2.4 − 1	2.5+9	D	52, 66°, 126*
348.356	1	0	4 727 500	5 014 563	2				52, 66°, 67
440.722	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_2$	4 727 500	4 954 368	3				52, 66°
416.59	2	2	4 714 294	4 954 368	2				52, 66°
405.035	2	3	4 714 294	4 961 187	4	7.5 − 1	4.4+9	D	52, 65, 66°, 126*
439.15	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{3}{2}]_1$	4 793 200	5 020 941					52
422.33	0	1	4 784 174	5 020 941	1				52, 66°
402.346	1	2	4 793 200	5 041 714	3				52, 65, 66°
411.28	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_1$	4 727 500	4 970 636	2				52, 66°
392.81	1	2	4 727 500	4 982 062	2				52, 66°
373.487	2	2	4 714 294	4 982 062	2				52, 66°
408.40[C]	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_0$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{1}{2}]^o_1$	5 014 563	5 259 419		1.3 − 2	1.8+8	D−	126*
305.83	1	0	4 926 429	5 253 448	bl	1.2 − 1	8.5+9	D	52°, 126*
300.30	1	1	4 926 429	5 259 419	bl	2.8 − 1	7.0+9	D	52°, 126*
405.035	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{1}{2}]_1$	4 793 200	5 039 971	4				66
390.959	0	1	4 784 174	5 039 971	3bl				52, 66°, 67
285.375	1	0	4 793 200	5 143 616	1				52, 66°, 67
346.189	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_2$	4 982 062	5 270 945	2				66°, 67
325.9	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{5}{2}]^o_2$	5 041 714	5 348 574					52
317.404	2	3	5 041 714	5 356 770	2				52, 65, 66°
305.205	1	2	5 020 941	5 348 574	2				52, 66°
322.96[C]	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_0$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_1$	5 014 563	5 324 200		1.9 − 1	4.0+9	D	126*
290.18	1	2	4 926 429	5 270 945					52
321.244	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_3$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{7}{2}]^o_4$	4 961 187	5 272 468	4	1.1	8.1+9	D	52, 65, 66°, 126*
315.51	3	3	4 961 187	5 278 128	1				66°, 67
308.895	2	3	4 954 368	5 278 128	4				52, 65, 66°
320.13	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{3}{2}]^o_2$	5 041 714	5 354 045					52
318.439	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{3}{2}]^o_2$	5 039 971	5 354 045	2				52, 66°
317.682	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{5}{2}]^o_3$	4 982 062	5 296 812	2				52, 65, 66°
313.319	1	2	4 970 636	5 289 794	2				52, 66°
298.11	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_2$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{5}{2}]^o_2$	4 954 368	5 289 794	bl				52
298.11	3	3	4 961 187	5 296 812	bl				67
240.2	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{1}{2}]_0$	4 727 500	5 143 616					52, 67°
104.59	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s2p^63s\ ^1S_0$	4 793 200	5 749 300					69
103.30[C]	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	$2s2p^63p\ ^3P^o_1$	4 926 429	5 894 500		7.5 − 2	1.5+10	E	126*
97.87	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s2p^63s\ ^1S_0$	4 727 500	5 749 300	bl				69
78.625	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{3}{2}]^o_1$	$2s^22p^5(^2P^o_{1/2})4f\ ^2[\frac{5}{2}]_2$	5 406 300	6 678 200	10				64
75.446	2	3	5 354 045	6 679 495	70				64°, 71
77.874	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_1$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{5}{2}]_2$	5 324 200	6 608 300	10				64
74.695	2	3	5 270 945	6 609 778	60				64°, 71
76.371	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{5}{2}]^o_3$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{9}{2}]_4$	5 296 812	6 606 203	6				64
76.162	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{5}{2}]^o_3$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{5}{2}]_3$	5 296 812	6 609 778	25				64
76.125	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{5}{2}]^o_3$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_4$	5 296 812	6 610 470	100				64°, 71
75.743	2	3	5 289 794	6 610 006	90				64°, 71
75.886	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{5}{2}]^o_2$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{3}{2}]_2$	5 289 794	6 607 601	1				64

Cr XV – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
75.670	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{5}{2}]^o_3$	$2s^22p^5(^2P^o_{1/2})4f\ ^2[\frac{7}{2}]_4$	5 356 770	6 678 300	90				64°, 71
75.241	2	3	5 348 574	6 677 634	50				64°, 71
75.605	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{5}{2}]^o_3$	$2s^22p^5(^2P^o_{1/2})4f\ ^2[\frac{5}{2}]_3$	5 356 770	6 679 495	1				64
75.297	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{7}{2}]^o_3$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{9}{2}]_4$	5 278 128	6 606 203	90				64°, 71
74.975	4	5	5 272 468	6 606 248	100				64°, 71
75.084	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{7}{2}]^o_3$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_3$	5 278 128	6 610 006	3				64
75.054	3	4	5 278 128	6 610 470	7				64
74.738	4	4	5 272 468	6 610 470	8				64°, 71
74.813	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_2$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{3}{2}]_2$	5 270 945	6 607 601	10				64°, 71
74.209	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{1}{2}]^o_1$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{3}{2}]_1$	5 259 419	6 606 943	9				64
74.173	1	2	5 259 419	6 607 601	20				64
73.884	0	1	5 253 448	6 606 943	10				64
73.627	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{3/2})4s\ (\frac{3}{2},\frac{1}{2})^o_2$	4 982 062	6 340 270	5				64
73.286	2	1	4 982 062	6 346 291	3				64
72.692	1	1	4 970 636	6 346 291	1				64
72.971	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{1/2})4s\ (\frac{1}{2},\frac{1}{2})^o_0$	5 039 971	6 410 346	1				64
72.849	1	1	5 039 971	6 412 678	5				64
72.941	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{1/2})4s\ (\frac{1}{2},\frac{1}{2})^o_1$	5 041 714	6 412 678	2				64
71.975	1	0	5 020 941	6 410 346	1				64
72.511	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_3$	$2s^22p^5(^2P^o_{3/2})4s\ (\frac{3}{2},\frac{1}{2})^o_2$	4 961 187	6 340 270	20				64
72.157	2	2	4 954 368	6 340 270	5				64
71.845	2	1	4 954 368	6 346 291	10				64
70.728	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{3/2})4s\ (\frac{3}{2},\frac{1}{2})^o_2$	4 926 429	6 340 270	4				64
70.428	1	1	4 926 429	6 346 291	1				64
63.637	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_2$	4 982 062	6 553 480	3				64
62.233	1	1	4 970 636	6 577 496	2				64
63.061	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_2$	5 039 971	6 625 741	40				64°, 70
63.061	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{1/2})4d\ ^2[\frac{5}{2}]^o_3$	5 041 714	6 627 484	40				64°, 70, 71
62.378	1	2	5 020 941	6 624 071	10				64°, 70, 71
62.958	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_1$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_2$	4 970 636	6 559 009	10				64°, 70, 71
62.842	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_3$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{7}{2}]^o_4$	4 961 187	6 552 477	50				64°, 70, 71
62.754	3	3	4 961 187	6 554 730	3				64
62.485	2	3	4 954 368	6 554 730	25				64°, 70, 71
62.318	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_2$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_2$	4 954 368	6 559 009	4				64°, 71
61.746	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{1}{2}]^o_0$	4 926 429	6 545 969	1				64
61.639	1	1	4 926 429	6 548 779	5				64
61.460	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_2$	4 926 429	6 553 480	3				64
58.555	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})4p\ ^2[\frac{5}{2}]_2$	4 727 500	6 435 277	3				64
58.107	2	2	4 714 294	6 435 277	3				64
58.008	2	3	4 714 294	6 438 194	10				64°, 71
58.469	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{1/2})4p\ ^2[\frac{3}{2}]_1$	4 793 200	6 503 510	1				64
58.194	1	2	4 793 200	6 511 590	2				64°, 71
58.350	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})4p\ ^2[\frac{3}{2}]_1$	4 727 500	6 441 300	10				64
57.775	2	2	4 714 294	6 445 145	2				64
58.350	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_2$	$2s^22p^5(^2P^o_{3/2})4p\ ^2[\frac{1}{2}]_1$	4 714 294	6 428 094	10				64
21.213	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_2$	0	4 714 294					61°, 62
21.153	0	1	0	4 727 500	4	1.1 − 1	5.6+11	C−	59, 60°, 61, 62, 126*
20.863	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	4 793 200	3	1.2 − 1	6.0+11	C−	59, 60°, 61, 62, 126*

Cr XV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
19.015	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{1}{2}]^o_1$	0	5 259 419		1.0 − 2	6.3+10	E	60°, 126*
18.782	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_1$	0	5 324 200	2	4.4 − 1	2.8+12	D	59,60°,61,62,126*
18.497	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{3}{2}]^o_1$	0	5 406 300	4	2.49	1.62+13	C−	59,60°,61,62,126*
16.965	$2s^22p^6\ ^1S_0$	$2s2p^63p\ ^3P^o_1$	0	5 894 500					60
16.889	$2s^22p^6\ ^1S_0$	$2s2p^63p\ ^1P^o_1$	0	5 921 000	1				60
15.21	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_1$	0	6 577 496					60
15.06	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_1$	0	6 641 000					60
13.991	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})5d\ ^2[\frac{3}{2}]^o_1$	0	7 148 000	2				63
13.862	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})5d\ ^2[\frac{3}{2}]^o_1$	0	7 215 000	2				63
13.416	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})6d\ ^2[\frac{3}{2}]^o_1$	0	7 452 000	1				63
13.294	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})6d\ ^2[\frac{3}{2}]^o_1$	0	7 524 000	1				63

Cr XVI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1410.60	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^5\ ^2P^o_{1/2}$	0	70 892		M1	6.39+3	B	45°, 73, 74, 126*
115.355	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^6\ ^2S_{1/2}$	70 892	937 790	10	1.18 − 1	2.95+10	C+	25, 52, 55, 75, 76, 77, 78°, 126*
106.633	3/2	1/2	0	937 790	30	2.58 − 1	7.58+10	C+	25, 52, 55, 75, 76, 77, 78°, 126*
19.995	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3s\ ^4P_{3/2}$	70 892	5 072 300	2				79
19.847	1/2	1/2	70 892	5 109 300	1				79
19.807	3/2	5/2	0	5 048 700	10bl	1.5 − 2	4.3+10	E	62, 79°, 80, 126*
19.714	3/2	3/2	0	5 072 300	20				62, 79°, 80
19.951	$2s2p^6\ ^2S_{1/2}$	$2s2p^5(^3P^o)3s\ ^2P^o_{3/2}$	937 790	5 950 200	6				79°, 80
19.807	1/2	1/2	937 790	5 986 600	10bl				79
19.807	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3s\ ^2P_{3/2}$	70 892	5 118 200	10bl				62, 79°
19.714	1/2	1/2	70 892	5 143 400	20	1.3 − 1	1.1+12	D	62, 79°, 126*
19.538	3/2	3/2	0	5 118 200	10				62, 79°, 80
19.442	3/2	1/2	0	5 143 400	6	1.1 − 1	9.9+11	D	79°, 80, 126*
19.511	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3s\ ^2D_{3/2}$	70 892	5 196 100	10	2.0 − 1	8.8+11	D	62, 79°, 80, 126*
19.255	3/2	5/2	0	5 193 500	15	2.6 − 1	7.7+11	D	62, 79°, 80, 126*
19.038	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1S)3s\ ^2S_{1/2}$	70 892	5 323 500	8	7.0 − 2	6.4+11	D	79°, 126*
18.775	3/2	1/2	0	5 323 500	30bl	2.7 − 2	2.6+11	E	79°, 126*
18.017	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3d\ ^4P_{3/2}$	70 892	5 620 600	2				79
17.833	3/2	1/2	0	5 607 600	2				79
17.793	3/2	3/2	0	5 620 600	2				62, 79°
17.730	3/2	5/2	0	5 640 200	3				79
17.993	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3d\ ^2P_{1/2}$	70 892	5 628 500	3				79°, 80
17.856	1/2	3/2	70 892	5 671 200	2				79°, 80
17.633	3/2	3/2	0	5 671 200	2				79°, 80
17.931	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3d\ ^2D_{3/2}$	70 892	5 648 100	2				79
17.704	3/2	3/2	0	5 648 100	2				79°, 80
17.603	3/2	5/2	0	5 680 800	5				79°, 80
17.785	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^4F_{5/2}$	0	5 622 700	5				79
17.671	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^2F_{5/2}$	0	5 659 000	4				79
17.656[C]	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2S_{1/2}$	70 892	5 734 600		1.9 − 1	2.0+12	D	126*
17.438	3/2	1/2	0	5 734 600	6	9.6 − 1	1.1+13	D	79°, 126*
17.589	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2P_{3/2}$	70 892	5 756 200	2	3.8 − 1	2.0+12	E	79°, 126*
17.373[C]	3/2	3/2	0	5 756 200		2.5	1.4+13	E	126*
17.514	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2D_{3/2}$	70 892	5 780 500	3	1.9	1.1+13	E	79°, 126*
17.370	3/2	5/2	0	5 757 100	8				62, 79°, 80
17.300[C]	3/2	3/2	0	5 780 500		4.4 − 1	2.5+12	E	126*
17.242	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1S)3d\ ^2D_{3/2}$	70 892	5 870 600	5	1.5	8.6+12	D	79°, 80, 126*
17.073	3/2	5/2	0	5 857 200	3	3.1 − 1	1.2+12	D	79°, 80, 126*
17.034[C]	3/2	3/2	0	5 870 600		1.7 − 2	9.9+10	E	126*

Cr XVII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1656.3	$2s^22p^4\ ^3P_2$	$2s^22p^4\ ^3P_1$	0	60 376		M1	4.59+3	C+	73°, 74, 126*
1340.7	$2s^22p^4\ ^3P_1$	$2s^22p^4\ ^1D_2$	60 376	134 980		M1	4.0+2	D	74°, 126*
740.75	2	2	0	134 980		M1	6.6+3	D	45°, 73, 74, 126*
493.8	$2s^22p^4\ ^3P_1$	$2s^22p^4\ ^1S_0$	60 376	262 970		M1	6.5+4	D	73°, 126*
168.15^C	$2s^22p^4\ ^1S_0$	$2s2p^5\ ^3P^o_1$	262 970	857 690		6.4 − 3	5.0+8	E	126*
147.40	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^3P^o_2$	134 980	813 180		2.4 − 2	1.4+9	E	55°, 126*
132.76	$2s^22p^4\ ^3P_1$	$2s2p^5\ ^3P^o_2$	60 376	813 180		1.23 − 1	9.3+9	C	25, 52, 55°, 75, 76, 77, 126*
125.35	1	1	60 376	857 690		7.71 − 2	1.09+10	C	55°, 75, 76, 126*
125.00	0	1	57 680	857 690		9.6 − 2	1.4+10	C	55°, 75, 76, 126*
122.974	2	2	0	813 180		3.7 − 1	3.3+10	C	25, 52, 55, 75, 76, 77, 78°, 126*
120.895	1	0	60 376	887 540		1.09 − 1	4.99+10	C	52, 55, 75, 76, 77, 78°, 126*
116.592	2	1	0	857 690		1.49 − 1	2.44+10	C	52, 55, 75, 76, 77, 78°, 126*
129.78	$2s2p^5\ ^1P^o_1$	$2p^6\ ^1S_0$	1 116 080	1 886 850		3.54 − 1	1.4+11	C	55°, 84, 126*
117.20	$2s^22p^4\ ^1S_0$	$2s2p^5\ ^1P^o_1$	262 970	1 116 080		5.9 − 2	9.6+9	C	55°, 76, 126*
101.926	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^1P^o_1$	134 980	1 116 080		6.15 − 1	1.32+11	C	52, 55, 75, 76, 77, 78°, 126*
97.20	$2s2p^5\ ^3P^o_1$	$2p^6\ ^1S_0$	857 690	1 886 850		8.4 − 3	5.9+9	E	55°, 126*
94.69	$2s^22p^4\ ^3P_1$	$2s2p^5\ ^1P^o_1$	60 376	1 116 080		2.0 − 3	4.8+8	E	55°, 126*
94.49	0	1	57 680	1 116 080		3.8 − 3	9.5+8	E	55°, 126*
89.599^C	2	1	0	1 116 080		3.0 − 2	8.5+9	E	55, 126*
18.531	$2s^22p^4\ ^3P_1$	$2s^22p^3(^4S^o)3s\ ^3S^o_1$	60 376	5 455 000		9.0 − 2	5.8+11	C−	85°, 126*
18.531	0	1	57 680	5 455 000		5.0 − 2	3.2+11	C−	85°, 126*
18.336	2	1	0	5 455 000		2.6 − 1	1.7+12	C−	85°, 126*
18.389	$2s^22p^4\ ^1S_0$	$2s^22p^3(^2P^o)3s\ ^1P^o_1$	262 970	5 700 700		1.4 − 1	9.2+11	D	85°, 126*
18.336	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3s\ ^1D^o_2$	134 980	5 588 700		4.0 − 1	1.6+12	D	85°, 126*
18.227^C	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2D^o)3s\ ^3D^o_1$	60 376	5 546 800		1.0 − 1	7.0+11	D	126*
18.219	0	1	57 680	5 546 800		2.6 − 2	1.7+11	D	85°, 126*
18.219	1	2	60 376	5 549 400		5.1 − 2	2.0+11	D	85°, 126*
18.020	2	2	0	5 549 400		1.5 − 1	6.4+11	D	85°, 126*
17.957	2	3	0	5 568 900		2.6 − 1	7.8+11	C	85°, 126*
18.089^C	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2D^o)3s\ ^1D^o_2$	60 376	5 588 700		4.2 − 2	1.7+11	E	126*
17.893^C	2	2	0	5 588 700		2.3 − 2	9.6+10	E	126*
17.968	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3s\ ^1P^o_1$	134 980	5 700 700		1.2 − 1	8.6+11	D	85°, 126*
17.201^C	$2s^22p^4\ ^1D_2$	$2s^22p^3(^4S^o)3d\ ^3D^o_3$	134 980	5 948 500		2.1 − 2	6.8+10	E	126*
16.84^C	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3d\ ^3D^o_3$	134 980	6 074 000		6.0 − 2	2.0+11	E	126*
16.811	$2s^22p^4\ ^3P_2$	$2s^22p^3(^4S^o)3d\ ^3D^o_3$	0	5 948 500		1.3	4.4+12	D	86°, 126*
16.696	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3d\ ^1F^o_3$	134 980	6 124 400		2.0	6.8+12	D	86°, 126*
16.64	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2D^o)3d\ ^3D^o_2$	60 376	6 070 000					86
16.46	2	3	0	6 074 000		3.7	1.3+13	D	86°, 126*
16.328^C	$2s^22p^4\ ^3P_2$	$2s^22p^3(^2D^o)3d\ ^1F^o_3$	0	6 124 400		9.0 − 1	3.2+12	E	126*
16.31	$2s^22p^4\ ^3P_2$	$2s^22p^3(^2P^o)3d\ ^3P^o_2$	0	6 131 000					86
16.31	$2s^22p^4\ ^3P_0$	$2s^22p^3(^2P^o)3d\ ^3D^o_1$	57 680	6 189 000					86
16.249	1	2	60 376	6 214 600					86
16.221	2	3	0	6 164 800					86
12.909	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)4d\ ^1D^o_2$	134 980	7 882 000					81
12.779	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)4d\ ^3F^o_3$	134 980	7 960 000					81

Cr XVIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4038.6	$2s^22p^3\ ^2D^o_{3/2}$	$2s^22p^3\ ^2D^o_{5/2}$	126 060	150 810		M1	1.27+2	C+	73, 87°, 126*
2606.4	$2s^22p^3\ ^2P^o_{1/2}$	$2s^22p^3\ ^2P^o_{3/2}$	226 180	264 540		M1	3.82+2	C	87°, 126*
1336^C	$2p^5\ ^2P^o_{3/2}$	$2p^5\ ^2P^o_{1/2}$	1 738 700	1 813 560		M1	7.6+3	C+	126*
998.8^C	$2s^22p^3\ ^2D^o_{3/2}$	$2s^22p^3\ ^2P^o_{1/2}$	126 060	226 180		M1	3.4+3	D	126*
879.28^C	5/2	3/2	150 810	264 540		M1	5.2+3	D	126*
722.1	3/2	3/2	126 060	264 540		M1	1.6+4	D	87°, 126*
793.4	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^3\ ^2D^o_{3/2}$	0	126 060		M1	6.1+3	D	73, 87°, 126*
663.1	3/2	5/2	0	150 810		M1	3.2+2	D−	87°, 126*
442.1	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^3\ ^2P^o_{1/2}$	0	226 180		M1	1.3+4	E	87°, 126*
378.0	3/2	3/2	0	264 540		M1	1.6+4	E	87°, 126*
248.42^C	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^4P_{5/2}$	264 540	667 080		1.3 − 3	2.3+7	E	126*
222.29^C	3/2	3/2	264 540	714 400		3.4 − 3	1.1+8	E	126*
197.68^C	1/2	1/2	226 180	732 050		1.2 − 3	1.0+8	E	126*
193.70^C	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^4P_{5/2}$	150 810	667 080		4.8 − 3	1.4+8	E	126*
184.84^C	3/2	5/2	126 060	667 080		8.0 − 3	2.6+8	E	126*
169.97^C	3/2	3/2	126 060	714 400		7.2 − 4	4.2+7	E	126*
165.02^C	3/2	1/2	126 060	732 050		1.0 − 3	1.3+8	E	126*
175.98^C	$2s2p^4\ ^2P_{1/2}$	$2p^5\ ^2P^o_{3/2}$	1 170 450	1 738 700		3.80 − 2	2.05+9	C	126*
157.40	3/2	3/2	1 103 370	1 738 700		4.20 − 1	2.83+10	C	55°, 126*
155.46	1/2	1/2	1 170 450	1 813 560		2.06 − 1	2.84+10	C	55°, 126*
140.81^C	3/2	1/2	1 103 370	1 813 560		1.58 − 1	2.66+10	C	55, 126*
151.93^C	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^2D_{3/2}$	264 540	922 720		8.4 − 3	6.1+8	D	126*
149.94	3/2	5/2	264 540	931 180		1.08 − 1	5.3+9	C	55°, 76, 126*
143.53	1/2	3/2	226 180	922 720		3.52 − 2	2.85+9	C	55°, 126*
149.907	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^4P_{5/2}$	0	667 080		2.4 − 1	1.2+10	C	25, 52, 55, 76, 77, 78°, 126*
139.977	3/2	3/2	0	714 400		1.75 − 1	1.49+10	C	25, 52, 55, 76, 77, 78°, 126*
136.602	3/2	1/2	0	732 050		9.28 − 2	1.66+10	C	25, 52, 55, 76, 77, 78°, 126*
147.79	$2s2p^4\ ^2S_{1/2}$	$2p^5\ ^2P^o_{3/2}$	1 061 750	1 738 700		9.38 − 2	7.2+9	C	55°, 126*
133.01^C	1/2	1/2	1 061 750	1 813 560		4.6 − 3	8.7+8	D	126*
129.55^C	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^2D_{3/2}$	150 810	922 720		2.9 − 3	2.9+8	E	126*
128.145	5/2	5/2	150 810	931 180		4.1 − 1	2.8+10	C	52, 55, 75, 76, 77, 78°, 126*
125.524	3/2	3/2	126 060	922 720		3.2 − 1	3.4+10	C	25, 55, 75, 76, 77, 78°, 126*
125.438	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^2S_{1/2}$	264 540	1 061 750		2.5 − 2	5.3+9	D	55, 78°, 126*
119.62	1/2	1/2	226 180	1 061 750		1.4 − 1	3.2+10	C	55°, 88, 126*
123.87	$2s2p^4\ ^2D_{5/2}$	$2p^5\ ^2P^o_{3/2}$	931 180	1 738 700		3.6 − 1	3.9+10	C	55°, 84, 86, 126*
122.56	3/2	3/2	922 720	1 738 700		1.12 − 1	1.24+10	C	55°, 84, 86, 126*
112.27	3/2	1/2	922 720	1 813 560		1.60 − 1	4.24+10	C	55°, 84, 126*
119.21	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^2P_{3/2}$	264 540	1 103 370		7.60 − 2	8.9+9	C	55°, 76, 126*
114.012	1/2	3/2	226 180	1 103 370		5.48 − 2	7.0+9	C	55, 76, 77, 78°, 126*
110.386	3/2	1/2	264 540	1 170 450		2.9 − 1	7.9+10	C	55, 76, 77, 78°, 126*
105.92	1/2	1/2	226 180	1 170 450		1.7 − 2	4.9+9	D	55°, 76, 126*
108.37	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^2D_{3/2}$	0	922 720		4.4 − 3	6.2+8	E	55°, 126*
106.84	$2s^22p^3\ ^2D^o_{3/2}$	$2s2p^4\ ^2S_{1/2}$	126 060	1 061 750		1.2 − 1	3.4+10	E	55°, 88, 126*
104.980	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^2P_{3/2}$	150 810	1 103 370		5.8 − 1	8.7+10	C	52, 55, 75, 76, 77, 78°, 126*
102.32	3/2	3/2	126 060	1 103 370		9.68 − 2	1.54+10	C	55°, 76, 126*
95.77	3/2	1/2	126 060	1 170 450		8.48 − 2	3.08+10	C	55°, 75, 76, 126*
99.339^C	$2s2p^4\ ^4P_{1/2}$	$2p^5\ ^2P^o_{3/2}$	732 050	1 738 700		1.5 − 3	2.5+8	E	126*
97.628^C	3/2	3/2	714 400	1 738 700		4.0 − 3	7.0+8	E	126*
93.36	5/2	3/2	667 080	1 738 700		9.0 − 3	1.7+9	E	55°, 126*
92.463^C	1/2	1/2	732 050	1 813 560		1.4 − 3	5.5+8	E	126*
94.16	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^2S_{1/2}$	0	1 061 750		2.4 − 3	9.2+8	E	55°, 126*

Cr XVIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
90.63	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^2P_{3/2}$	0	1 103 370		1.2 – 2	2.4+9	E	55°, 126*
15.60	$2s^22p^3\ ^2D^o_{5/2}$	$2s^22p^2(^1D)3d\ ^2F_{7/2}$	150 810	6 555 000					86
15.519	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^2(^3P)3d\ ^4P_{5/2}$	0	6 443 000					62°, 86
15.519	3/2	3/2	0	6 443 000					62

Cr XIX

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2885.4	$1s^22s^22p^2\ ^3P_1$	$1s^22s^22p^2\ ^3P_2$	47 811	82 458		M1	4.69+2	C+	73°, 89, 126*
2090.9	0	1	0	47 811		M1	1.81+3	C+	73°, 89, 126*
979.1	$1s^22s^22p^2\ ^3P_2$	$1s^22s^22p^2\ ^1D_2$	82 458	184 600		M1	5.7+3	C	73, 87°, 126*
731.1	1	2	47 811	184 600		M1	5.7+3	D	73, 74, 87°, 126*
398.4	$1s^22s^22p^2\ ^3P_1$	$1s^22s^22p^2\ ^1S_0$	47 811	298 800		M1	6.4+4	D	73°, 126*
311.71^C	$1s^22s^22p^2\ ^3P_2$	$1s^22s2p^3\ ^5S^o_2$	82 458	[403 268]		1.3 − 3	1.7+7	E	126*
281.33^C	1	2	47 811	[403 268]		8.7 − 4	1.5+7	E	126*
278.18^C	$1s^22s2p^3\ ^1P^o_1$	$1s^22p^4\ ^3P_2$	1 090 510	1 449 990		5.1 − 3	8.8+7	E	126*
236.12^C	1	1	1 090 510	1 514 020		1.2 − 2	4.7+8	E	126*
267.54^C	$1s^22s^22p^2\ ^1S_0$	$1s^22s2p^3\ ^3D^o_1$	298 800	672 580		1.2 − 3	3.7+7	E	126*
210.97^C	$1s^22s2p^3\ ^1D^o_2$	$1s^22p^4\ ^3P_2$	976 000	1 449 990		2.1 − 2	6.3+8	E	126*
185.87^C	2	1	976 000	1 514 020		2.2 − 3	1.4+8	E	126*
205.37^C	$1s^22s^22p^2\ ^1D_2$	$1s^22s2p^3\ ^3D^o_2$	184 600	671 520		1.0 − 3	3.3+7	E	126*
204.93^C	2	1	184 600	672 580		2.3 − 3	1.2+8	E	126*
199.15^C	2	3	184 600	686 730		2.6 − 2	6.2+8	E	126*
203.91^C	$1s^22s2p^3\ ^3S^o_1$	$1s^22p^4\ ^3P_2$	959 570	1 449 990		1.9 − 1	6.3+9	C	126*
180.37	1	1	959 570	1 514 020		1.6 − 1	1.1+10	C	55°, 126*
179.18	1	0	959 570	1 517 690		6.96 − 2	1.45+10	C	55°, 126*
202.06^C	$1s^22s^22p^2\ ^1S_0$	$1s^22s2p^3\ ^3P^o_1$	298 800	793 710		2.0 − 3	1.1+8	E	126*
201.82	$1s^22s2p^3\ ^1P^o_1$	$1s^22p^4\ ^1D_2$	1 090 510	1 586 020		1.27 − 1	4.16+9	C	55°, 126*
169.73	$1s^22s^22p^2\ ^3P_2$	$1s^22s2p^3\ ^3D^o_2$	82 458	671 520		2.1 − 4	9.5+6	E	55°, 126*
169.46^C	2	1	82 458	672 580		3.3 − 4	2.6+7	E	126*
165.488	2	3	82 458	686 730		1.69 − 1	5.9+9	C	25, 52, 55, 77, 78°, 86, 126*
160.331	1	2	47 811	671 520		1.6 − 1	8.3+9	C	25, 52, 55, 77, 78°, 86, 126*
160.01	1	1	47 811	672 580		1.2 − 2	1.1+9	D	55°, 126*
148.681	0	1	0	672 580		8.9 − 2	9.0+9	C	25, 52, 55, 78°, 126*
164.17^C	$1s^22s^22p^2\ ^1D_2$	$1s^22s2p^3\ ^3P^o_1$	184 600	793 710		3.3 − 3	2.8+8	E	126*
161.35^C	2	2	184 600	804 380		3.8 − 3	1.9+8	E	126*
163.94	$1s^22s2p^3\ ^1D^o_2$	$1s^22p^4\ ^1D_2$	976 000	1 586 020		6.25 − 1	3.10+10	C	55°, 126*
154.92	$1s^22s2p^3\ ^3P^o_2$	$1s^22p^4\ ^3P_2$	804 380	1 449 990		6.35 − 2	3.53+9	C	55°, 126*
152.42	1	2	793 710	1 449 990		5.70 − 2	3.27+9	C	55°, 126*
140.92	2	1	804 380	1 514 020		1.23 − 1	1.38+10	C	55°, 126*
138.86	1	1	793 710	1 514 020					55
138.15	1	0	793 710	1 517 690		5.01 − 2	1.75+10	C	25, 55°, 126*
137.89	0	1	788 830	1 514 020		3.56 − 2	4.16+9	C	25, 55°, 126*
151.34^C	$1s^22s^22p^2\ ^1S_0$	$1s^22s2p^3\ ^3S^o_1$	298 800	959 570		4.3 − 3	4.2+8	E	126*
143.57	$1s^22s2p^3\ ^1P^o_1$	$1s^22p^4\ ^1S_0$	1 090 510	1 786 900		2.2 − 1	7.2+10	C	25, 55°, 126*
140.51	$1s^22s^22p^2\ ^3P_2$	$1s^22s2p^3\ ^3P^o_1$	82 458	793 710		3.1 − 2	3.5+9	D	55°, 126*
138.519	2	2	82 458	804 380		2.45 − 1	1.71+10	C	55, 77, 78°, 86, 88, 126*
134.949	1	0	47 811	788 830		5.40 − 2	1.98+10	C	55, 78°, 126*
134.066	1	1	47 811	793 710		9.75 − 2	1.21+10	C	55, 78°, 126*
132.11	1	2	47 811	804 380		9.3 − 3	7.1+8	D	55°, 126*
125.93	0	1	0	793 710		2.89 − 2	4.05+9	C	55°, 126*
130.99	$1s^22s2p^3\ ^3D^o_3$	$1s^22p^4\ ^3P_2$	686 730	1 449 990		3.7 − 1	2.9+10	C	55°, 86, 126*
128.63	1	2	672 580	1 449 990		2.9 − 2	2.3+9	D	55°, 126*
128.43	2	2	671 520	1 449 990		1.47 − 1	1.19+10	C	55°, 126*
118.83	1	1	672 580	1 514 020		8.58 − 2	1.35+10	C	55°, 86, 126*
118.67	2	1	671 520	1 514 020		1.33 − 1	2.10+10	C	55°, 86, 126*
118.31	1	0	672 580	1 517 690		6.90 − 2	3.29+10	C	55°, 126*
129.04^C	$1s^22s^22p^2\ ^1D_2$	$1s^22s2p^3\ ^3S^o_1$	184 600	959 570		5.5 − 4	7.3+7	E	126*
127.95	$1s^22s2p^3\ ^3P^o_2$	$1s^22p^4\ ^1D_2$	804 380	1 586 020		1.2 − 2	1.0+9	E	55°, 126*
126.21^C	1	2	793 710	1 586 020		8.4 − 3	7.0+8	E	126*
126.358	$1s^22s^22p^2\ ^1D_2$	$1s^22s2p^3\ ^1D^o_2$	184 600	976 000		5.20 − 1	4.35+10	C	55, 77, 78°, 86, 88, 126*
126.30	$1s^22s^22p^2\ ^1S_0$	$1s^22s2p^3\ ^1P^o_1$	298 800	1 090 510		1.12 − 1	1.56+10	C	55°, 126*

Cr XIX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
114.012	$1s^22s^22p^2\ ^3P_2$	$1s^22s2p^3\ ^3S^o_1$	82 458	959 570		3.2 – 1	5.5+10	C	25, 55, 77, 78°, 86, 88, 126*
109.676	1	1	47 811	959 570		1.33 – 1	2.46+10	C	55, 77, 78°, 86, 88, 126*
104.18	0	1	0	959 570		4.38 – 2	9.0+9	C	55°, 77, 88, 126*
111.88	$1s^22s^22p^2\ ^3P_2$	$1s^22s2p^3\ ^1D^o_2$	82 458	976 000		5.0 – 2	5.3+9	E	55°, 126*
107.74^C	1	2	47 811	976 000		2.1 – 3	2.4+8	E	126*
111.18	$1s^22s2p^3\ ^3D^o_3$	$1s^22p^4\ ^1D_2$	686 730	1 586 020		3.4 – 2	3.7+9	E	55°, 126*
109.35^C	2	2	671 520	1 586 020		4.9 – 3	5.5+8	E	126*
110.386	$1s^22s^22p^2\ ^1D_2$	$1s^22s2p^3\ ^1P^o_1$	184 600	1 090 510		3.3 – 1	6.0+10	C	55, 77, 78°, 86, 88, 126*
100.69^C	$1s^22s2p^3\ ^3P^o_1$	$1s^22p^4\ ^1S_0$	793 710	1 786 900		3.9 – 3	2.6+9	E	126*
95.88	$1s^22s^22p^2\ ^3P_1$	$1s^22s2p^3\ ^1P^o_1$	47 811	1 090 510		1.5 – 2	3.6+9	E	55°, 126*
95.536^C	$1s^22s2p^3\ ^5S^o_2$	$1s^22p^4\ ^3P_2$	[403 268]	1 449 990		4.9 – 3	7.2+8	E	126*
90.029^C	2	1	[403 268]	1 514 020		6.5 – 4	1.8+8	E	126*
2.2414	$1s^22s^22p^2\ ^1S_0$	$1s2s^22p^3\ ^1P^o_1$	298 800	44 924 000					91
2.2386	$1s^22s^22p^2\ ^1D_2$	$1s2s^22p^3\ ^1D^o_2$	184 600	44 855 000					91
2.2371	$1s^22s^22p^2\ ^3P_1$	$1s2s^22p^3\ ^3P^o_0$	47 811	44 749 000					91
2.2347	$1s^22s^22p^2\ ^1D_2$	$1s2s^22p^3\ ^1P^o_1$	184 600	44 924 000					91

Cr XX

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1205.9	$1s^22s^22p\ ^2P^o_{1/2}$	$1s^22s^22p\ ^2P^o_{3/2}$	0	82 970		M1	5.11+3	B	73°, 74, 89, 126*
416.08^{C}	$1s^22s2p^2\ ^2P_{3/2}$	$1s^22p^3\ ^4S^o_{3/2}$	861 500	1 101 840		2.0 − 3	1.9+7	E	126*
368.19^{C}	$1s^22s^22p\ ^2P^o_{3/2}$	$1s^22s2p^2\ ^4P_{1/2}$	82 970	354 570		4.4 − 4	1.1+7	E	126*
287.62^{C}	$_{3/2}$	$_{5/2}$	82 970	430 650		2.4 − 3	3.3+7	E	126*
282.03^{C}	$_{1/2}$	$_{1/2}$	0	354 570		1.0 − 3	4.2+7	E	126*
271.72	$1s^22s2p^2\ ^2P_{3/2}$	$1s^22p^3\ ^2D^o_{3/2}$	861 500	1 229 600	2	2.4 − 3	5.4+7	E	55°, 126*
258.48^{C}	$_{3/2}$	$_{5/2}$	861 500	1 248 380		1.79 − 1	2.98+9	C	126*
213.10	$_{1/2}$	$_{3/2}$	760 270	1 229 600	4bl				55
216.97^{C}	$1s^22s2p^2\ ^2D_{3/2}$	$1s^22p^3\ ^4S^o_{3/2}$	640 950	1 101 840		1.2 − 3	4.2+7	E	126*
192.82	$1s^22s2p^2\ ^2P_{3/2}$	$1s^22p^3\ ^2P^o_{1/2}$	861 500	1 380 140	1	2.6 − 2	2.3+9	D	55°, 126*
180.85	$_{3/2}$	$_{3/2}$	861 500	1 414 510	5	3.1 − 1	1.6+10	C	55°, 126*
161.33	$_{1/2}$	$_{1/2}$	760 270	1 380 140	2				55
152.86	$_{1/2}$	$_{3/2}$	760 270	1 414 510	3				55
187.79	$1s^22s2p^2\ ^2S_{1/2}$	$1s^22p^3\ ^2P^o_{1/2}$	847 560	1 380 140	3				55
176.42	$_{1/2}$	$_{3/2}$	847 560	1 414 510	1				55
179.21	$1s^22s^22p\ ^2P^o_{3/2}$	$1s^22s2p^2\ ^2D_{3/2}$	82 970	640 950	4bl	2.2 − 3	1.1+8	E	55°, 126*
175.404	$_{3/2}$	$_{5/2}$	82 970	653 080	10	1.47 − 1	5.3+9	C	25, 55, 77, 78°, 126*
156.019	$_{1/2}$	$_{3/2}$	0	640 950	100	1.2 − 1	8.4+9	C	25, 55, 77, 78°, 126*
173.42	$1s^22s2p^2\ ^2D_{5/2}$	$1s^22p^3\ ^2D^o_{3/2}$	653 080	1 229 600	4	7.26 − 2	4.03+9	C	55°, 126*
169.87	$_{3/2}$	$_{3/2}$	640 950	1 229 600	5	1.22 − 1	7.1+9	C	55°, 126*
167.97	$_{5/2}$	$_{5/2}$	653 080	1 248 380	8	2.84 − 1	1.12+10	C	55°, 126*
164.63	$_{3/2}$	$_{5/2}$	640 950	1 248 380	4	5.88 − 2	2.41+9	C	55°, 126*
148.99	$1s^22s2p^2\ ^4P_{5/2}$	$1s^22p^3\ ^4S^o_{3/2}$	430 650	1 101 840	9	2.33 − 1	1.75+10	C	55°, 126*
140.75	$_{3/2}$	$_{3/2}$	391 360	1 101 840	9bl	1.60 − 1	1.35+10	C	55°, 126*
133.82	$_{1/2}$	$_{3/2}$	354 570	1 101 840	7	8.90 − 2	8.3+9	C	55°, 126*
147.62^{T}	$1s^22s^22p\ ^2P^o_{3/2}$	$1s^22s2p^2\ ^2P_{1/2}$	82 970	760 270	1				55
131.532	$_{1/2}$	$_{1/2}$	0	760 270	80				25, 55, 77, 78°
128.448	$_{3/2}$	$_{3/2}$	82 970	861 500	60	3.7 − 1	3.8+10	C	25, 55, 77, 78°, 86, 92, 126*
116.077	$_{1/2}$	$_{3/2}$	0	861 500	5	4.60 − 2	5.7+9	C	55, 78°, 92, 126*
135.26	$1s^22s2p^2\ ^2D_{3/2}$	$1s^22p^3\ ^2P^o_{1/2}$	640 950	1 380 140	6	1.32 − 1	2.41+10	C	55°, 126*
131.31	$_{5/2}$	$_{3/2}$	653 080	1 414 510	7	1.31 − 1	1.27+10	C	55°, 126*
129.26	$_{3/2}$	$_{3/2}$	640 950	1 414 510	4	4.28 − 2	4.27+9	C	55°, 126*
130.789	$1s^22s^22p\ ^2P^o_{3/2}$	$1s^22s2p^2\ ^2S_{1/2}$	82 970	847 560	20				25, 55, 78°, 86
117.986	$_{1/2}$	$_{1/2}$	0	847 560	40bl				55, 78°
122.29^{T}	$1s^22s2p^2\ ^4P_{5/2}$	$1s^22p^3\ ^2D^o_{5/2}$	430 650	1 248 380	2	1.3 − 2	9.8+8	E	55°, 126*
119.30^{C}	$_{3/2}$	$_{3/2}$	391 360	1 229 600		8.4 − 3	9.8+8	E	126*
101.64^{C}	$1s^22s2p^2\ ^4P_{5/2}$	$1s^22p^3\ ^2P^o_{3/2}$	430 650	1 414 510		6.6 − 4	1.1+8	E	126*
97.737^{C}	$_{3/2}$	$_{3/2}$	391 360	1 414 510		1.1 − 3	2.0+8	E	126*
97.507^{C}	$_{1/2}$	$_{1/2}$	354 570	1 380 140		4.2 − 4	1.5+8	E	126*
14.685	$1s^22s2p^2\ ^2P_{1/2}$	$1s^22s2p(^3P^o)3d\ ^2P^o_{3/2}$	760 270	7 570 100	25				94
14.660	$1s^22s2p^2\ ^2D_{5/2}$	$1s^22s2p(^3P^o)3d\ ^2D^o_{5/2}$	653 080	7 473 700	30				94
14.660	$_{3/2}$	$_{3/2}$	640 950	7 462 300	30				94
14.635	$_{3/2}$	$_{5/2}$	640 950	7 473 700	25				94
14.533	$1s^22s2p^2\ ^2D_{5/2}$	$1s^22s2p(^3P^o)3d\ ^2F^o_{5/2}$	653 080	7 533 800	5				94
14.508	$_{3/2}$	$_{5/2}$	640 950	7 533 800	35				94
14.442	$_{5/2}$	$_{7/2}$	653 080	7 577 200	65				94
14.466	$1s^22s2p^2\ ^2P_{3/2}$	$1s^22s2p(^1P^o)3d\ ^2D^o_{5/2}$	861 500	7 774 400	35				94
14.457^{T}	$1s^22s2p^2\ ^2S_{1/2}$	$1s^22s2p(^1P^o)3d\ ^2D^o_{3/2}$	847 560	7 764 800?	30				94
14.402	$1s^22s2p^2\ ^2P_{3/2}$	$1s^22s2p(^1P^o)3d\ ^2P^o_{3/2}$	861 500	7 806 900	80				94
14.213	$_{1/2}$	$_{1/2}$	760 270	7 796 200	90				94
14.366	$1s^22s2p^2\ ^2S_{1/2}$	$1s^22s2p(^1P^o)3d\ ^2P^o_{3/2}$	847 560	7 806 900	40				94

Cr XX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
14.323	$1s^22s2p^2\ {}^4P_{5/2}$	$1s^22s2p({}^3P^o)3d\ {}^4F^o_{7/2}$	430 650	7 412 400	35				81, 94°
14.213	$1s^22s2p^2\ {}^4P_{3/2}$	$1s^22s2p({}^3P^o)3d\ {}^4P^o_{5/2}$	391 360	7 427 200	90				94
14.152	$5/2$	$3/2$	430 650	7 498 700	55				94
14.066	$3/2$	$3/2$	391 360	7 498 700	65				94
14.066	$3/2$	$1/2$	391 360	7 500 700	65				94
14.172	$1s^22s2p^2\ {}^4P_{5/2}$	$1s^22s2p({}^3P^o)3d\ {}^4D^o_{7/2}$	430 650	7 486 800	65				94
14.152	$5/2$	$5/2$	430 650	7 496 800	55				94
14.121	$1/2$	$3/2$	354 570	7 436 200	65				94
14.121	$1/2$	$1/2$	354 570	7 436 200	65				81, 94°
14.121	$1s^22s2p^2\ {}^4P_{3/2}$	$1s^22s2p({}^3P^o)3d\ {}^2D^o_{5/2}$	391 360	7 473 700	65				94
14.066	$1s^22s2p^2\ {}^2D_{5/2}$	$1s^22s2p({}^1P^o)3d\ {}^2F^o_{7/2}$	653 080	7 762 300	65				94
14.037	$3/2$	$5/2$	640 950	7 765 000	100				94
11.030	$1s^22s^22p\ {}^2P^o_{3/2}$	$1s^22s^24s\ {}^2S_{1/2}$	82 970	9 145 000	5				81
10.940	$1/2$	$1/2$	0	9 145 000	3				81
10.840	$1s^22s^22p\ {}^2P^o_{3/2}$	$1s^22s^24d\ {}^2D_{5/2}$	82 970	9 308 000	2				81
10.712	$1/2$	$3/2$	0	9 335 000	3				81
2.2263	$1s^22s^22p\ {}^2P^o_{3/2}$	$1s2s^22p^2\ {}^2D_{5/2}$	82 970	45 000 000					91
2.2233	$1s^22s^22p\ {}^2P^o_{1/2}$	$1s2s^22p^2\ {}^2P_{1/2}$	0	44 978 000					91
2.2222	$3/2$	$3/2$	82 970	45 083 000					91
2.2199	$1s^22s^22p\ {}^2P^o_{3/2}$	$1s2s^22p^2\ {}^2S_{1/2}$	82 970	45 130 000					91

Cr XXI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4330^{C}	$1s^22s2p\ ^3P^o_0$	$1s^22s2p\ ^3P^o_1$	318 030	341 120		M1	2.18+2	C+	126*
1565^{C}	1	2	341 120	405 020		M1	3.45+3	C+	126*
2777^{C}	$1s^22p^2\ ^3P_1$	$1s^22p^2\ ^3P_2$	911 080	947 080		M1	5.2+2	C	126*
2157^{C}	0	1	864 730	911 080		M1	1.72+3	C	126*
955.11^{C}	$1s^22p^2\ ^3P_2$	$1s^22p^2\ ^1D_2$	947 080	1 051 780		M1	6.8+3	D+	126*
710.73^{C}	1	2	911 080	1 051 780		M1	6.3+3	D+	126*
505.94^{C}	$1s^22s2p\ ^1P^o_1$	$1s^22p^2\ ^3P_0$	667 080	864 730		7.2 − 4	1.9+7	E	126*
409.84^{C}	1	1	667 080	911 080		3.0 − 4	4.0+6	E	126*
357.14^{C}	1	2	667 080	947 080		2.0 − 2	2.1+8	D	126*
381.59^{C}	$1s^22s2p\ ^3P^o_2$	$1s^22s2p\ ^1P^o_1$	405 020	667 080		M1	6.0+3	D	126*
306.79^{C}	1	1	341 120	667 080		M1	6.8+3	D−	126*
286.49^{C}	0	1	318 030	667 080		M1	1.1+4	D	126*
293.15	$1s^22s^2\ ^1S_0$	$1s^22s2p\ ^3P^o_1$	0	341 120		1.0 − 3	2.6+7	D	18°, 25, 95, 96, 126*
290.91^{C}	$1s^22p^2\ ^3P_1$	$1s^22p^2\ ^1S_0$	911 080	1 254 830		M1	9.2+4	D	126*
259.97	$1s^22s2p\ ^1P^o_1$	$1s^22p^2\ ^1D_2$	667 080	1 051 780		1.85 − 1	3.65+9	B	55°, 126*
197.61	$1s^22s2p\ ^3P^o_2$	$1s^22p^2\ ^3P_1$	405 020	911 080		7.05 − 2	4.01+9	B	55°, 126*
190.98	1	0	341 120	864 730		5.97 − 2	1.09+10	B	55°, 126*
184.48	2	2	405 020	947 080		1.88 − 1	7.37+9	B	55°, 126*
175.45	1	1	341 120	911 080		4.74 − 2	3.42+9	B	55°, 126*
168.62	0	1	318 030	911 080		6.70 − 2	5.24+9	B	55°, 126*
165.03	1	2	341 120	947 080		8.73 − 2	4.28+9	B	55°, 126*
170.16	$1s^22s2p\ ^1P^o_1$	$1s^22p^2\ ^1S_0$	667 080	1 254 830		1.18 − 1	2.71+10	B	55°, 126*
154.61	$1s^22s2p\ ^3P^o_2$	$1s^22p^2\ ^1D_2$	405 020	1 051 780		5.05 − 2	2.82+9	C	55°, 126*
140.71^{C}	1	2	341 120	1 051 780		3.6 − 3	2.4+8	D	126*
149.907	$1s^22s^2\ ^1S_0$	$1s^22s2p\ ^1P^o_1$	0	667 080		1.64 − 1	1.62+10	B	25, 55, 77, 78°, 97, 126*
14.24^{C}	$1s^22p^2\ ^1S_0$	$1s^22p3d\ ^1P^o_1$	1 254 830	8 275 000		1.29	1.41+13	C−	126*
14.17^{C}	$1s^22s2p\ ^3P^o_2$	$1s^22s3s\ ^3S_1$	405 020	7 463 000		1.3 − 1	1.4+12	D	126*
14.041	1	1	341 120	7 463 000		8.1 − 2	9.1+11	D	98, 99°, 126*
14.00^{C}	0	1	318 030	7 463 000		2.8 − 2	3.2+11	D	126*
13.950	$1s^22p^2\ ^1D_2$	$1s^22p3d\ ^3P^o_2$	1 051 780	8 219 000		5.5 − 1	3.8+12	C−	94, 98, 99°, 126*
13.94^{C}	$1s^22p^2\ ^3P_2$	$1s^22p3d\ ^3D^o_2$	947 080	8 121 000		1.6 − 1	1.1+12	D	126*
13.91^{C}	2	1	947 080	8 134 000		9.0 − 3	1.0+11	D	126*
13.870	1	2	911 080	8 121 000		1.22	8.5+12	C−	81, 98, 99°, 126*
13.844	1	1	911 080	8 134 000		3.0 − 1	3.5+12	C−	98, 99°, 126*
13.779	2	3	947 080	8 204 000		3.4	1.7+13	C−	81, 86, 94, 98, 99°, 126*
13.752	0	1	864 730	8 134 000		1.29	1.51+13	C−	98, 99°, 126*
13.844	$1s^22p^2\ ^1D_2$	$1s^22p3d\ ^1P^o_1$	1 051 780	8 275 000		7.5 − 2	8.7+11	D	98, 99°, 126*
13.844	$1s^22p^2\ ^1D_2$	$1s^22p3d\ ^1F^o_3$	1 051 780	8 275 000		5.20	2.59+13	C−	81, 94, 99°, 126*
13.752	$1s^22p^2\ ^3P_2$	$1s^22p3d\ ^3P^o_1$	947 080	8 219 000		3.8 − 1	4.5+12	C−	94, 98, 99°, 126*
13.752	2	2	947 080	8 219 000		1.35	9.5+12	C−	94, 98, 99°, 126*
13.684	1	2	911 080	8 219 000		1.7 − 1	1.2+12	D	94, 98, 99°, 126*
13.684	1	0	911 080	8 219 000		3.3 − 1	1.2+13	C−	94, 98, 99°, 126*
13.684	1	1	911 080	8 219 000		6.9 − 1	8.2+12	C−	94, 98, 99°, 126*
13.60^{C}	0	1	864 730	8 219 000		5.1 − 3	6.1+10	D	126*
13.67^{C}	$1s^22s2p\ ^3P^o_2$	$1s^22s3d\ ^3D_2$	405 020	7 721 000		5.5 − 1	3.9+12	C−	126*
13.647	2	3	405 020	7 733 000		3.0	1.5+13	C−	86, 94, 98, 99°, 126*
13.55	1	2	341 120	7 721 000		1.6	1.2+13	C−	81, 86°, 94, 126*
13.60^{C}	$1s^22s2p\ ^1P^o_1$	$1s^22p3p\ ^1P_1$	667 080	8 022 000		1.3 − 1	1.6+12	D	126*
13.44^{C}	$1s^22s2p\ ^1P^o_1$	$1s^22p3p\ ^3P_2$	667 080	8 109 000		1.6 − 1	1.2+12	D	126*
13.203	$1s^22s2p\ ^1P^o_1$	$1s^22s3s\ ^1S_0$	667 080	8 241 300					98, 99°
13.123	$1s^22s^2\ ^1S_0$	$1s^22s3p\ ^3P^o_1$	0	7 620 000		2.9 − 1	3.7+12	C−	98, 99°, 126*

Cr XXI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
13.060	$1s^22s2p\ ^3P^o_0$	$1s^22p3p\ ^3D_1$	318 030	7 975 100		8.2 − 2	1.1+12	D	98, 99°, 126*
13.018	1	2	341 120	8 023 000		4.8 − 1	3.8+12	C−	98, 99°, 126*
13.018	2	3	405 020	8 087 000		7.0 − 1	3.9+12	C−	81, 98, 99°, 126*
13.018	$1s^22s2p\ ^3P^o_1$	$1s^22p3p\ ^1P_1$	341 120	8 022 000					98, 99°
12.981	0	1	318 030	8 022 000					98, 99°
12.981	$1s^22s2p\ ^3P^o_2$	$1s^22p3p\ ^3S_1$	405 020	8 108 700					99
12.981	$1s^22s2p\ ^3P^o_2$	$1s^22p3p\ ^3P_2$	405 020	8 109 000		4.9 − 1	3.9+12	C−	99°, 126*
12.981	1	0	341 120	8 045 000		1.2 − 1	4.8+12	D	81, 99°, 126*
12.87[C]	1	2	341 120	8 109 000		3.3 − 2	2.7+11	D	126*
2.2173	$1s^22s2p\ ^1P^o_1$	$1s2s2p^2\ ^1D_2$	667 080	45 770 000					91
2.2140	$1s^22s2p\ ^3P^o_2$	$1s2s2p^2\ ^3D_3$	405 020	45 570 000					91
2.2115	1	2	341 120	45 560 000					91
2.2103	1	1	341 120	45 580 000					91
2.2079	$1s^22s^2\ ^1S_0$	$1s2s^22p\ ^1P^o_1$	0	45 290 000					91

Cr XXII

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1100.0^{C}	$1s^22p\ ^2P^o_{1/2}$	$1s^22p\ ^2P^o_{3/2}$	357 476	448 394		M1	6.76+3	B	126*
279.739^{S}	$1s^22s\ ^2S_{1/2}$	$1s^22p\ ^2P^o_{1/2}$	0	357 476		3.86 − 2	1.65+9	B+	18, 25, 55, 78$^{\Delta}$, 96, 97, 101, 103, 104, 106°, 126*
223.018^{S}	1/2	3/2	0	448 394		9.80 − 2	3.29+9	B+	18, 25, 55, 78$^{\Delta}$, 96, 97, 101,102,103,104,105, 106°, 126*
82.238^{C}	3/2	5/2	[10 539 180]	[11 755 160]					
81.599^{C}	1/2	3/2	[10 527 820]	[11 753 320]					
39.0995^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	[7 928 620]	[10 486 200]					
38.6919^{C}	1/2	1/2	[7 901 680]	[10 486 200]					
38.0744^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	[7 928 620]	[10 555 060]		2.3 − 1	2.7+11	C+	126*
38.0225^{C}	3/2	5/2	[7 928 620]	[10 558 640]		2.1	1.7+12	B	126*
37.6878^{C}	1/2	3/2	[7 901 680]	[10 555 060]		1.2	1.4+12	B	126*
36.6942^{C}	$1s^23s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	[7 802 590]	[10 527 820]					
36.5418^{C}	1/2	3/2	[7 802 590]	[10 539 180]					
26.3886^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	[7 928 620]	[11 718 140]					
26.2023^{C}	1/2	1/2	[7 901 680]	[11 718 140]					
26.1458^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	[7 928 620]	[11 753 320]					
26.1333^{C}	3/2	5/2	[7 928 620]	[11 755 160]					
25.9630^{C}	1/2	3/2	[7 901 680]	[11 753 320]					
13.5977^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^23s\ ^2S_{1/2}$	448 394	[7 802 590]					107,109
13.4316^{C}	1/2	1/2	357 476	[7 802 590]					107,109
13.3015^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^23d\ ^2D_{3/2}$	448 394	[7 966 320]		2.7 − 1	2.6+12	B	109, 126*
13.2866^{C}	3/2	5/2	448 394	[7 974 800]		2.44	1.54+13	B	81, 107, 108, 109, 126*
13.1426^{C}	1/2	3/2	357 476	[7 966 320]		1.34	1.29+13	B	81, 107, 108, 109, 126*
12.6555^{C}	$1s^22s\ ^2S_{1/2}$	$1s^23p\ ^2P^o_{1/2}$	0	[7 901 680]		2.54 − 1	5.28+12	B	81, 107, 108, 109, 126*
12.6125^{C}	1/2	3/2	0	[7 928 620]		4.90 − 1	5.13+12	B	81, 107, 108, 109, 126*
9.96234^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	448 394	[10 486 200]					109
9.87291^{C}	1/2	1/2	357 476	[10 486 200]					109
9.89446^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	448 394	[10 555 060]		4.8 − 2	7.9+11	C+	109, 126*
9.89096^{C}	3/2	5/2	448 394	[10 558 640]		4.4 − 1	4.9+12	B	108, 109, 126*
9.80624^{C}	1/2	3/2	357 476	[10 555 060]		2.4 − 1	4.1+12	B	108, 109, 126*
9.49864^{C}	$1s^22s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	0	[10 527 820]					108,109
9.48840^{C}	1/2	3/2	0	[10 539 180]					108,109
8.87331^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	448 394	[11 718 140]					109
8.80230^{C}	1/2	1/2	357 476	[11 718 140]					109
8.84570^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	448 394	[11 753 320]					109
8.84426^{C}	3/2	5/2	448 394	[11 755 160]					109
8.77513^{C}	1/2	3/2	357 476	[11 753 320]					109
8.51833^{C}	$1s^22s\ ^2S_{1/2}$	$1s^25p\ ^2P^o_{1/2}$	0	[11 739 390]					109
8.51412^{C}	1/2	3/2	0	[11 745 200]					109
2.2387^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s2s^2\ ^2S_{1/2}$	448 394	[45 116 000]					109
2.2343^{C}	1/2	1/2	357 476	[45 116 000]					109
2.2137^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^4P_{1/2}$	448 394	[45 621 000]					109
2.2115^{C}	3/2	3/2	448 394	[45 666 000]					109
2.2097^{C}	3/2	5/2	448 394	[45 702 000]					109
2.2093^{C}	1/2	1/2	357 476	[45 621 000]					109
2.2071^{C}	1/2	3/2	357 476	[45 666 000]					109
2.2121^{C}	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^4P^o_{1/2}$	0	[45 206 000]					109
2.2110^{C}	1/2	3/2	0	[45 228 000]					109

Cr XXII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2.2027[C]	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1D)\ ^2D_{3/2}$	448 394	[45 846 000]					109
2.2015[C]	$_{3/2}$	$_{5/2}$	448 394	[45 871 000]		6.8 − 1	1.6+14	C	91, 109, 110, 126*
2.1984[C]	$_{1/2}$	$_{3/2}$	357 476	[45 846 000]		6.6 − 1	2.3+14	C	91, 109, 110, 126*
2.2020[C]	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^2P_{1/2}$	448 394	[45 862 000]					109
2.1976[C]	$_{1/2}$	$_{1/2}$	357 476	[45 862 000]					109
2.1972[C]	$_{3/2}$	$_{3/2}$	448 394	[45 960 000]					109
2.1929[C]	$_{1/2}$	$_{3/2}$	357 476	[45 960 000]					109
2.1979[C]	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^2P^o_{1/2}$	0	[45 498 000]					109
2.1955[C]	$_{1/2}$	$_{3/2}$	0	[45 548 000]					91,109,110
2.1905[C]	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^1P^o)\ ^2P^o_{1/2}$	0	[45 652 000]					91,109,110,111
2.1896[C]	$_{1/2}$	$_{3/2}$	0	[45 670 000]					109
2.1898[C]	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1S)\ ^2S_{1/2}$	448 394	[46 113 000]					109
2.1856[C]	$_{1/2}$	$_{1/2}$	357 476	[46 113 000]					109
2.1854	$1s^23p\ ^2P^o_{3/2}$	$1s2p3p\ ^2D_{5/2}$	[7 928 620]	53 680 000					111
2.1846	$_{1/2}$	$_{3/2}$	[7 901 680]	53 671 000					111
2.1846	$1s^23p\ ^2P^o_{3/2}$	$1s2p3p\ ^2P_{3/2}$	[7 928 620]	53 697 000					111
2.1846	$1s^23s\ ^2S_{1/2}$	$1s2p3s\ ^2P^o_{1/2}$	[7 802 590]	53 601 000					111
2.1846	$_{1/2}$	$_{3/2}$	[7 802 590]	53 601 000					111
2.1846	$1s^23d\ ^2D_{5/2}$	$1s2p3d\ ^2D^o_{5/2}$	[7 974 800]	53 755 000					111
2.1834	$_{3/2}$	$_{5/2}$	[7 966 320]	53 755 000					111
2.1834	$1s^23d\ ^2D_{5/2}$	$1s2p3d\ ^2F^o_{7/2}$	[7 974 800]	53 772 000					111
2.1834	$1s^24p\ ^2P^o_{3/2}$	$1s2p4p\ ^2D_{5/2}$	[10 539 180]	56 334 000					111

Cr XXIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
7500^{C}	$1s4p\ ^3P^o_2$	$1s4d\ ^3D_2$	[56 695 100]	[56 708 400]					
5800^{C}	2	3	[56 695 100]	[56 712 400]					
4220^{C}	1	2	[56 684 700]	[56 708 400]					
4180^{C}	1	1	[56 684 700]	[56 708 600]					
3910^{C}	0	1	[56 683 000]	[56 708 600]					
7500^{C}	$1s5s\ ^3S_1$	$1s5p\ ^3P^o_1$	[57 992 700]	[58 006 100]					
5300^{C}	1	2	[57 992 700]	[58 011 400]					
7400^{C}	$1s5s\ ^1S_0$	$1s5p\ ^1P^o_1$	[58 005 800]	[58 019 400]					
3820^{C}	$1s4s\ ^3S_1$	$1s4p\ ^3P^o_1$	[56 658 500]	[56 684 700]					
2730^{C}	1	2	[56 658 500]	[56 695 100]					
3760^{C}	$1s4s\ ^1S_0$	$1s4p\ ^1P^o_1$	[56 684 100]	[56 710 700]					
1600^{C}	$1s3s\ ^3S_1$	$1s3p\ ^3P^o_1$	[53 760 100]	[53 822 410]					
1590^{C}	$1s3s\ ^1S_0$	$1s3p\ ^1P^o_1$	[53 821 190]	[53 884 060]					
472.14^{C}	$1s2s\ ^3S_1$	$1s2p\ ^3P^o_0$	[45 384 110]	[45 595 910]		1.11 − 2	3.33+8	B	126*
443.95^{C}	1	1	[45 384 110]	[45 609 360]		3.36 − 2	3.77+8	B	126*
324.98^{C}	1	2	[45 384 110]	[45 691 820]		8.10 − 2	1.02+9	B	102, 126*
466.37^{C}	$1s2s\ ^1S_0$	$1s2p\ ^1P^o_1$	[45 614 410]	[45 828 830]		3.27 − 2	3.34+8	B	126*
224.86^{C}	$1s2s\ ^3S_1$	$1s2p\ ^1P^o_1$	[45 384 110]	[45 828 830]		4.41 − 3	1.94+8	B	126*
77.21^{C}	$1s4p\ ^1P^o_1$	$1s5s\ ^1S_0$	[56 710 700]	[58 005 800]		1.6 − 1	1.8+11	C	126*
77.07^{C}	$1s4p\ ^3P^o_2$	$1s5s\ ^3S_1$	[56 695 100]	[57 992 700]					
76.45^{C}	1	1	[56 684 700]	[57 992 700]		1.6 − 1	6.3+10	D	126*
74.89^{C}	$1s4s\ ^1S_0$	$1s5p\ ^1P^o_1$	[56 684 100]	[58 019 400]		4.5 − 1	1.8+11	D	126*
74.21^{C}	$1s4s\ ^3S_1$	$1s5p\ ^3P^o_1$	[56 658 500]	[58 006 100]		4.53 − 1	1.83+11	C	126*
35.714^{C}	$1s3p\ ^1P^o_1$	$1s4s\ ^1S_0$	[53 884 060]	[56 684 100]		1.0 − 1	5.3+11	C	126*
35.664^{C}	$1s3d\ ^3D_1$	$1s4p\ ^3P^o_0$	[53 879 040]	[56 683 000]					
35.642^{C}	1	1	[53 879 040]	[56 684 700]					
35.637^{C}	2	1	[53 878 640]	[56 684 700]					
35.626^{C}	3	2	[53 888 200]	[56 695 100]					
35.506^{C}	2	2	[53 878 640]	[56 695 100]					
35.569^{C}	$1s3p\ ^3P^o_2$	$1s4s\ ^3S_1$	[53 847 040]	[56 658 500]					
35.260^{C}	1	1	[53 822 410]	[56 658 500]		9.9 − 2	1.8+11	C−	126*
35.454^{C}	$1s3d\ ^1D_2$	$1s4p\ ^1P^o_1$	[53 890 160]	[56 710 700]					
35.346^{C}	$1s3p\ ^1P^o_1$	$1s4d\ ^1D_2$	[53 884 060]	[56 713 200]					
34.948^{C}	$1s3p\ ^3P^o_2$	$1s4d\ ^3D_2$	[53 847 040]	[56 708 400]					
34.900^{C}	2	3	[53 847 040]	[56 712 400]					
34.650^{C}	1	2	[53 822 410]	[56 708 400]					
34.648^{C}	1	1	[53 822 410]	[56 708 600]					
34.601^{C}	0	1	[53 818 510]	[56 708 600]					
34.608^{C}	$1s3s\ ^1S_0$	$1s4p\ ^1P^o_1$	[53 821 190]	[56 710 700]		4.05 − 1	7.5+11	C	126*
34.193^{C}	$1s3s\ ^3S_1$	$1s4p\ ^3P^o_1$	[53 760 100]	[56 684 700]		4.08 − 1	7.8+11	C	126*
34.072^{C}	1	2	[53 760 100]	[56 695 100]					
24.262^{C}	$1s3p\ ^1P^o_1$	$1s5s\ ^1S_0$	[53 884 060]	[58 005 800]		2.3 − 2	2.6+11	C	126*
24.122^{C}	$1s3p\ ^3P^o_2$	$1s5s\ ^3S_1$	[53 847 040]	[57 992 700]					
23.979^{C}	1	1	[53 822 410]	[57 992 700]		2.3 − 2	8.9+10	D	126*
23.820^{C}	$1s3s\ ^1S_0$	$1s5p\ ^1P^o_1$	[53 821 190]	[58 019 400]		1.04 − 1	4.08+11	C+	126*
23.552^{C}	$1s3s\ ^3S_1$	$1s5p\ ^3P^o_1$	[53 760 100]	[58 006 100]		1.0 − 1	4.2+11	C	126*
23.522^{C}	1	2	[53 760 100]	[58 011 400]					
12.512^{C}	$1s2p\ ^1P^o_1$	$1s3s\ ^1S_0$	[45 828 830]	[53 821 190]		4.5 − 2	1.9+12	C+	126*

Cr XXIII – Continued

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
12.405^{C}	$1s2p\ ^1P^o_1$	$1s3d\ ^1D_2$	[45 828 830]	[53 890 160]					
12.394^{C}	$1s2p\ ^3P^o_2$	$1s3s\ ^3S_1$	[45 691 820]	[53 760 100]					
12.269^{C}	1	1	[45 609 360]	[53 760 100]		4.2 − 2	6.2+11	C−	126*
12.215^{C}	$1s2p\ ^3P^o_2$	$1s3d\ ^3D_2$	[45 691 820]	[53 878 640]					
12.201^{C}	2	3	[45 691 820]	[53 888 200]					
12.093^{C}	1	2	[45 609 360]	[53 878 640]					
12.092^{C}	1	1	[45 609 360]	[53 879 040]					
12.073^{C}	0	1	[45 595 910]	[53 879 040]					
12.092^{C}	$1s2s\ ^1S_0$	$1s3p\ ^1P^o_1$	[45 614 410]	[53 884 060]		3.68 − 1	5.6+12	C	126*
11.851^{C}	$1s2s\ ^3S_1$	$1s3p\ ^3P^o_1$	[45 384 110]	[53 822 410]		3.69 − 1	5.8+12	C	126*
9.2121^{C}	$1s2p\ ^1P^o_1$	$1s4s\ ^1S_0$	[45 828 830]	[56 684 100]		9.3 − 3	7.3+11	C	126*
9.1875^{C}	$1s2p\ ^1P^o_1$	$1s4d\ ^1D_2$	[45 828 830]	[56 713 200]					
9.1185^{C}	$1s2p\ ^3P^o_2$	$1s4s\ ^3S_1$	[45 691 820]	[56 658 500]					
9.0505^{C}	1	1	[45 609 360]	[56 658 500]		9.3 − 3	2.5+11	D	126*
9.0772^{C}	$1s2p\ ^3P^o_2$	$1s4d\ ^3D_2$	[45 691 820]	[56 708 400]					
9.0739^{C}	2	3	[45 691 820]	[56 712 400]					
9.0098^{C}	1	2	[45 609 360]	[56 708 400]					
9.0096^{C}	1	1	[45 609 360]	[56 708 600]					
8.9987^{C}	0	1	[45 595 910]	[56 708 600]					
9.0120^{C}	$1s2s\ ^1S_0$	$1s4p\ ^1P^o_1$	[45 614 410]	[56 710 700]		8.9 − 2	2.4+12	C+	126*
8.8491^{C}	$1s2s\ ^3S_1$	$1s4p\ ^3P^o_1$	[45 384 110]	[56 684 700]		9.0 − 2	2.6+12	C+	126*
8.8410^{C}	1	2	[45 384 110]	[56 695 100]					
8.2122^{C}	$1s2p\ ^1P^o_1$	$1s5s\ ^1S_0$	[45 828 830]	[58 005 800]		3.9 − 3	3.9+11	C	126*
8.1295^{C}	$1s2p\ ^3P^o_2$	$1s5s\ ^3S_1$	[45 691 820]	[57 992 700]					
8.0754^{C}	1	1	[45 609 360]	[57 992 700]		3.9 − 3	1.3+11	D	126*
8.0613^{C}	$1s2s\ ^1S_0$	$1s5p\ ^1P^o_1$	[45 614 410]	[58 019 400]		3.7 − 2	1.3+12	C+	126*
7.9227^{C}	$1s2s\ ^3S_1$	$1s5p\ ^3P^o_1$	[45 384 110]	[58 006 100]		3.6 − 2	1.3+12	C+	126*
7.9194^{C}	1	2	[45 384 110]	[58 011 400]					
2.203414^{C}	$1s^2\ ^1S_0$	$1s2s\ ^3S_1$	0	[45 384 110]		M1	9.37+7	B	91, 110, 126*
2.192532^{C}	$1s^2\ ^1S_0$	$1s2p\ ^3P^o_1$	0	[45 609 360]		5.05 − 2	2.34+13	B	91, 110, 126*
2.188576^{C}	0	2	0	[45 691 820]		M2	3.45+9	B	91, 110, 111, 126*
2.182033^{C}	$1s^2\ ^1S_0$	$1s2p\ ^1P^o_1$	0	[45 828 830]		7.21 − 1	3.37+14	B	91, 110, 111, 113, 114, 115, 116, 126*
2.1296^{C}	$1s2p\ ^1P^o_1$	$2s^2\ ^1S_0$	[45 828 830]	[92 786 000]		3.6 − 2	5.1+13	D	109, 126*
2.1197^{C}	$1s2p\ ^3P^o_1$	$2s^2\ ^1S_0$	[45 609 360]	[92 786 000]		1.8 − 2	2.7+13	D	109, 126*
2.1178^{C}	$1s2p\ ^1P^o_1$	$2p^2\ ^3P_0$	[45 828 830]	[93 047 000]					109
2.1154^{C}	1	1	[45 828 830]	[93 100 000]					109
2.1135^{C}	1	2	[45 828 830]	[93 143 000]		2.0 − 1	5.9+13	D	109, 126*
2.1171^{C}	$1s2s\ ^1S_0$	$2s2p\ ^3P^o_1$	[45 614 410]	[92 848 000]					109
2.1093^{C}	$1s2p\ ^3P^o_2$	$2p^2\ ^3P_1$	[45 691 820]	[93 100 000]		3.4 − 1	1.7+14	C	109, 126*
2.1081^{C}	1	0	[45 609 360]	[93 047 000]		2.5 − 1	3.8+14	C	109, 126*
2.1074^{C}	2	2	[45 691 820]	[93 143 000]		7.5 − 1	2.3+14	C	109, 126*
2.1057^{C}	1	1	[45 609 360]	[93 100 000]		1.9 − 1	9.6+13	D	109, 126*
2.1051^{C}	0	1	[45 595 910]	[93 100 000]		2.8 − 1	1.4+14	C	109, 126*
2.1038^{C}	1	2	[45 609 360]	[93 143 000]		3.9 − 1	1.2+14	C	109, 126*
2.1081^{C}	$1s2s\ ^3S_1$	$2s2p\ ^3P^o_0$	[45 384 110]	[92 820 000]		1.3 − 1	2.0+14	C	109, 126*
2.1069^{C}	1	1	[45 384 110]	[92 848 000]		3.9 − 1	2.0+14	C	109, 126*
2.1030^{C}	1	2	[45 384 110]	[92 935 000]		6.9 − 1	2.1+14	C	109, 126*
2.1078^{C}	$1s2p\ ^1P^o_1$	$2p^2\ ^1D_2$	[45 828 830]	[93 271 000]		1.1	3.3+14	C	109, 126*

Cr XXIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2.1017^C	$1s2p\ ^3P^o_2$	$2p^2\ ^1D_2$	[45 691 820]	[93 271 000]		2.6 − 1	7.9+13	D	109, 126*
2.0982^C	$_1$	$_2$	[45 609 360]	[93 271 000]					109
2.1014^C	$1s2s\ ^1S_0$	$2s2p\ ^1P^o_1$	[45 614 410]	[93 201 000]		4.0 − 1	2.0+14	C	109, 126*
2.0960^C	$1s2p\ ^1P^o_1$	$2p^2\ ^1S_0$	[45 828 830]	[93 539 000]		2.3 − 1	3.5+14	C	109, 126*
2.0913^C	$1s2s\ ^3S_1$	$2s2p\ ^1P^o_1$	[45 384 110]	[93 201 000]					109
2.0864^C	$1s2p\ ^3P^o_1$	$2p^2\ ^1S_0$	[45 609 360]	[93 539 000]					109
1.85796^C	$1s^2\ ^1S_0$	$1s3p\ ^3P^o_1$	0	[53 822 410]		1.3 − 2	8.4+12	E	126*
1.85584^C	$1s^2\ ^1S_0$	$1s3p\ ^1P^o_1$	0	[53 884 060]		1.39 − 1	8.97+13	C+	126*
1.76414^C	$1s^2\ ^1S_0$	$1s4p\ ^3P^o_1$	0	[56 684 700]		4.5 − 3	3.2+12	E	126*
1.76334^C	$1s^2\ ^1S_0$	$1s4p\ ^1P^o_1$	0	[56 710 700]		5.14 − 2	3.68+13	C+	113, 122, 126*
1.72396^C	$1s^2\ ^1S_0$	$1s5p\ ^3P^o_1$	0	[58 006 100]		2.2 − 3	1.6+12	E	126*
1.72356^C	$1s^2\ ^1S_0$	$1s5p\ ^1P^o_1$	0	[58 019 400]		2.48 − 2	1.86+13	C+	113, 126*

Cr XXIV

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2806[C]	$3s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[56 599 130]	[56 634 760]		4.06 − 2	8.60+6	A	125*
2728[C]	$3p\ ^2P^o_{1/2}$	$3d\ ^2D_{3/2}$	[56 598 060]	[56 634 700]		2.61 − 2	5.84+6	A	125*
830.841[C]	$2s\ ^2S_{1/2}$	$2p\ ^2P^o_{3/2}$	[47 723 240]	[47 843 600]		2.28 − 2	5.52+7	A	125*
32.5024[C]	$3d\ ^2D_{5/2}$	$4f\ ^2F^o_{7/2}$	[56 646 760]	[59 723 460]		5.82	4.60+12	A	125*
32.4026[C]	$3p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[56 634 760]	[59 720 930]		2.23	2.37+12	A	125*
32.0848[C]	$3s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[56 599 130]	[59 715 870]		6.56 − 1	1.06+12	A	125*
22.2261[C]	$3d\ ^2D_{5/2}$	$5f\ ^2F^o_{7/2}$	[56 646 760]	[61 145 980]		8.96 − 1	1.51+12	A	125*
22.1733[C]	$3p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[56 634 760]	[61 144 680]		5.03 − 1	1.14+12	A	125*
22.0121[C]	$3s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[56 599 130]	[61 142 090]		1.63 − 1	5.61+11	A	125*
11.3596[C]	$2p\ ^2P^o_{3/2}$	$3d\ ^2D_{5/2}$	[47 843 600]	[56 646 760]		2.51	2.16+13	A	125*
11.2214[C]	$2s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[47 723 240]	[56 634 760]		5.89 − 1	7.80+12	A	125*
8.419401[C]	$2p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[47 843 600]	[59 720 930]		4.39 − 1	6.89+12	A	125*
8.338455[C]	$2s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[47 723 240]	[59 715 870]		1.39 − 1	3.32+12	A	125*
7.518186[C]	$2p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[47 843 600]	[61 144 680]		1.60 − 1	3.15+12	A	125*
7.452203[C]	$2s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[47 723 240]	[61 142 090]		5.65 − 2	1.70+12	A	125*
2.095567[C]	$1s\ ^2S_{1/2}$	$2p\ ^2P^o_{1/2}$	0	[47 719 790]		2.79 − 1	2.12+14	A	125*
2.090144[C]	$1/2$	$3/2$	0	[47 843 600]		5.60 − 1	2.14+14	A	125*
1.766845[C]	$1s\ ^2S_{1/2}$	$3p\ ^2P^o_{1/2}$	0	[56 598 060]		5.31 − 2	5.68+13	A	122, 125*
1.765700[C]	$1/2$	$3/2$	0	[56 634 760]		1.06 − 1	5.69+13	A	122, 125*
1.674597[C]	$1s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	0	[59 715 870]		3.90 − 2	2.32+13	A	125*
1.635535[C]	$1s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	0	[61 142 090]		1.87 − 2	1.17+13	A	125*

2.4.3. References for Comments and Tables for Cr Ions

[1] J. O. Ekberg, Phys. Scr. **7**, 59 (1973).
[2] E. Alexander, U. Feldman, and B. S. Fraenkel, J. Opt. Soc. Am. **55**, 650 (1965).
[3] A. H. Gabriel, B. C. Fawcett, and C. Jordan, Nature **206**, 390 (1965).
[4] P. G. Kruger and S. G. Weissberg, Phys. Rev. **52**, 314 (1937).
[5] A. H. Gabriel, B. C. Fawcett, and C. Jordan, Proc. Phys. Soc. **87**, 825 (1966).
[6] U. Feldman and B. S. Fraenkel, Astrophys. J. **145**, 959 (1966).
[7] R. D. Cowan, Astrophys. J. **147**, 377 (1967).
[8] B. C. Fawcett, J. Phys. B **3**, 1732 (1970).
[9] J. O. Ekberg, Phys. Scr. **8**, 35 (1973).
[10] P. G. Kruger and S. G. Weissberg, Phys. Rev. **48**, 659 (1935).
[11] E. Alexander, U. Feldman, B. S. Fraenkel, and S. Hoory, Nature **204**, 176 (1965).
[12] U. Feldman, B. S. Fraenkel, and S. Hoory, Astrophys. J. **142**, 719 (1965).
[13] W. J. Wagner and L. L. House, Astrophys. J. **166**, 683 (1971).
[14] J. O. Ekberg, Phys. Scr. **13**, 245 (1976).
[15] S. O. Kastner, A. M. Crooker, W. E. Behring, and L. Cohen, Phys. Rev. A **16**, 577 (1977).
[16] S. G. Weissberg and P. G. Kruger, Phys. Rev. **49**, 872 (1936).
[17] R. Smitt, L. Å. Svensson, and M. Outred, Phys. Scr. **13**, 293 (1976).
[18] K. P. Dere, Astrophys. J. **221**, 1062 (1978).
[19] B. C. Fawcett and A. H. Gabriel, Proc. Phys. Soc. **88**, 262 (1966).
[20] G. E. Bromage, R. D. Cowan, and B. C. Fawcett, Phys. Scr. **15**, 177 (1977).
[21] B. Edlén, Z. Phys. **104**, 407 (1937).
[22] B. C. Fawcett, R. D. Cowan, and R. W. Hayes, J. Phys. B **5**, 2143 (1972).
[23] W. Lotz, J. Opt. Soc. Am **57**, 873 (1967).
[24] B. C. Fawcett, J. Phys. B **4**, 1577 (1971).
[25] J. H. Davé, U. Feldman, J. F. Seely, A. Wouters, S. Suckewer, E. Hinnov, and J. L. Schwob, J. Opt. Soc. Am. B **4**, 635 (1987).
[26] B. Edlén, Z. Phys. **104**, 188 (1937).
[27] B. C. Fawcett, R. D. Cowan, and R. W. Hayes, Supplementary Publication No. SUP 70005 (1972).
[28] J. T. Jefferies, F. Q. Orrall, and J. B. Zirker, Solar Phys. **16**, 103 (1971).
[29] G. D. Sandlin, G. E. Brueckner, and R. Tousey, Astrophys. J. **214**, 898 (1977).
[30] U. Feldman and G. A. Doschek, J. Opt. Soc. Am. **67**, 726 (1977).
[31] B. C. Fawcett and N. J. Peacock, Proc. Phys. Soc. **91**, 973 (1967).
[32] B. C. Fawcett, A. H. Gabriel, and P. A. H. Saunders, Proc. Phys. Soc. **90**, 863 (1967).
[33] L. Å. Svensson, Solar Phys. **18**, 232 (1971).
[34] J. T. Jefferies, Mem. Soc. Roy. Sci. Liége. **17**, 213 (1969).
[35] F. Magnant-Crifo, Solar Phys. **31**, 91 (1973).
[36] E. Träbert, P. H. Heckmann, R. Hutton, and I. Martinson, J. Opt. Soc. Am. B **5**, 2173 (1988).
[37] S. O. Kastner, M. Swartz, A. K. Bhatia, and J. Lapides, J. Opt. Soc. Am. **68**, 1558 (1978).
[38] U. Litzén and A. Redfors, Phys. Lett. A **127**, 88 (1988).
[39] A. Redfors and U. Litzén, J. Opt. Soc. Am. B **6**, 1447 (1989).
[40] V. E. Levashov, A. N. Ryabtsev, and S. S. Churilov, Opt. Spectrosc. **69**, 20 (1990).
[41] S. S. Churilov and V. E. Levashov, Phys. Scr. **48**, 425 (1993).
[42] B. Edlén, Z. Phys. **103**, 536 (1936).
[43] B. C. Fawcett, R. D. Cowan, E. Y. Kononov, and R. W. Hayes, J. Phys. B **5**, 1255 (1972).
[44] U. Litzén and A. Redfors, Phys. Scr. **36**, 895 (1987).
[45] N. J. Peacock, M. F. Stamp, and J. D. Silver, Phys. Scr. **T8**, 10 (1984).
[46] M. Finkenthal, R. E. Bell, H. W. Moos, and TFR Group, Phys. Lett. **88A**, 165 (1982).
[47] V. E. Levashov and S. S. Churilov, Opt. Spectrosc. **65**, 143 (1988).
[48] A. Redfors, Phys. Scr. **38**, 702 (1988).
[49] S. S. Churilov, V. E. Levashov, and J. F. Wyart, Phys. Scr. **40**, 625 (1989).
[50] K. G. Widing, G. D. Sandlin, and R. Cowan, Astrophys. J. **169**, 405 (1971).
[51] L. Cohen and W. E. Behring, J. Opt. Soc. Am. **66**, 899 (1976).
[52] M. C. Buchet-Poulizac, J. P. Buchet, and S. Martin, J. Physique **47**, 407 (1986).
[53] J. Reader, V. Kaufman, J. Sugar, J. O. Ekberg, U. Feldman, C. M. Brown, J. F. Seely, and W. L. Rowan, J. Opt. Soc. Am. B **4**, 1821 (1987).
[54] C. Jupén, L. Engström, R. Hutton, and E. Träbert, J. Phys. B **21**, L347 (1988).
[55] K. D. Lawson and N. J. Peacock, J. Phys. B **13**, 3313 (1980).
[56] B. Edlén, Z. Phys. **100**, 621 (1936).
[57] U. Feldman and L. Cohen, J. Opt. Soc. Am. **57**, 1128 (1967).
[58] B. Edlén, Phys. Scr. **17**, 565 (1978).
[59] B. Edlén and F. Tyrén, Z. Phys. **101**, 206 (1936).
[60] F. Tyrén, Z. Phys. **111**, 314 (1938).
[61] M. Klapisch, A. Bar Shalom, J. L. Schwob, B. S. Fraenkel, C. Breton, C. de Michelis, M. Finkenthal, and M. Mattioli, Phys. Lett. **69A**, 34 (1978).
[62] D. L. McKenzie and P. B. Landecker, Astrophys. J. **254**, 309 (1982).
[63] M. Swartz, S. Kastner, E. Rothe, and W. Neupert, J. Phys. B **4**, 1747 (1971).
[64] C. Jupén, U. Litzén, V. Kaufman, and J. Sugar, Phys. Rev. A **35**, 116 (1987).
[65] C. Jupén and U. Litzén, Phys. Scr. **30**, 112 (1984).
[66] C. Jupén and U. Litzén, Phys. Scr. **33**, 509 (1986).
[67] J. P. Buchet, M. C. Buchet-Poulizac, A. Denis, J. Desesquelles, M. Druetta, S. Martin, and J. F. Wyart, J. Phys. B **20**, 1709 (1987).
[68] S. O. Kastner, Astrophys. J. **275**, 922 (1983).
[69] M. Finkenthal, P. Mandelbaum, A. Bar-Shalom, M. Klapisch, J. L. Schwob, C. Breton, C. De Michelis, and M. Mattioli, J. Phys. B **18**, L331 (1985).
[70] S. O. Kastner, W. E. Behring, and L. Cohen, Astrophys. J. **199**, 777 (1975).
[71] B. C. Fawcett, G. E. Bromage, and R. W. Hayes, Mon. Not. Roy. Astron. Soc. **186**, 113 (1979).
[72] J. Sugar and C. Corliss, J. Phys. Chem. Ref. Data **14**, Suppl. 2 (1985).
[73] E. Hinnov, S. Suckewer, S. Cohen, and K. Sato, Phys. Rev. A **25**, 2293 (1982).
[74] M. Finkenthal, R. E. Bell, H. W. Moos, and TFR Group, J. Appl. Phys. **56**, 2012 (1984).
[75] B. C. Fawcett, J. Phys. B **4**, 981 (1971).
[76] G. A. Doschek, U. Feldman, R. D. Cowan, and L. Cohen, Astrophys. J. **188**, 417 (1974).
[77] C. Breton, C. De Michelis, M. Finkenthal, and M. Mattioli, J. Opt. Soc. Am. **69**, 1652 (1979).
[78] J. Sugar, V. Kaufman, and W. L. Rowan, J. Opt. Soc. Am. B **10**, 13 (1993).
[79] U. Feldman, G. A. Doschek, R. D. Cowan, and L. Cohen, J. Opt. Soc. Am. **63**, 1445 (1973).
[80] L. Cohen, U. Feldman, and S. O. Kastner, J. Opt. Soc. Am. **58**, 331 (1968).
[81] N. Spector, A. Zigler, H. Zmora, and J. L. Schwob, J. Opt. Soc. Am. **70**, 857 (1980).
[82] K. T. Cheng, unpublished material (1981).
[83] W. C. Martin, unpublished material (1982).
[84] G. A. Doschek, U. Feldman, J. Davis, and R. D. Cowan, Phys. Rev. A **12**, 980 (1975).

[85] G. A. Doschek, U. Feldman, and L. Cohen, J. Opt. Soc. Am. **63**, 1463 (1973).
[86] B. C. Fawcett and R. W. Hayes, Mon. Not. Roy. Astron. Soc. **170**, 185 (1975).
[87] B. Denne and E. Hinnov, J. Opt. Soc. Am. B **1**, 699 (1984).
[88] U. Feldman, G. A. Doschek, R. D. Cowan, and L. Cohen, Astrophys. J. **196**, 613 (1975).
[89] E. Hinnov and S. Suckewer, Phys. Lett. **79A**, 298 (1980).
[90] B. Edlén, Phys. Scr. **31**, 345 (1985).
[91] TFR Group, J. Dubau, and M. Loulergue, J. Phys. B **15**, 1007 (1981).
[92] G. A. Doschek, U. Feldman, and L. Cohen, J. Opt. Soc. Am. **65**, 463 (1975).
[93] B. Edlén, Phys. Scr. **28**, 483 (1983).
[94] P. G. Burkhalter, G. Charatis, P. D. Rockett, and D. Newman, J. Opt. Soc. Am. B **1**, 155 (1984).
[95] K. G. Widing, Astrophys. J. **197**, L33 (1975).
[96] G. D. Sandlin, G. E. Brueckner, V. E. Scherrer, and R. Tousey, Astrophys. J. **205**, L47 (1976).
[97] E. Hinnov, Astrophys. J. **230**, L197 (1979).
[98] V. A. Boiko, S. A. Pikuz, U. I. Safronova, and A. Ya. Faenov, J. Phys. B **10**, 1253 (1977).
[99] V. A. Boiko, A. Ya. Faenov, and S. A. Pikuz, J. Quant. Spectrosc. Radiat. Transfer **19**, 11 (1978).
[100] G. E. Bromage, R. D. Cowan, B. C. Fawcett, and A. Ridgeley, J. Opt. Soc. Am. **68**, 48 (1978).
[101] K. G. Widing and J. D. Purcell, Astrophys. J. **204**, L151 (1976).
[102] J. P. Grandin, M. Huet, X. Husson, D. Lecler, D. Touvet, J. P. Buchet, M. C. Buchet-Poulizac, A. Denis, J. Desesquelles, and M. Druetta, J. Physique **45**, 1423 (1984).
[103] R. J. Knize, A. T. Ramsey, B. C. Stratton, and J. Timberlake, The Sixth Topical Conference on Atomic Processes in High Temperature Plasmas (Santa Fe, NM, USA, 1987).
[104] E. Hinnov, the TFTR Operating Team, B. Denne, and the JET Operating Team, Phys. Rev. A **40**, 4357 (1989).
[105] R. J. Knize, Phys. Rev. A **43**, 1637 (1991).
[106] Y. -K. Kim, D. H. Baik, P. Indelicato, and J. P. Desclaux, Phys. Rev. A **44**, 148 (1991).
[107] S. Goldsmith, U. Feldman, L. Oren, and L. Cohen, Astrophys. J. **174**, 209 (1972).
[108] E. V. Aglitskii, V. A. Boiko, S. A. Pikuz, and A. Ya. Faenov, Sov. J. Quant. Electron. **4**, 956 (1975).
[109] L. A. Vainshtein and U. I. Safronova, Reprint No. 2, Acad. Nauk USSR, Inst. Spectrosc. Moscow (1985).
[110] V. A. Bryzgunov, S. Yu. Luk'yanov, M. T. Pakhomov, A. M. Potapov, and S. A. Chuvatin, Sov. Phys. JETP **55**, 1095 (1982).
[111] M. L. Apicella, R. Bartiromo, F. Bombarda, and R. Giannella, Phys. Lett. **98A**, 174 (1983).
[112] B. Edlén, Phys. Scr. **19**, 255 (1979).
[113] P. Beiersdorfer, M. Bitter, S. von Goeler, and K. W. Hill, Phys. Rev. A **40**, 150 (1989).
[114] E. V. Aglitsky, P. S. Antsiferov, S. L. Mandelstam, A. M. Panin, U. I. Safronova, S. A. Ulitin, and L. A. Vainshtein, Phys. Scr. **38**, 136 (1988).
[115] S. Morita, J. Phys. Soc. Jpn. **52**, 2673 (1983).
[116] S. Morita and J. Fujita, Nucl. Instrum. Meth. B **9**, 713 (1985).
[117] K. T. Cheng, M. H. Chen, W. R. Johnson, and J. Sapirstein, Phys. Rev. A **50**, 247 (1994).
[118] K. T. Cheng, unpublished material (1996).
[119] W. R. Johnson and G. Soff, Atom. Data Nucl. Data Tables **33**, 405 (1985).
[120] G. W. F. Drake, *Calculated transition frequencies for helium-like ions,* unpublished (1985).
[121] M. Bitter, S. von Goeler, S. Cohen, K. W. Hill, S. Sesnic, F. Tenney, J. Timberlake, U. I. Safronova, L. A. Vainshtein, J. Dubau, M. Loulergue, F. Bely-Dubau, and L. Steenman-Clark, Phys. Rev. A **29**, 661 (1984).
[122] V. Decaux, M. Bitter, H. Hsuan, S. von Goeler, K. W. Hill, R. A. Hulse, G. Taylor, H. Park, and C. P. Bhalla, Phys. Rev. A **43**, 228 (1991).
[123] P. J. Mohr, Atom. Data Nucl. Data Tables **29**, 453 (1983).
[124] G. W. Erickson, J. Phys. Chem. Ref. Data **6**, 831 (1977).
[125] W. L. Wiese, M. W. Smith, and B. M. Glennon, Natl. Stand. Ref. Data Ser., Natl. Bur. Stand. (U. S.) **4**, Vol. I, U. S. Govt. Print. Office, Washington, D. C. (1966).
[126] G. A. Martin, J. R. Fuhr, and W. L. Wiese, J. Phys. Chem. Ref. Data **17**, Suppl. 3 (1988).
[127] S. M. Younger and A. W. Weiss, J. Res. Natl. Bur. Stand. Sec. **79A**, 629 (1975).
[128] K. D. Lawson, N. J. Peacock, and M. F. Stamp, J. Phys. B **14**, 1929 (1981).

2.5. Manganese

2.5.1. Brief Comments on Each Manganese Ion

Mn VI

Ca I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^6 3d^2\ \ ^3F_2$

Ionization energy 771 100 ± 200 cm^{-1}
(95.60 ± 0.02 eV)

The $3d^2 - 3d4p$ array in the range of 307 – 330 Å was analyzed by Cady [1] using a vacuum spark. He classified 30 lines including three blended and two tentatively classified.

King [2] classified 43 lines of the $3d4s-3d4p$ and $3d4p-3d4d$ arrays in the range of 800 – 1550 Å. He observed them with a vacuum sliding spark light source with an estimated uncertainty of ±0.007 Å.

The spectrum from 140 – 220 Å was observed by Ryabtsev [3] with an uncertainty of ±0.003 Å in a low-inductance vacuum spark. He identified 151 transitions from the $3dnf$ ($n = 4-8$), $3d5p$, and $3p^5 3d^3$ configurations to the ground configuration.

The value for the ionization energy was derived from the $3dnf\ ^1H^{\circ}_5$ series by Sugar and Corliss [4].

Mn VII

K I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^6 3d\ \ ^2D_{3/2}$

Ionization energy 961 440 ± 100 cm^{-1}
(119.204 ± 0.010 eV)

Kruger and Weissberg [5] observed the $4p - ns$ ($n = 5, 6$), $3d-4p$, and $3d-nf$ ($n = 4-9$) doublets in the range of 111 – 468 Å. Gabriel *et al.* [6,7] identified the $3p^6 3d - 3p^5 3d^2$ doublets in the range of 182 – 204 Å. Feldman and Fraenkel [8] observed 16 lines in the range of 133 – 144 Å, which were subsequently assigned to the $3p^6 3d - 3p^5 3d4s$ inner-shell transitions by Cowan [9]. More extensive observations with vacuum spark discharges were carried out by Ramonas and Ryabtsev [10], whose results are quoted here. They identified 55 lines in the range of 114 – 255 Å as transitions from the levels of $3p^5 3d^2$, $3p^6 4p$, $3p^5 3d4s$, and $3p^6 nf$ ($n = 4-8$) configurations to the ground level, with uncertainties estimated to be ±0.003 Å. The wavelength of the $3p^6 3d\ ^2D_{5/2} - 3p^5(^2P^{\circ})3d^2(^1G)\ \ ^2F^{\circ}_{7/2}$ line is 252.985 Å from the energy level difference, instead of 252.950 Å given by the authors.

A tentatively identified spin-forbidden $^2D_{5/2} - (^3P^{\circ})\ ^4P^{\circ}_{3/2}$ line at 143.87 Å in Ref. [9] has been deleted, because it was not observed in the stronger spectra of Ramonas and Ryabtsev. Furthermore, the $4p\ ^2P^{\circ}_{3/2,1/2} - ns\ ^2S_{1/2}$ ($n = 5, 6$) lines at 467.662 Å, 462.363 Å, 284.059 Å, and 282.095 Å in Ref. [5] have been omitted here, because the $4p\ ^2P^{\circ}$ splitting is incompatible with that found by Ramonas and Ryabtsev. In addition, the wavelength of 112.260 Å for the $3d\ ^2D_{5/2} - 9f\ ^2F^{\circ}_{7/2}$ transition is apparently a misprint and should be 112.060 Å.

The value for the ionization energy was derived from the $4p^5 nf$ series by Ramonas and Ryabtsev [10].

Mn VIII

Ar I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^6\ \ ^1S_0$

Ionization energy 1 569 000 ± 3000 cm^{-1}
(194.5 ± 0.4 eV)

The $3p^6 - 3p^5 4l$ transitions were observed by Kruger and Weissberg [11] and Kruger *et al.* [12] for $l = s$ at 124.053 Å and 122.168 Å, and by Alexander *et al.* [13] for $l = d$ at 97.411 Å and 96.332 Å. Smitt and Svensson [14] measured the $3p^6\ ^1S_0 - 3p^5 3d\ ^1P^{\circ}_1$ resonance line at 185.455 Å, previously identified by Alexander *et al.* [15] and Gabriel *et al.* [6,7], and added the $^1S_0 - {}^3P^{\circ}_1, {}^3D^{\circ}_1$ spin-forbidden lines at 266.181 Å and 236.218 Å. They also identified 30 lines of the $3s^2 3p^5 3d - 3s3p^6 3d$ array in the range of 323 – 668 Å. Observations were made with vacuum sparks with an uncertainty estimated to be ±0.01 Å. The wavelengths of 403.497 Å and 402.446 Å for the $^1D^{\circ}_2 - {}^3D_{1,2}$ transitions are longer by 0.043 Å and 0.017 Å, respectively, than those calculated from level differences. For the blended lines at 415.348 Å, 410.374 Å, 340.234 Å, and 266.181 Å, the differences between the observed and calculated wavelengths are about 0.02 Å.

Wagner and House [16] classified 12 lines of the $3p^5 3d - 3p^5 4f$ array in the range of 134 – 142 Å, measured with an uncertainty of ±0.02 Å. The blended $^3P^{\circ}_2 - {}^3D_2$ line at 135.48 Å deviates by 0.09 Å from the wavelength obtained from the energy level difference.

The value for the ionization energy was derived from the $3p^5 nd$ levels by Sugar and Corliss [4].

Mn IX

Cl I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^5\ \ ^2P^{\circ}_{3/2}$

Ionization energy 1 789 000 cm^{-1} (221.8 eV)

The $3s^2 3p^5\ ^2P^{\circ}_{1/2,3/2} - 3s3p^6\ ^2S_{1/2}$ transitions were identified by Fawcett and Peacock [17]. Smitt *et al.* [18] measured the values 395.473±0.008 Å and 376.778±0.008 Å in vacuum sparks.

Gabriel *et al.* [6,7] identified the $3p^5 - 3p^4(^1\mathrm{D})3d$ array. The wavelengths were remeasured by Fawcett and Gabriel [19], who identified six new lines in the range of 184 – 204 Å using a vacuum spark. The designation of the parent term has been changed from ^{1}D to ^{3}P for the upper levels $3p^43d$ ^{2}P and ^{2}D, as indicated by the calculated levels of Fe X by Bromage *et al.* [20].

The $3p^5$ $^2\mathrm{P}^\circ - 3p^44s$ ^{2}P doublet was first observed by Weissberg and Kruger [21] in the range of 111 – 114 Å. Edlén [22] reobserved the spectrum in the range of 105 – 114 Å with a vacuum spark and identified the $^2\mathrm{P}^\circ - ^2\mathrm{D}, ^2\mathrm{S}$ lines and the $^2\mathrm{P}^\circ - ^4\mathrm{P}$ spin-forbidden transitions.

Fawcett *et al.* [23] observed the $3p^5 - 3p^44d$ transitions in the range of 87 – 91 Å, from which the $^2\mathrm{P}^\circ_{1/2} - (^3\mathrm{P})$ $^2\mathrm{D}_{3/2}$ and $^2\mathrm{P}^\circ_{3/2} - (^1\mathrm{D})$ $^2\mathrm{P}_{1/2}$ lines at 91.0 Å and 87.79 Å are adopted here. This array was reobserved by Fawcett *et al.* [24] with a reduced uncertainty of ±0.01 Å in theta-pinch spectra. They also identified six $3p^43d - 3p^44f$ transitions in the range of 118 – 124 Å.

The value for the ionization energy was obtained by Lotz [25] by extrapolation.

Mn X

S I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^4$ $^3\mathrm{P}_2$

Ionization energy 2 003 000 cm^{-1} (248.3 eV)

Fawcett [26,27] identified the $3s^23p^4 - 3s3p^5$ array in the range of 333 – 398 Å. Improved measurements with a vacuum spark discharge were made by Smitt *et al.* [18]. In addition to the lines observed by Fawcett, the $^1\mathrm{S}_0 - ^1\mathrm{P}^\circ_1$ line at 384.827 Å and the $^3\mathrm{P}_1 - ^3\mathrm{P}^\circ_0$ line at 379.368 Å were identified. Wavelengths are from Ref. [18] and have an uncertainty of ±0.008 Å.

Gabriel *et al.* [7] and Fawcett and Gabriel [19] identified the $3p^4 - 3p^33d$ array with a vacuum spark. Their measurements were extended by Fawcett [27], who observed a theta-pinch spectrum with an estimated uncertainty of ±0.05 Å in the range of 193 – 218 Å. He identified 13 lines.

Eleven lines of the $3p^4 - 3p^34s$ transition array in the range of 100 – 105 Å were identified by Edlén [28] in vacuum spark observations. It should be noted that the faint $3s^23p^4$ $^1\mathrm{S}_0 - 3s^23p^3(^2\mathrm{P}^\circ)4s$ $^1\mathrm{P}^\circ_1$ line is at 104.310 Å, shorter by 0.015 Å than the wavelength calculated from the energy level difference.

After the earlier work Fawcett *et al.* [23,24] reobserved four lines of the $3p^4 - 3p^34d$ transition array at 82 – 84 Å, and identified nine new lines in the range of 107 – 109 Å as $3p^33d - 3p^34f$ transitions. Most lines are doubly classified. Wavelengths of these transitions were measured in a theta-pinch plasma with an uncertainty of ±0.01 Å.

The value for the ionization energy was obtained by Lotz [25] by extrapolation.

Mn XI

P I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^3$ $^4\mathrm{S}^\circ_{3/2}$

Ionization energy 2 307 000 cm^{-1} (286.0 eV)

Sandlin *et al.* [29] and Feldman and Doschek [30] identified the magnetic-dipole transition $3p^3$ $^4\mathrm{S}^\circ_{3/2} - ^2\mathrm{P}^\circ_{3/2}$ in the solar corona. The wavelength of 1359.59 Å is adopted from the latter article. Sandlin *et al.* also identified the $^4\mathrm{S}^\circ_{3/2} - ^2\mathrm{P}^\circ_{1/2}$ transition at 1450.49 Å.

Fawcett and Peacock [17] and Fawcett [26,27] identified the $3s^23p^3 - 3s3p^4$ transition array in the range of 306 – 394 Å. With new observations Smitt *et al.* [18] found 14 lines of this array, including six new ones, in a vacuum spark discharge. Their results, estimated to have an uncertainty of ±0.008 Å, are given. The blended line at 363.510 Å deviates by 0.07 Å from the value calculated with the energy levels.

Gabriel *et al.* [6,7] observed the $3p^3$ $^2\mathrm{D}^\circ_{5/2} - 3p^2(^3\mathrm{P})3d$ $^2\mathrm{F}_{7/2}$ transition at 200.67 Å. In their article, the parent term was designated as ^{1}D, instead of ^{3}P as given later by Fawcett [27]. Fawcett *et al.* [31] identified the $3p^3$ $^4\mathrm{S}^\circ - 3p^2(^3\mathrm{P})3d$ ^{4}P resonance transitions in the range of 207 – 210 Å. With data from a theta-pinch plasma, Fawcett [27] classified more completely the $3p^3 - 3p^23d$ array in the range of 200 – 236 Å. The estimated uncertainty of his wavelengths is ±0.05 Å.

The $3p^23d - 3p^24f$ and $3p^3 - 3p^24s$ transitions in the ranges of 98 – 99 Å and 75 – 95 Å were identified by Fawcett *et al.* [24] in a laser-produced plasma with an estimated uncertainty of ±0.01 Å.

The value for the ionization energy was obtained by Lotz [25] by extrapolation.

Mn XII

Si I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^2$ $^3\mathrm{P}_0$

Ionization energy 2 536 000 cm^{-1} (314.4 eV)

Jefferies *et al.* [32] assigned the line at 3685.5±0.4 Å measured by Jefferies [33] in the solar corona to the magnetic-dipole transition $3s^23p^2$ $^3\mathrm{P}_2 - ^1\mathrm{D}_2$. Sandlin *et al.* [29] identified a coronal line at 1322.23±0.04 Å as the $^3\mathrm{P}_1 - ^1\mathrm{S}_0$ transition. The wavelength is from Sandlin and Tousey [34].

Fawcett [26,27] analyzed the $3s^23p^2 - 3s3p^3$ transition array in the range of 259 – 553 Å. Two additional $^3\mathrm{P}_{2,1} - ^5\mathrm{S}^\circ_2$ spin-forbidden transitions at 552.84±0.4 Å and 529.79±0.5 Å were identified by Träbert *et al.* [35] in a beam-foil spectrum.

Fawcett [27] provided classifications of twelve $3p^2 - 3p3d$ transitions in the range of 210 – 238 Å observed in a theta-pinch plasma discharge. The estimated uncertainty of the wavelengths is ±0.05 Å.

Fawcett *et al.* [36] identified the $3p3d-3p4f$, $3p^2-3p4s$ and $3p^2-3p4d$ transitions in the range of 70–90 Å. Wavelengths, with an estimated uncertainty of ±0.015 Å, were observed by them in a laser-produced plasma. Kastner *et al.* [37] identified several lines of the $3p^2-3p4d$ array.

The value for the ionization energy was obtained by Lotz [25] by extrapolation.

Mn XIII

Al I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p\ ^2P^\circ_{1/2}$

Ionization energy 2 771 000 cm^{-1} (343.6 eV)

Jefferies *et al.* [32] identified the line at 6536.3±0.4 Å, measured by Jefferies [33] in the solar corona, to the magnetic-dipole transition $3s^23p\ ^2P^\circ_{1/2}-{}^2P^\circ_{3/2}$.

Träbert *et al.* [35] observed the $3s^23p\ ^2P^\circ-3s3p^2\ ^4P$ spin-forbidden transitions in beam-foil spectra, and estimated their uncertainties as ranging from 0.3 Å to 0.5 Å. They adopted the $3s3p^2\ ^4P$ fine structure splitting derived experimentally by Litzén and Redfors [38].

Fawcett *et al.* [31] and Fawcett and Peacock [17] identified the transitions from the $3s^23d\ ^2D$ and $3s3p^2\ ^2P$ configurations to the ground $3s^23p\ ^2P^\circ$ configuration. Subsequently Fawcett [26,27] identified the $3s3p^2\ ^4P-3p^3\ ^4S^\circ$, $3s^23p\ ^2P^\circ-3s3p^2\ ^2D,^2S$ and $3s3p^2\ ^4P_{5/2}-3s3p3d\ ^4D^\circ_{7/2}$ transitions. These early observations were revised and extended by Litzén and Redfors [38] and Redfors and Litzén [39], who observed laser-produced plasmas in the range of 205 – 425 Å. They reported 44 transitions between levels of the $3s^23p$, $3s3p^2$, $3s^23d$, $3p^3$, and $3s3p3d$ configurations. Wavelengths were measured with an estimated uncertainty of ±0.02 Å. Three $3s3p^2-3s3p(^3P^\circ)3d$ lines were reobserved by Levashov *et al.* [40] at 227.73 Å for $^4P_{3/2}-{}^4P^\circ_{3/2}$, at 227.98 Å for $^4P_{3/2}-{}^4P^\circ_{1/2}$, and at 228.63 Å for $^4P_{1/2}-{}^4D^\circ_{1/2}$.

The transition arrays $3s3p3d-3p^23d$, $3s3d^2$ were newly identified by Churilov and Levashov [41] in a laser-produced plasma with an estimated uncertainty of ±0.02 Å. They also determined new values for the energy levels of the $n=3$ configurations. We have adopted their results. It should be noted that the term designations of $3s3p(^3P^\circ)3d\ ^4P^\circ_{1/2,3/2}$ and $3s3p(^1P^\circ)3d\ ^2P^\circ_{3/2}$ have been interchanged with $3s3p(^3P^\circ)3d\ ^4D^\circ_{1/2,3/2}$ and $3s3p(^1P^\circ)3d\ ^2D^\circ_{3/2}$. These levels cross at this ion, as shown in the calculation of Redfors and Litzén [39]. The $3s^23p\ ^2P^\circ_{3/2}-3s3p^2\ ^2S_{1/2}$ and $^2D_{3/2}$ lines at 308.92 Å and 382.76 Å in Ref. [27] have been omitted, because they are not observed by Redfors and Litzén. We give calculated values for these lines.

The $3p\ ^2P^\circ-4d\ ^2D$ doublet at ~67 Å was identified by Edlén [42]. Fawcett *et al.* [24] identified the $3d\ ^2D-4f\ ^2F^\circ$ doublet and the $3s3p3d\ ^4F^\circ-3s3p4f\ ^4G$ and $3s3p^2\ ^4P-3s3p4s\ ^4P^\circ$ quartets in the range of 79 – 87 Å.

The value for the ionization energy was obtained by Lotz [25] by extrapolation.

Mn XIV

Mg I isoelectronic sequence

Ground state $1s^22s^22p^63s^2\ ^1S_0$

Ionization energy 3 250 000 ± 2000 cm^{-1}
(403.0 ± 0.2 eV)

Classifications of the $n=3-3$ transitions were made in a series of articles of Fawcett *et al.* [31,36], Fawcett and Peacock [17], and Fawcett [26,27] for the transitions between the levels of the $3s^2$, $3s3p$, $3s3d$, $3p^2$, and $3p3d$ configurations. Dere [43] reported the $3s^2\ ^1S-3s3p\ ^1P^\circ$ line from solar flare observations. Litzén and Redfors [44] reobserved the spectra in the range of 212 – 582 Å in a laser-produced plasma and identified 45 lines, including 18 from the earlier works. Wavelengths were measured with an estimated uncertainty of ±0.02 Å. Their results are adopted together with their energy levels. For the perturbed lines at 418.51 Å and 471.94 Å and the blended line at 257.24 Å, however, the differences between the observed wavelengths and those derived from energy level data are 0.03 – 0.04 Å.

The $3p3d-3d^2$ transitions were identified by Levashov and Churilov [45] and more completely by Redfors [46] in the range of 235 – 327 Å in laser-produced plasmas. Wavelengths of Redfors with an uncertainty of ±0.02 Å are adopted together with his energy level values for the $3d^2$ configurations. The $^3D^\circ_1-{}^3F_2$ line at 277.11±0.02 Å is from Ref. [45]. The designation of the lower term is given there as $^3P^\circ_1$, but is $^3D^\circ_1$ in the level scheme of Litzén and Redfors [44]. We adopt the latter.

Edlén [42] first identified the $3s3p-3s4s$, $3s3p-3snd$ ($n=4,5$), and $3s3d-3s4f$ triplets in the range of 57 – 80 Å, together with the $3s^2\ ^1S-3s4p\ ^1P^\circ$ resonance line at 59.325 Å. Singlet terms were identified by Fawcett *et al.* [24,36], specifically the $3s3d-3s4f$ transition at 84.09±0.01 Å and the $3s3p-3s4d$ and $3p^2-3s4f$ transitions at 67.02±0.015 Å and 72.45±0.015 Å. Fawcett *et al.* [24] also provided 11 lines of the $3p3d-3p4f$ array in the range of 78 – 84 Å. Identifications of the $3s3d-3snf$, ($n=5,6$), $3p^2-3p4s$, $3s3p-3sns$ ($n=5-6$), $3s3p-3snd$ ($n=5,6$), $3p^2-3p4d$, $3s^2-3snp$ ($n=5,6$), and $3s3p-3p4p$ transitions in the range of 38 – 76 Å are taken from Fawcett *et al.* [47].

The value for the ionization energy was derived by Sugar and Corliss [4] from the $3snp$ and $3snf$ series. The average is given. The value by Lotz [25] is 404.1 eV.

Mn XV

Na I isoelectronic sequence

Ground state $1s^22s^22p^63s\ \ ^2S_{1/2}$

Ionization energy 3 509 820 ± 300 cm^{-1}
(435.166 ±0.030 eV)

Fawcett *et al.* [31] and Fawcett and Peacock [17] identified the five lines of the $3s-3p$ and $3p-3d$ transition arrays in the ranges of 360 – 385 Å and 261 – 282 Å, respectively, in a laser-produced plasma. The $3s-3p$ line was remeasured by Widing *et al.* [48] and Dere [43]. An isoelectronic comparison of the measured wavelengths with Dirac-Fock calculations was made by Reader *et al.* [49] for Ar^{7+} to Xe^{43+}, including those for the $3d-4f$ doublet, and least squares adjusted wavelengths were derived. The overall uncertainty estimate is ±0.007 Å. We give these results, from which the energy levels for the $2p^63p$, $2p^63d$ and $2p^64f$ configurations were derived.

Edlén [50] analyzed the transition arrays $3s-4p$, $3p-4s$, $3p-nd$ $(n=4,5)$, and $3d-nf$ $(n=4,5)$ in vacuum spark discharges, from which the $3p-4s$, $3p-4d$ and $3s-4p$ and $3d-5f$ lines at ∼ 71 Å, ∼61 Å, ∼56 Å and ∼53 Å are quoted. The uncertainty of their wavelengths was estimated to be ±0.01 Å to ±0.02 Å. The $3d-np$ $(n=4,5)$ lines at ∼87 Å and ∼55 Å were identified by Fawcett *et al.* [24,36], respectively.

Identifications along Rydberg series have been taken from Fawcett *et al.* [47] for the $3d-nf$ $(n=9-11)$, $3p-7s$, $3p-nd$ $(n=8-10)$ and $3s-np$ $(n=9,10)$ transitions and from Cohen and Behring [51] for the $3s-np$ $(n=5-8)$, $3p-ns$ $(n=5,6)$, $3p-nd$ $(n=5-8)$ and $3d-nf$ $(n=6-8)$ transitions.

The $4f\ ^2F^\circ-5g\ ^2G$ and $4d\ ^2D-5f\ ^2F^\circ$ doublets at ∼178 Å and ∼163 Å were identified by Lawson and Peacock [52]. Observations were made in a laser-produced plasma with an uncertainty estimated at ±0.03 Å. For the $4d-5f$ doublet, however, there appear discrepancies, ranging from 0.06 – 0.1 Å, between their results and those calculated from the energy level differences of Edlén. The measurements in Ref. [50] were adopted here to determine the $4d$ and $5f$ levels.

The value for the ionization energy was derived by Edlén [53] from core polarization theory applied to the nf series.

Mn XVI

Ne I isoelectronic sequence

Ground state $1s^22s^22p^6\ \ ^1S_0$

Ionization energy 9 152 000 ± 5000 cm^{-1}
(1134.7 ± 0.6 eV)

Tyrén [54] identified the transitions from the $2s^22p^53s$, $3d$, $4d$ and $2s2p^63p$ levels to the ground level in the range of 13.4 – 18.9 Å with a vacuum spark discharge. Swartz *et al.* [55] added the identification of the $2p^6-2p^54s$, $5d$, $6d$ transitions in the range of 11.8 – 14.1 Å.

Kastner [56] identified a coronal line at 1452.68 Å as the $2p^53s(\frac{3}{2},\frac{1}{2})^\circ_1-(\frac{1}{2},\frac{1}{2})^\circ_0$ transition, but it is omitted because it is inconsistent with the levels derived by Jupén *et al.* [57].

The $2p^53s-2p^53p$ and $2p^53p-2p^53d$ arrays in the ranges of 347 – 439 Å and 288 – 302 Å, respectively, were observed with a laser-produced plasma and classified by Jupén and Litzén [58].

The uncertainty of the wavelengths is estimated to be ±0.02 Å. The $2p^5(^2P^\circ_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^\circ_1-2p^5(^2P^\circ_{1/2})3p\ ^2[\frac{1}{2}]_1$ line at 377.414 Å is questionable, because it shows a deviation of 0.775 Å from the wavelength 376.639 Å derived from the energy levels.

The $3p-4d$ transitions were first identified by Kastner *et al.* [59] and also by Fawcett *et al.* [60], together with the $3d-4f$ transitions. More complete and improved measurements were carried out by Jupén *et al.* [57] with a laser-produced plasma. They found 40 lines of the $3p-4s$ and $3s-4p$ transitions, in the range of 51 – 67 Å, which are quoted here. The estimated wavelength uncertainties vary from ±0.005 to ±0.01 Å. We have adopted the energy levels of Jupén *et al.* for the $2s^22p^53l$ and $2s^22p^54l$ configurations. Predicted values for several unresolved levels are given in Ref. [57].

The value for the ionization energy was derived from the $2p^5nd\ ^3D^\circ_1$ series by Sugar and Corliss [4].

Mn XVII

F I isoelectronic sequence

Ground state $1s^22s^22p^5\ \ ^2P^\circ_{3/2}$

Ionization energy 9 867 000 cm^{-1} (1223.4 eV)

The $2s^22p^5\ ^2P^\circ-2s2p^6\ ^2S$ doublet was observed by Fawcett [61], Doschek *et al.* [62] and Lawson and Peacock [52] in laser-produced plasmas, and by the TFR group [63] in tokamak plasmas. Wavelength values of 109.35 Å and 100.00 Å with estimated uncertainties of ±0.03 Å are taken from Ref. [52].

Feldman *et al.* [64] reported extensive observations in laser-produced plasmas of the transitions $2s2p^6-2s2p^53s$, $2p^5-2p^43s$ and $2p^5-2p^43d$ in the range of 15 – 18 Å with an estimated uncertainty of ±0.01 Å. We give their classifications of these lines.

For the ionization energy we use a value calculated by Cheng [65] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [66].

Mn XVIII

O I isoelectronic sequence

Ground state $1s^2 2s^2 2p^4$ $^3P_2$

Ionization energy 10 643 000 cm^{-1} (1319.6 eV)

The $2s^2 2p^4 - 2s2p^5$ array was observed by Fawcett [61], Doschek *et al.* [62] and Lawson and Peacock [52] in laser-produced plasmas, and by the TFR group [63] in tokamak plasmas. The measurements of Lawson and Peacock in the range of 84 – 140 Å are the most comprehensive and their wavelengths are adopted here. The uncertainty of the wavelengths is given as ±0.03 Å. They also found the $2s2p^5$ $^1P^\circ_1 - 2p^6$ $^1S_0$ transition at 122.29 Å, identified first by Doschek *et al.* [67], and the $^3P^\circ_1 - {}^1S_0$ transition at 91.90 Å.

The $2p^4 - 2p^3 3s$ array at approximately 16 Å was identified by Doschek *et al.* [68]. Wavelengths with estimated uncertainties of ±0.01 Å were measured by them in laser-produced plasmas. The $^3P_{1,0} - {}^3S^\circ_1$ transitions are not resolved in this array. We give a calculated value for the $^3P_0 - {}^3S^\circ_1$ line.

Swartz *et al.* [55] observed five lines at 15 Å in a low-inductance vacuum spark which were tentatively identified by Fawcett and Hayes [69] as $2p^4 - 2p^3 3d$ transitions.

For the ionization energy we use a value calculated by Cheng [65] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [66].

Mn XIX

N I isoelectronic sequence

Ground state $1s^2 2s^2 2p^3$ $^4S^\circ_{3/2}$

Ionization energy 11 535 000 cm^{-1} (1430.15 eV)

Observations of the $2s^2 2p^3 - 2s2p^4$ array were made by Doschek *et al.* [62], Feldman *et al.* [70] and Lawson and Peacock [52] in laser-produced plasmas, and by the TFR group [63] in tokamak plasmas. We adopt the wavelengths from the comprehensive measurements of Lawson and Peacock, who identified 20 lines in the range of 85 – 143 Å, including the spin-forbidden transitions from the $^2D_{3/2}$, $^2S_{1/2}$ and $^2P_{3/2}$ terms to the ground $^4S^\circ_{3/2}$. The uncertainty of the wavelengths is estimated to be ±0.03 Å below 180 Å and ±0.06 Å above.

Lawson and Peacock [52] also identified nine lines in the range of 88 – 148 Å of the $2s2p^4 - 2p^5$ array, including the $^2D - {}^2P^\circ$ doublet in the earlier work of Doschek *et al.* [67].

Fawcett and Hayes [69] tentatively identified the $2p^3$ $^4S^\circ_{3/2} - 2p^2(^3P)3d$ $^4P_{3/2,5/2}$ transitions as a blended line at 14.098 Å observed previously by Swartz *et al.* [55] in a low-inductance vacuum spark.

For the ionization energy we use a value calculated by Cheng [65] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [66].

Mn XX

C I isoelectronic sequence

Ground state $1s^2 2s^2 2p^2$ $^3P_0$

Ionization energy 12 413 000 cm^{-1} (1539.03 eV)

The $2s^2 2p^2 - 2s2p^3$ array was observed by Feldman *et al.* [70] in a laser-produced plasma, and by the TFR group [63] in a tokamak plasma. The tabulated wavelengths are taken from the more extensive observations with a laser-produced plasma by Lawson and Peacock [52], who gave identifications for 37 lines due to the $2s^2 2p^2 - 2s2p^3$ and $2s2p^3 - 2p^4$ transitions in the range of 89 – 192 Å. The uncertainties of the wavelengths are estimated to be ±0.03 Å below 180 Å and ±0.06 Å above 180 Å. Smoothed wavelengths along isoelectronic sequence are given by Edlén [71]. They indicate that the $2s2p^3$ $^5S^\circ_2 - 2p^4$ $^3P_2$ transition at 90.76 Å is incorrectly identified. Therefore, we have estimated the position of the $^5S^\circ_2$ level from the smoothed wavelengths of $2s^2 2p^2$ $^3P - 2s2p^3$ $^5S^\circ$ lines by Edlén.

A line at 13.46 Å, observed with a low-inductance vacuum spark by Swartz *et al.* [55], was tentatively identified as the $2p^2$ $^1D_2 - 2p3d$ $^1F^\circ_3$ transition by Fawcett and Hayes [69].

For the ionization energy we use a value calculated by Cheng [65] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [66].

Mn XXI

B I isoelectronic sequence

Ground state $1s^2 2s^2 2p$ $^2P^\circ_{1/2}$

Ionization energy 13 256 000 cm^{-1} (1643.50 eV)

The $2s^2 2p - 2s2p^2$ array was identified by Doschek *et al.* [72] in a laser-produced plasma and by the TFR group [63] in a tokamak plasma. Extensive measurements for both this array and the $2s2p^2 - 2p^3$ array are from a laser-produced plasma by Lawson and Peacock [52], who classified 26 lines in the range of 108 – 259 Å. Their results are adopted here. The uncertainties of the wavelengths are estimated to be ±0.03 Å below 180 Å and ±0.06 Å above 180 Å. The designation of the two levels $2s2p^2$ $^2P_{1/2}$ and $^2S_{1/2}$ has been interchanged according to Edlén [73] and as confirmed by the calculated percentage composition in Sugar and Corliss [4].

For the ionization energy we use a value calculated by Cheng [65] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [66].

Mn XXII

Be I isoelectronic sequence

Ground state $1s^22s^2$ $^1S_0$

Ionization energy 14 433 000 cm^{-1} (1789.4 eV)

The $2s^2$ $^1S_0 - 2s2p$ $^3P^\circ_1$ transition was observed in the solar corona by Sandlin *et al.* [74] and Dere [43]. The wavelength of Sandlin *et al.*, 277.80±0.03 Å, is given here. The $2s^2$ $^1S_0 - 2s2p$ $^1P^\circ_1$ resonance transition was observed by the TFR group [63] and Davé *et al.* [75] in tokamak plasmas and by Lawson and Peacock [52] in a laser-produced plasma. The wavelength of 141.10±0.02 Å measured by Davé *et al.* is quoted. Lawson and Peacock also identified $2s2p - 2p^2$ transitions, including the intercombination $^3P^\circ_2 - {}^1D_2$ transition, in the range of 145 – 240 Å. The uncertainties of the wavelengths are estimated to be ±0.03 Å below 180 Å and ±0.06 Å above 180 Å. We give these results.

Fawcett and Hayes [69] tentatively identified the four lines at approximately 12 Å observed by Swartz *et al.* [55] as $2s2p - 2s3d$ and $2p^2 - 2p3d$ transitions. More extensive work for the $n = 2, 3$ transition arrays in the range of 11.7 – 13.2 Å were made by Boiko *et al.* [76,77] in laser-produced plasmas. Some of the lines are given as unresolved or blended lines. The uncertainty of the wavelengths is estimated as ±0.003 Å. Differences up to ±0.03 Å between the observed wavelengths and those calculated for the energy level differences occur. The designations of the two lines $2s^2$ $^1S_0 - 2s3p$ $^{1,3}P^\circ_1$ at 11.997 Å and 11.971 Å have been interchanged, in accordance with the calculation of Kim *et al.* [78]. This places the $2s3p$ $^3P^\circ$ below the $^1P^\circ$.

The value for the ionization energy was calculated by K. T. Cheng [65].

Mn XXIII

Li I isoelectronic sequence

Ground state $1s^22s$ $^2S_{1/2}$

Ionization energy 15 162 000 ± 35 000 cm^{-1} (1879.9 eV)

The $2s - 2p$ resonance transitions were identified by Widing and Purcell [79], Sandlin *et al.* [74] and Dere [43] from solar coronal observations and remeasured by Lawson and Peacock [52] with a laser-produced plasma. Kim *et al.* [80] have smoothed the energies of these transitions for Li-like ions with respect to calculated values. We use their predicted values.

Observations of the $n = 2 - 3$ doublets were made with a low-inductance vacuum spark by Goldsmith *et al.* [81]. Improved measurements in the extended range of 7.7 – 12.5 Å were carried out with a laser-produced plasma by Boiko *et al.* [77] who provided data for the $2p - 3s$, $2p - nd$ ($n = 3 - 5$), and $2s - np$ ($n = 3 - 5$) transitions. The uncertainties of the wavelengths are estimated to be ±0.002 Å below 10 Å and ±0.003 Å above 10 Å.

Vainshtein and Safronova [82] calculated energy levels of the $1s^2nl$ configurations with $n = 2 - 5$, and $l = s, p,$ and d. Their energy levels are adjusted to the $1s^22p$ $^2P^\circ_{1/2,3/2}$ levels of Kim *et al.* by subtracting 130 cm^{-1}. They also calculated wavelengths of the $1s^22s - 1s2s2p$, $1s^22p - 1s2p^2$, and $1s^22p - 1s2s^2$ transitions. We use their results to derive these autoionizing levels.

The value for the ionization energy was derived by Edlén [83] from a polarization formula applied to the *nd* series.

Mn XXIV

He I isoelectronic sequence

Ground state $1s^2$ $^1S_0$

Ionization energy 65 660 100 ± 2500 cm^{-1} (8140.818 ± 3 eV)

Cheng *et al.* [84] give calculated total energies for the ground and n=2 singlet states of selected He-like ions. We use a later calculation of both singlet and triplet states by Cheng [85] for all elements from Ti through Cu and Kr for the $n = 1$ and 2 configurations. With these data and the binding energy of the H-like ions [86] we obtain the value for the ionization energy of the He-like ions. For the $1s3l$ states we use the level values from Drake [87].

The levels $1s4l$ and $5l$ calculated by Vainshtein and Safronova [82] have been tabulated after increasing them by 1300 cm^{-1} to correspond with the values of lower n by Drake. All wavelengths have been derived from differences of the adopted energy levels.

Vainshtein and Safronova also calculated wavelengths of the transitions $1s2s - 2s2p$, $1s2p - 2s^2$, and $1s2p - 2p^2$, which we have compiled without correction.

Mn XXV

H I isoelectronic sequence

Ground state $1s$ $^2S_{1/2}$

Ionization energy 69 137 430 ± 20 cm^{-1} (8571.952 ± 0.002 eV)

No observations of this spectrum have been reported. We have tabulated the wavelengths calculated from the theoretical energy levels of Johnson and Soff [86] for the $n = 2$ shell whose estimated uncertainty is ± 20 cm^{-1}. Their energy differences are in close agreement with those of Mohr [89]. The binding energies for the levels with $n = 3 - 5$ have been calculated by Erickson [90]. We subtract these energies from the binding energy of the ground state obtained by Johnson and Soff to obtain predicted wavelengths.

Transition probabilities and oscillator strengths were obtained by scaling the data tabulated for the hydrogen spectrum by Wiese *et al.* [91]. The scaling was actually performed for the line strengths S, which for a hydrogen- like ion of nuclear charge Z are reduced according to $S_Z = Z^{-2} S_H$, so that

$$S_{\mathrm{Mn\ XXV}} = S_H (25)^{-2} = S_H/625.$$

The f and A values were then obtained from the usual numerical conversion formulas, given for example in Ref. [92]. For these conversions the accurate wavelengths listed in the Mn XXV table were used, in which relativistic and QED effects in the energies were taken into account. Relativistic effects in the line strengths are only of the order of $1 - 3$ for Mn XXV, according to the work by Younger and Weiss [93], and have been neglected.

The value for the ionization energy is from Johnson and Soff [86].

2.5.2. Spectroscopic Data for Mn VI through Mn XXV

Mn VI

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1548.430	$3p^63d4s\ ^1D_2$	$3p^63d4p\ ^1D^o_2$	255 239.7	319 821.2	1000	8.0 − 1	4.5+8	D−	2°, 92*
1488.755	$3p^63d4s\ ^1D_2$	$3p^63d4p\ ^3D^o_2$	255 239.7	322 409.6	23				2
1458.660	$3p^63d4s\ ^1D_2$	$3p^63d4p\ ^3F^o_2$	255 239.7	323 796.1	30				2
1408.312	$3p^63d4s\ ^3D_3$	$3p^63d4p\ ^3D^o_2$	251 403.0	322 409.6	120	3.2 − 1	2.2+8	D−	2°, 92*
1405.156	2	1	250 527.0	321 693.5	55	2.7 − 1	3.0+8	D−	2°, 92*
1396.708	1	1	250 096.6	321 693.5	180	5.1 − 1	5.7+8	D−	2°, 92*
1391.218	3	3	251 403.0	323 282.5	750	1.6	8.0+8	D−	2°, 92*
1391.173	2	2	250 527.0	322 409.6	500	7.5 − 1	5.2+8	D−	2°, 92*
1356.852	$3p^63d4s\ ^3D_1$	$3p^63d4p\ ^3F^o_2$	250 096.6	323 796.1	600	1.1	8.3+8	D−	2°, 92*
1345.494	2	3	250 527.0	324 849.1	800	1.7	8.7+8	D−	2°, 92*
1333.874	3	4	251 403.0	326 372.6	1000	2.5	1.0+9	D−	2°, 92*
1285.102	$3p^63d4s\ ^1D_2$	$3p^63d4p\ ^1F^o_3$	255 239.7	333 054.5	700	1.9	1.1+9	D−	2°, 92*
1272.444	$3p^63d4s\ ^3D_3$	$3p^63d4p\ ^3P^o_2$	251 403.0	329 992.0	500	1.1	8.4+8	D−	2°, 92*
1264.101	2	1	250 527.0	329 634.5	200	5.5 − 1	7.6+8	D−	2°, 92*
1258.413	2	2	250 527.0	329 992.0	100	3.1 − 1	2.6+8	D−	2°, 92*
1255.766	1	0	250 096.6	329 729.3	90	2.9 − 1	1.2+9	D−	2°, 92*
1236.230	$3p^63d4s\ ^1D_2$	$3p^63d4p\ ^1P^o_1$	255 239.7	336 130.8	230	8.5 − 1	1.3+9	D−	2°, 92*
1041.121	$3p^63d4p\ ^1F^o_3$	$3p^63d4d\ ^1F_3$	333 054.5	429 104.8	20				2
1039.690	$3p^63d4p\ ^1P^o_1$	$3p^63d4d\ ^1P_1$	336 130.8	432 313.3	18				2
985.951	$3p^63d4p\ ^3P^o_1$	$3p^63d4d\ ^3D_2$	329 634.5	431 059.4	15				2
984.111	2	3	329 992.0	431 606.6	40				2
939.329	$3p^63d4p\ ^3P^o_2$	$3p^63d4d\ ^3S_1$	329 992.0	436 451.0	13				2
936.183	1	1	329 634.5	436 451.0	7				2
933.785	$3p^63d4p\ ^3F^o_4$	$3p^63d4d\ ^3G_5$	326 372.6	433 463.6	90				2
932.476	3	3	324 849.1	432 090.5	5				2
927.614	3	4	324 849.1	432 652.6	60				2
923.400	2	3	323 796.1	432 090.5	55				2
921.600	$3p^63d4p\ ^1P^o_1$	$3p^63d4d\ ^1D_2$	336 130.8	444 637.1	10				2
915.050	$3p^63d4p\ ^1D^o_2$	$3p^63d4d\ ^1F_3$	319 821.2	429 104.8	45				2
878.257	$3p^63d4p\ ^3F^o_4$	$3p^63d4d\ ^3F_4$	326 372.6	440 234.1	20				2
871.118	3	3	324 849.1	439 643.4	7				2
867.236	2	2	323 796.1	439 105.0	5				2
866.662	3	4	324 849.1	440 234.1	6				2
872.240	$3p^63d4p\ ^1F^o_3$	$3p^63d4d\ ^1G_4$	333 054.5	447 701.8	50				2
865.060	$3p^63d4p\ ^3P^o_2$	$3p^63d4d\ ^3P_1$	329 992.0	445 590.9	5				2
861.681	2	2	329 992.0	446 044.2	16				2
859.396	$3p^63d4p\ ^3D^o_3$	$3p^63d4d\ ^3F_3$	323 282.5	439 643.4	7				2
856.935	2	2	322 409.6	439 105.0	5				2
855.056	3	4	323 282.5	440 234.1	30				2
852.996	2	3	322 409.6	439 643.4	20				2
851.705	1	2	321 693.5	439 105.0	16				2
814.580	$3p^63d4p\ ^3D^o_3$	$3p^63d4d\ ^3P_2$	323 282.5	446 044.2	3				2
801.182	$3p^63d4p\ ^1D^o_2$	$3p^63d4d\ ^1D_2$	319 821.2	444 637.1	7				2
329.320	$3p^63d^2\ ^3P_1$	$3p^63d4p\ ^3D^o_1$	18 057	321 693.5	5	2.0 − 2	4.0+8	E	1°, 92*
329.177	2	2	18 628	322 409.6	2	7.5 − 3	9.1+7	E	1°, 92*
329.043	0	1	17 782	321 693.5	5	5.4 − 2	1.1+9	D−	1°, 92*
328.558	1	2	18 057	322 409.6	9	9.6 − 2	1.2+9	D−	1°, 92*
328.232	2	3	18 628	323 282.5	10	9.0 − 2	8.1+8	D−	1°, 92*
328.431	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^1D^o_2$	15 336	319 821.2	20	3.6 − 1	4.4+9	D−	1°, 92*
328.129	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^3D^o_2$	15 336	322 409.6	2				1
327.131	2	3	15 336	323 282.5	1				1

Mn VI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
327.131	$3p^63d^2\ ^3P_1$	$3p^63d4p\ ^3F^o_2$	18 057	323 796.1	1				1
326.571	2	3	18 628	324 849.1	2				1
326.571	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^3F^o_2$	15 336	323 796.1	2				1
325.146T	$3p^63d^2\ ^1G_4$	$3p^63d4p\ ^1F^o_3$	25 511	333 054.5	20	1.4	1.3+10	D−	1°, 92*
321.541	$3p^63d^2\ ^3P_2$	$3p^63d4p\ ^3P^o_1$	18 628	329 634.5	9	1.3 − 1	2.7+9	D−	1°, 92*
321.176	2	2	18 628	329 992.0	11	4.7 − 1	6.0+9	D−	1°, 92*
320.979	1	1	18 057	329 634.5	9	9.9 − 2	2.2+9	D−	1°, 92*
320.874T	1	0	18 057	329 729.3	9	1.2 − 1	7.8+9	D−	1°, 92*
320.681	0	1	17 782	329 634.5	9	1.0 − 1	2.2+9	D−	1°, 92*
320.598	1	2	18 057	329 992.0	9	1.2 − 1	1.5+9	D−	1°, 92*
320.146	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^3P^o_2$	15 336	329 992.0	6				1
314.979T	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^1F^o_3$	15 336	333 054.5	6				1
312.692	$3p^63d^2\ ^3P_2$	$3p^63d4p\ ^1P^o_1$	18 628	336 130.8	8				1
311.748	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^1P^o_1$	15 336	336 130.8	10	2.5 − 1	5.7+9	D−	1°, 92*
310.908	$3p^63d^2\ ^3F_4$	$3p^63d4p\ ^3D^o_3$	1 669	323 282.5	40				1
310.908	2	1	0	321 693.5	40				1
310.908	3	2	746	322 409.6	40				1
310.182	2	2	0	322 409.6	9	2.0 − 1	2.8+9	D−	1°, 92*
310.058	3	3	746	323 282.5	10	3.4 − 1	3.4+9	D−	1°, 92*
309.579	$3p^63d^2\ ^3F_3$	$3p^63d4p\ ^3F^o_2$	746	323 796.1	10	3.2 − 1	4.4+9	D−	1°, 92*
309.440	4	3	1 669	324 849.1	12	5.8 − 1	5.7+9	D−	1°, 92*
308.853	2	2	0	323 796.1	15	5.5 − 2	7.5+8	D−	1°, 92*
308.560	3	3	746	324 849.1	20	7.0 − 2	7.3+8	D−	1°, 92*
307.999	4	4	1 669	326 372.6	20	4.7 − 1	3.7+9	D−	1°, 92*
307.842	2	3	0	324 849.1	3	1.2 − 2	1.2+8	E	1°, 92*
307.109	3	4	746	326 372.6	5	3.2 − 2	2.5+8	D−	1°, 92*
211.870	$3p^63d^2\ ^1S_0$	$3p^63d5p\ ^1P^o_1$	59 265	531 252	150				3
205.492	$3p^63d^2\ ^1D_2$	$3p^63d4f\ ^3F^o_2$	15 336	501 976	2				3
204.067	$3p^63d^2\ ^1S_0$	$3p^5(^2P^o)3d^3(^2P)\ ^1P^o_1$	59 265	549 303	30				3
203.198	$3p^63d^2\ ^1S_0$	$3p^5(^2P^o)3d^3(^4F)\ ^3D^o_1$	59 265	551 400	5				3
202.678	$3p^63d^2\ ^1G_4$	$3p^63d4f\ ^1G^o_4$	25 511	518 905	60				3
201.949	$3p^63d^2\ ^1G_4$	$3p^63d4f\ ^3G^o_3$	25 511	520 698	20				3
201.457	4	5	25 511	521 892	5				3
199.768	$3p^63d^2\ ^1G_4$	$3p^63d4f\ ^1H^o_5$	25 511	526 092	300				3
199.612	$3p^63d^2\ ^3F_4$	$3p^63d4f\ ^3F^o_3$	1 669	502 639	5				3
199.509	3	2	746	501 976	10				3
199.297	4	4	1 669	503 432	270				3
199.246	3	3	746	502 639	200				3
199.213	2	2	0	501 976	130				3
198.947	2	3	0	502 639	20				3
198.933	3	4	746	503 432	20				3
198.792	$3p^63d^2\ ^1G_4$	$3p^63d5p\ ^1F^o_3$	25 511	528 532	70				3
197.856	$3p^63d^2\ ^3P_0$	$3p^63d5p\ ^3D^o_1$	17 782	523 203	10				3
197.635	2	3	18 628	524 608	150				3
197.423	$3p^63d^2\ ^3P_1$	$3p^63d5p\ ^3F^o_2$	18 057	524 590	10				3
197.070	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^3(^2G)\ ^1F^o_3$	18 628	526 055	60				3
196.809	$3p^63d^2\ ^1D_2$	$3p^63d5p\ ^1D^o_2$	15 336	523 443	150				3
196.531	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(^2D)\ ^1D^o_2$	15 336	524 162	300				3
196.111	$3p^63d^2\ ^3P_2$	$3p^63d5p\ ^1F^o_3$	18 628	528 532	40				3
195.802	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(^2G)\ ^1F^o_3$	15 336	526 055	300				3

Mn VI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
194.857	$3p^63d^2\ ^1D_2$	$3p^63d5p\ ^1F^o_3$	15 336	528 532	200				3
193.706	$3p^63d^2\ ^1S_0$	$3p^5(^2P^o)3d^3(b^2D)\ ^1P^o_1$	59 265	575 512	60				3
192.675	$3p^63d^2\ ^3F_4$	$3p^63d4f\ ^3G^o_3$	1 669	520 698	10				3
192.441	4	4	1 669	521 305	80				3
192.327	3	3	746	520 698	50				3
192.225	4	5	1 669	521 892	450				3
192.101	3	4	746	521 305	500				3
192.050	2	3	0	520 698	350				3
191.227	$3p^63d^2\ ^3F_4$	$3p^63d5p\ ^3D^o_3$	1 669	524 608	200				3
191.130	2	1	0	523 203	70				3
191.059	3	2	746	524 146	120				3
190.890	3	3	746	524 608	30				3
191.091	$3p^63d^2\ ^3F_4$	$3p^63d5p\ ^3F^o_3$	1 669	524 985	200				3
190.753	3	3	746	524 985	250				3
190.700	4	4	1 669	526 054	350				3
190.625	2	2	0	524 590	150				3
190.480	2	3	0	524 985	10				3
190.365	3	4	746	526 054	20				3
190.565	$3p^63d^2\ ^1G_4$	$3p^5(^2P^o)3d^3(^4F)\ ^3D^o_3$	25 511	550 258	15				3
189.837	$3p^63d^2\ ^3F_3$	$3p^5(^2P^o)3d^3(^4F)\ ^3F^o_2$	746	527 514	30				3
189.569	2	2	0	527 514	100				3
189.460	4	3	1 669	529 488	70				3
189.129	3	3	746	529 488	400				3
189.078	4	4	1 669	530 550	500				3
188.862	2	3	0	529 488	60				3
188.748	3	4	746	530 550	90				3
188.438	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^3(^2P)\ ^1P^o_1$	18 628	549 303	10				3
188.233	1	1	18 057	549 303	15				3
188.137	0	1	17 782	549 303	50				3
188.160	$3p^63d^2\ ^1G_4$	$3p^5(^2P^o)3d^3(^2H)\ ^1G^o_4$	25 511	556 973	450				3
188.097	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^3(^4F)\ ^3D^o_3$	18 628	550 258	250				3
187.955	2	2	18 628	550 654	80				3
187.756	1	2	18 057	550 654	130				3
187.695	2	1	18 628	551 400	10				3
187.495	1	1	18 057	551 400	30				3
187.398	0	1	17 782	551 400	40				3
187.278	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(^2P)\ ^1P^o_1$	15 336	549 303	90				3
186.942	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(^4F)\ ^3D^o_3$	15 336	550 258	10				3
186.805	2	2	15 336	550 654	5				3
186.545	2	1	15 336	551 400	40				3
184.001	$3p^63d^2\ ^1G_4$	$3p^5(^2P^o)3d^3(^2F)\ ^1F^o_3$	25 511	568 974	350				3
182.286	$3p^63d^2\ ^3F_4$	$3p^5(^2P^o)3d^3(^4F)\ ^3D^o_3$	1 669	550 258	250				3
181.980	3	3	746	550 258	70				3
181.849	3	2	746	550 654	130				3
181.602	2	2	0	550 654	80				3
181.357	2	1	0	551 400	160				3
182.048	$3p^63d^2\ ^3F_2$	$3p^5(^2P^o)3d^3(^2P)\ ^1P^o_1$	0	549 303	90				3
181.897	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^3(^4P)\ ^3S^o_1$	18 628	568 390	120				3
181.708	1	1	18 057	568 390	80				3
181.617	0	1	17 782	568 390	50				3
180.817	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(^4P)\ ^3S^o_1$	15 336	568 390	15				3
180.626	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(^2F)\ ^1F^o_3$	15 336	568 974	60				3
180.474	$3p^63d^2\ ^1S_0$	$3p^63d5f\ ^1P^o_1$	59 265	613 361	40				3
179.572	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^3(b^2D)\ ^1P^o_1$	18 628	575 512	10				3
178.515	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(b^2D)\ ^1P^o_1$	15 336	575 512	110				3
171.633	$3p^63d^2\ ^1G_4$	$3p^63d5f\ ^1G^o_4$	25 511	608 125	120				3

Mn VI – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
171.348	$3p^63d^2\ ^1G_4$	$3p^63d5f\ ^3F^o_4$	25 511	609 095	70				3
170.990	$3p^63d^2\ ^1G_4$	$3p^63d5f\ ^3G^o_4$	25 511	610 314	1				3
170.910	4	5	25 511	610 595	1				3
170.303	$3p^63d^2\ ^1G_4$	$3p^63d5f\ ^1H^o_5$	25 511	612 678	220				3
169.551	$3p^63d^2\ ^3P_2$	$3p^63d5f\ ^3F^o_3$	18 628	608 407	1				3
168.888	$3p^63d^2\ ^3P_2$	$3p^63d5f\ ^1F^o_3$	18 628	610 723	20				3
168.740	$3p^63d^2\ ^3P_1$	$3p^63d5f\ ^3D^o_1$	18 057	610 678	5				3
168.691	2	3	18 628	611 405	160				3
168.664	0	1	17 782	610 678	40				3
168.549	1	2	18 057	611 340	70				3
168.515	$3p^63d^2\ ^3P_2$	$3p^63d5f\ ^3P^o_2$	18 628	612 044	15				3
168.353	1	2	18 057	612 044	15				3
168.321	1	1	18 057	612 161	10				3
168.282	$3p^63d^2\ ^1D_2$	$3p^63d5f\ ^3G^o_3$	15 336	609 568	15				3
168.147	$3p^63d^2\ ^1D_2$	$3p^63d5f\ ^1D^o_2$	15 336	610 051	70				3
167.957	$3p^63d^2\ ^1D_2$	$3p^63d5f\ ^1F^o_3$	15 336	610 723	70				3
167.765	$3p^63d^2\ ^1D_2$	$3p^63d5f\ ^3D^o_3$	15 336	611 405	20				3
166.115	$3p^63d^2\ ^1S_0$	$3p^63d6f\ ^1P^o_1$	59 265	661 258	10				3
164.892	$3p^63d^2\ ^3F_4$	$3p^63d5f\ ^1G^o_4$	1 669	608 125	20				3
164.639	3	4	746	608 125	60				3
164.815	$3p^63d^2\ ^3F_4$	$3p^63d5f\ ^3F^o_3$	1 669	608 407	1				3
164.629	4	4	1 669	609 095	85				3
164.566	3	3	746	608 407	60				3
164.421	2	2	0	608 193	55				3
164.378	3	4	746	609 095	10				3
164.365	2	3	0	608 407	25				3
164.300	$3p^63d^2\ ^3F_4$	$3p^63d5f\ ^3G^o_4$	1 669	610 314	30				3
164.249	3	3	746	609 568	20				3
164.224	4	5	1 669	610 595	180				3
164.051	3	4	746	610 314	180				3
164.051	2	3	0	609 568	180				3
164.188	$3p^63d^2\ ^3F_4$	$3p^63d5f\ ^1F^o_3$	1 669	610 723	2				3
163.939	3	3	746	610 723	5				3
163.740	2	3	0	610 723	5				3
163.663	$3p^63d^2\ ^3F_4$	$3p^63d5f\ ^1H^o_5$	1 669	612 678	1				3
163.557	$3p^63d^2\ ^3F_2$	$3p^63d5f\ ^3D^o_3$	0	611 405	1				3
158.139	$3p^63d^2\ ^1G_4$	$3p^63d6f\ ^1G^o_4$	25 511	657 867	6				3
157.908	$3p^63d^2\ ^1G_4$	$3p^63d6f\ ^3F^o_4$	25 511	658 777	2				3
157.301	$3p^63d^2\ ^1G_4$	$3p^63d6f\ ^1H^o_5$	25 511	661 233	60				3
155.914	$3p^63d^2\ ^3P_2$	$3p^63d6f\ ^3D^o_3$	18 628	660 007	25				3
155.813	1	1	18 057	659 849	5				3
155.789	1	2	18 057	659 951	20				3
155.747	0	1	17 782	659 849	10				3
155.317	$3p^63d^2\ ^1D_2$	$3p^63d6f\ ^1D^o_2$	15 336	659 181	2				3
155.119	$3p^63d^2\ ^1D_2$	$3p^63d6f\ ^3D^o_3$	15 336	660 007	12				3
154.994	$3p^63d^2\ ^1D_2$	$3p^63d6f\ ^1F^o_3$	15 336	660 522	2				3
152.182	$3p^63d^2\ ^3F_4$	$3p^63d6f\ ^3F^o_4$	1 669	658 777	10				3
152.093	3	3	746	658 238	5				3
152.046	2	2	0	657 696	8				3
151.920	2	3	0	658 238	10				3

Mn VI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
151.949	$3p^63d^2\ ^3F_4$	$3p^63d6f\ ^3G^o_4$	1 669	659 783	20				3
151.899	4	5	1 669	660 000	45				3
151.769	2	3	0	658 896	20				3
151.736	3	4	746	659 783	35				3
151.617	$3p^63d^2\ ^3F_4$	$3p^63d6f\ ^1H^o_5$	1 669	661 233	1				3
150.324	$3p^63d^2\ ^1G_4$	$3p^63d7f\ ^1H^o_5$	25 511	690 741	8				3
148.998	$3p^63d^2\ ^3P_2$	$3p^63d7f\ ^3D^o_3$	18 628	689 778	4				3
148.909	0	1	17 782	689 333	2				3
148.846	1	2	18 057	689 892	2				3
148.476	$3p^63d^2\ ^1D_2$	$3p^63d7f\ ^1D^o_2$	15 336	688 844	1				3
148.273	$3p^63d^2\ ^1D_2$	$3p^63d7f\ ^3D^o_3$	15 336	689 778	1				3
146.118	$3p^63d^2\ ^1G_4$	$3p^63d8f\ ^1H^o_5$	25 511	709 890	2				3
145.452	$3p^63d^2\ ^3F_4$	$3p^63d7f\ ^3F^o_4$	1 669	689 181	2				3
145.414	3	3	746	688 438	2				3
145.304	2	2	0	688 212	2				3
145.257	3	4	746	689 181	2				3
145.280	$3p^63d^2\ ^3F_4$	$3p^63d7f\ ^3G^o_5$	1 669	689 995	16				3
145.169	2	3	0	688 846	4				3
145.117	3	4	746	689 844	8				3
141.277	$3p^63d^2\ ^3F_4$	$3p^63d8f\ ^3G^o_5$	1 669	709 500	10				3
141.193	2	3	0	708 250	1				3
141.119	3	4	746	709 370	2				3

Mn VII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
254.517	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1G)\ ^2F^o_{5/2}$	1 338	394 238	15				10
253.654	3/2	5/2	0	394 238	400				10
252.985	5/2	7/2	1 338	396 618	750				10
252.760	$3p^63d\ ^2D_{3/2}$	$3p^64p\ ^2P^o_{1/2}$	0	395 633	400				5, 10°
250.969	5/2	3/2	1 338	399 795	1000				5, 10°
250.127	3/2	3/2	0	399 795	50				5, 10°
247.473	$3p^63d\ ^2D_{3/2}$	$3p^5(^2P^o)3d^2(^1D)\ ^2P^o_{1/2}$	0	404 085	250	6.8 − 2	3.8+9	D−	10°, 92*
245.739	5/2	3/2	1 338	408 273	300	1.3 − 1	3.4+9	D−	10°, 92*
244.935	3/2	3/2	0	408 273	100	1.4 − 2	3.8+8	E	10°, 92*
244.766	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1D)\ ^2F^o_{7/2}$	1 338	409 891	500	2.2 − 1	3.1+9	D−	10°, 92*
239.381	5/2	5/2	1 338	419 081	25	1.1 − 2	2.2+8	E	10°, 92*
238.617	3/2	5/2	0	419 081	300	1.6 − 1	3.2+9	D−	10°, 92*
204.675	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2F^o_{5/2}$	1 338	489 916	50	2.2 − 1	5.9+9	E	10°, 92*
204.117	3/2	5/2	0	489 916	400	3.1	8.3+10	D−	7, 10°, 92*
202.840	5/2	7/2	1 338	494 337	600	4.5	9.1+10	D−	7, 10°, 92*
184.538	$3p^63d\ ^2D_{3/2}$	$3p^5(^2P^o)3d^2(^3P)\ ^2P^o_{1/2}$	0	541 894	200	2.1	2.1+11	D−	10°, 92*
184.161	5/2	3/2	1 338	544 342	300	3.8	1.9+11	D−	10°, 92*
183.708	3/2	3/2	0	544 342	100	4.4 − 1	2.1+10	E	10°, 92*
183.141	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2D^o_{5/2}$	1 338	547 367	500	8.4	2.7+11	D−	6, 7, 10°, 92*
182.945	5/2	3/2	1 338	547 949	100	6.0 − 1	3.0+10	E	6, 7, 10°, 92*
182.692	3/2	5/2	0	547 367	200	6.0 − 1	2.0+10	E	6, 7, 10°, 92*
182.499	3/2	3/2	0	547 949	300	5.2	2.7+11	D−	6, 7, 10°, 92*
162.689	$3p^63d\ ^2D_{5/2}$	$3p^64f\ ^2F^o_{5/2}$	1 338	616 007	100				5, 10°
162.656	5/2	7/2	1 338	616 132	300				5, 10°
162.336	3/2	5/2	0	616 007	250				5, 10°
142.615	$3p^63d\ ^2D_{3/2}$	$3p^53d(^3P^o)4s\ ^2P^o_{1/2}$	0	701 189	30	1.2 − 1	2.0+10	D	8, 9, 10°, 92*
142.028	5/2	3/2	1 338	705 425	50	2.0 − 1	1.7+10	D	8, 9, 10°, 92*
141.757	3/2	3/2	0	705 425	25	3.4 − 2	2.8+9	E	8, 9, 10°, 92*
141.044	$3p^63d\ ^2D_{5/2}$	$3p^53d(^3F^o)4s\ ^4F^o_{7/2}$	1 338	710 337	20				8, 9, 10°
140.323	3/2	5/2	0	712 642	15				8, 9, 10°
139.862	3/2	3/2	0	714 990	1				10
139.595	$3p^63d\ ^2D_{5/2}$	$3p^53d(^3F^o)4s\ ^2F^o_{7/2}$	1 338	717 696	85	6.0 − 1	2.6+10	D	8, 9, 10°, 92*
138.697	5/2	5/2	1 338	722 331	3	3.1 − 2	1.8+9	E	8, 9, 10°, 92*
138.441	3/2	5/2	0	722 331	70	5.6 − 1	3.3+10	D	8, 9, 10°, 92*
136.177	$3p^63d\ ^2D_{5/2}$	$3p^53d(^3D^o)4s\ ^4D^o_{7/2}$	1 338	735 676	35				8, 9, 10°
135.900	5/2	5/2	1 338	737 173	15				8, 9, 10°
135.532	3/2	3/2	0	737 833	8				10
135.394	3/2	1/2	0	738 585	3				10
135.609	$3p^63d\ ^2D_{5/2}$	$3p^65f\ ^2F^o_{5/2}$	1 338	738 765	10				5, 10°
135.475	5/2	7/2	1 338	739 482	120				5, 10°
135.362	3/2	5/2	0	738 765	100				5, 10°
135.148	$3p^63d\ ^2D_{3/2}$	$3p^53d(^1F^o)4s\ ^2F^o_{5/2}$	0	739 930	75				10
134.190	5/2	7/2	1 338	746 550	25	2.5 − 1	1.2+10	D	8, 9, 10°, 92*
134.972	$3p^63d\ ^2D_{3/2}$	$3p^53d(^1D^o)4s\ ^2D^o_{3/2}$	0	740 894	15				10
134.628	5/2	5/2	1 338	744 126	30				10
133.875	$3p^63d\ ^2D_{5/2}$	$3p^53d(^3D^o)4s\ ^2D^o_{3/2}$	1 338	748 302	5	6.6 − 2	5.9+9	E	8, 9, 10°, 92*
133.655	5/2	5/2	1 338	749 532	60	4.3 − 1	2.7+10	D	8, 9, 10°, 92*
133.636	3/2	3/2	0	748 302	35	2.7 − 1	2.5+10	D	8, 9, 10°, 92*
133.417	3/2	5/2	0	749 532	2				8, 9, 10°
123.993	$3p^63d\ ^2D_{5/2}$	$3p^66f\ ^2F^o_{7/2}$	1 338	807 835	50				5, 10°
123.790	3/2	5/2	0	807 820	30				5, 10°
117.978	$3p^63d\ ^2D_{5/2}$	$3p^67f\ ^2F^o_{7/2}$	1 338	848 954	15				5, 10°
117.793	3/2	5/2	0	848 947	10				5, 10°
114.380	$3p^63d\ ^2D_{5/2}$	$3p^68f\ ^2F^o_{7/2}$	1 338	875 620	2				5, 10°
114.205	3/2	5/2	0	875 620	2				5, 10°

Mn VII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
112.060	$3p^63d\ ^2D_{5/2}$	$3p^69f\ ^2F^o_{7/2}$	1 338	893 730	1				5
111.889	$_{3/2}$	$_{5/2}$	0	893 730					5

Mn VIII

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
668.288	$3s^23p^53d\ ^1P^o_1$	$3s3p^63d\ ^1D_2$	539 214	688 850					14
415.348	$3s^23p^53d\ ^1F^o_3$	$3s3p^63d\ ^3D_2$	427 531	668 308	4bl				14
413.582	3	3	427 531	669 326	5				14
411.473	$3s^23p^53d\ ^3D^o_2$	$3s3p^63d\ ^3D_1$	424 641	667 677					14
410.374	2	2	424 641	668 308	6bl				14
409.270	1	1	423 337	667 677	5				14
408.685	2	3	424 641	669 326	5				14
408.206	1	2	423 337	668 308					14
400.075	3	3	419 374	669 326	8				14
403.497	$3s^23p^53d\ ^1D^o_2$	$3s3p^63d\ ^3D_1$	419 817	667 677	2				14
402.446	2	2	419 817	668 308	5				14
400.781	2	3	419 817	669 326	3				14
382.666	$3s^23p^53d\ ^1F^o_3$	$3s3p^63d\ ^1D_2$	427 531	688 850	9				14
378.482	$3s^23p^53d\ ^3D^o_2$	$3s3p^63d\ ^1D_2$	424 641	688 850	5				14
371.090	3	2	419 374	688 850	6				14
371.695	$3s^23p^53d\ ^1D^o_2$	$3s3p^63d\ ^1D_2$	419 817	688 850	8				14
371.586	$3s^23p^53d\ ^3F^o_2$	$3s3p^63d\ ^3D_1$	398 564	667 677	9				14
370.722	2	2	398 564	668 308	5				14
365.779	3	2	394 921	668 308	10				14
364.427	3	3	394 921	669 326	5				14
360.373	4	3	391 836	669 326	11				14
347.602	$3s^23p^53d\ ^3P^o_2$	$3s3p^63d\ ^3D_1$	379 993	667 677	2				14
346.842	2	2	379 993	668 308	8				14
345.617	2	3	379 993	669 326	11				14
342.501	1	1	375 710	667 677	7				14
341.770	1	2	375 710	668 308	10				14
340.114	0	1	373 658	667 677	8				14
344.493	$3s^23p^53d\ ^3F^o_2$	$3s3p^63d\ ^1D_2$	398 564	688 850	3				14
340.234	3	2	394 921	688 850	bl				14
323.782	$3s^23p^53d\ ^3P^o_2$	$3s3p^63d\ ^1D_2$	379 993	688 850	1				14
266.181	$3p^6\ ^1S_0$	$3p^53d\ ^3P^o_1$	0	375 710	5bl				14
236.218	$3p^6\ ^1S_0$	$3p^53d\ ^3D^o_1$	0	423 337	15				14
185.455	$3p^6\ ^1S_0$	$3p^53d\ ^1P^o_1$	0	539 214	20	2.87	1.85+11	C	6, 7, 14°, 15, 92*
141.76	$3p^53d\ ^3D^o_3$	$3p^54f\ ^1G_4$	419 374	1 124 800	10				16
141.29	$3p^53d\ ^1F^o_3$	$3p^54f\ ^3F_4$	427 531	1 135 300	7				16
140.73	$3p^53d\ ^3D^o_2$	$3p^54f\ ^3F_3$	424 641	1 135 200	5				16
139.93	$3p^53d\ ^1D^o_2$	$3p^54f\ ^1F_3$	419 817	1 134 500	5				16
137.92	$3p^53d\ ^3F^o_2$	$3p^54f\ ^3G_3$	398 564	1 123 600	6				16
137.82	3	4	394 921	1 120 500	7				16
137.50	4	5	391 836	1 119 100	10				16
135.48T	$3p^53d\ ^3P^o_2$	$3p^54f\ ^3D_2$	379 993	1 117 600	bl				16
135.15	2	3	379 993	1 119 900	bl				16
135.06	1	1	375 710	1 116 100	3				16
134.79	1	2	375 710	1 117 600	4				16
134.69	0	1	373 658	1 116 100	2				16
124.055	$3p^6\ ^1S_0$	$3p^5(^2P^o_{3/2})4s\ ^2[\frac{3}{2}]^o_1$	0	806 100	10	1.4 − 1	2.0+10	D	11, 12°, 92*
122.168	$3p^6\ ^1S_0$	$3p^5(^2P^o_{1/2})4s\ ^2[\frac{1}{2}]^o_1$	0	818 500	15	2.7 − 1	4.0+10	D	11, 12°, 92*
97.411	$3p^6\ ^1S_0$	$3p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_1$	0	1 026 600	7				13
96.332	$3p^6\ ^1S_0$	$3p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_1$	0	1 038 100	6				13

Mn IX

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
7968.5^C	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^5\ ^2P^o_{1/2}$	0	12 546		M1	3.55+1	B	92*
395.473	$3s^23p^5\ ^2P^o_{1/2}$	$3s3p^6\ ^2S_{1/2}$	12 546	265 408	8	6.8 − 2	1.5+9	C−	17, 18°, 21, 26, 92*
376.778	$_{3/2}$	$_{1/2}$	0	265 408	10	1.42 − 1	3.33+9	C−	17, 18°, 21, 26, 92*
204.43	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)3d\ ^2S_{1/2}$	12 546	501 710		4.94 − 1	3.95+10	C−	19°, 92*
199.32	$_{3/2}$	$_{1/2}$	0	501 710		1.3	1.1+11	C−	19°, 92*
196.38	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)3d\ ^2P_{3/2}$	12 546	521 840					19
194.61	$_{1/2}$	$_{1/2}$	12 546	526 380					19
191.60	$_{3/2}$	$_{3/2}$	0	521 840					6, 7, 19°
189.98	$_{3/2}$	$_{1/2}$	0	526 380					19
189.16	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)3d\ ^2D_{3/2}$	12 546	541 160		3.40	1.59+11	C	6, 7, 19°, 92*
188.48	$_{3/2}$	$_{5/2}$	0	530 560		5.32	1.66+11	C	6, 7, 19°, 92*
184.80	$_{3/2}$	$_{3/2}$	0	541 160		1.2 − 1	6.1+9	D	19°, 92*
123.85^L	$3s^23p^4(^1D)3d\ ^2F_{7/2}$	$3s^23p^4(^1D)4f\ ^2G^o_{9/2}$							24
121.633^L	$3s^23p^4(^3P)3d\ ^4F_{7/2}$	$3s^23p^4(^3P)4f\ ^4G^o_{9/2}$							24
121.351^L	$_{9/2}$	$_{11/2}$							24
121.12^L	$_{5/2}$	$_{7/2}$							24
121.442^L	$3s^23p^4(^1D)3d\ ^2G_{9/2}$	$3s^23p^4(^1D)4f\ ^2H^o_{11/2}$							24
118.510^L	$3s^23p^4(^3P)3d\ ^4D_{7/2}$	$3s^23p^4(^3P)4f\ ^4F^o_{9/2}$							24
114.472	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^3P)4s\ ^4P_{5/2}$	0	873 580					22
113.627	$_{3/2}$	$_{3/2}$	0	880 070	3				22
114.023	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)4s\ ^2P_{3/2}$	12 546	889 560					21, 22°
113.080	$_{1/2}$	$_{1/2}$	12 546	896 860	2				21, 22°
112.415	$_{3/2}$	$_{3/2}$	0	889 560	5				21, 22°
111.500	$_{3/2}$	$_{1/2}$	0	896 860	2				21, 22°
111.262	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)4s\ ^2D_{3/2}$	12 546	911 310	4				22
109.783	$_{3/2}$	$_{5/2}$	0	910 890	5				22
105.256	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^1S)4s\ ^2S_{1/2}$	0	950 060					22
91.06	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)4d\ ^2D_{3/2}$	12 546	1 110 700	8				23
90.134	$_{3/2}$	$_{5/2}$	0	1 109 500	9				23△, 24°
90.034	$_{3/2}$	$_{3/2}$	0	1 110 700	8				23△, 24°
90.599	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)4d\ ^2P_{3/2}$	12 546	1 116 300					24
89.914	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^3P)4d\ ^4F_{5/2}$	0	1 112 200	4				23△, 24°
89.783	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^3P)4d\ ^2F_{5/2}$	0	1 113 800	4				23△, 24°
89.448	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)4d\ ^2S_{1/2}$	12 546	1 130 700					24
88.423	$_{3/2}$	$_{1/2}$	0	1 130 700	6				23△, 24°
88.923	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)4d\ ^2P_{3/2}$	12 546	1 137 000	4				23△, 24°
88.773	$_{1/2}$	$_{1/2}$	12 546	1 139 000	4				23△, 24°
87.958	$_{3/2}$	$_{3/2}$	0	1 137 000	6				23△, 24°
87.79	$_{3/2}$	$_{1/2}$	0	1 139 000	2				23
88.258	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)4d\ ^2D_{3/2}$	12 546	1 145 700	5				23△, 24°
87.552	$_{3/2}$	$_{5/2}$	0	1 142 200	8				23△, 24°
87.27	$_{3/2}$	$_{3/2}$	0	1 145 700	3				23△, 24°

Mn X

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
9978.3[C]	$3s^23p^4\ ^3P_2$	$3s^23p^4\ ^3P_1$	0	10 019		M1	2.18+1	C+	92*
2956.0[C]	$3s^23p^4\ ^3P_2$	$3s^23p^4\ ^1D_2$	0	33 820		M1	5.3+1	D−	92*
1574.2[C]	$3s^23p^4\ ^3P_1$	$3s^23p^4\ ^1S_0$	10 019	73 545		M1	5.8+2	E	92*
398.322	$3s^23p^4\ ^3P_1$	$3s3p^5\ ^3P^o_2$	10 019	261 072					18°, 26, 27
388.988	0	1	11 797	268 874					18°, 26, 27
386.316	1	1	10 019	268 874					18°, 26, 27
383.036	2	2	0	261 072		1.7 − 1	1.5+9	E	18°, 26, 27, 92*
379.368	1	0	10 019	273 615					18
371.905	2	1	0	268 874	bl				18°, 26, 27
384.827	$3s^23p^4\ ^1S_0$	$3s3p^5\ ^1P^o_1$	73 545	333 402					18
333.798	$3s^23p^4\ ^1D_2$	$3s3p^5\ ^1P^o_1$	33 820	333 402		3.3 − 1	6.6+9	D	18°, 26, 27, 92*
218.11	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)3d\ ^3P^o_1$	33 820	492 320					27
217.88	2	2	33 820	492 770					27
207.15	$3s^23p^4\ ^3P_1$	$3s^23p^3(^2D^o)3d\ ^3P^o_2$	10 019	492 770					19, 27°
203.12	2	1	0	492 320					27
202.93	2	2	0	492 770		3.1	1.0+11	E	19, 27°, 92*
199.08	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)3d\ ^1D^o_2$	33 820	536 130		3.4	1.2+11	D	19, 27°, 92*
198.42	$3s^23p^4\ ^1S_0$	$3s^23p^3(^2D^o)3d\ ^1P^o_1$	73 545	577 530		2.4	1.4+11	D	27°, 92*
195.85	$3s^23p^4\ ^3P_1$	$3s^23p^3(^4S^o)3d\ ^3D^o_2$	10 019	520 620					7, 27°
195.03	0	1	11 797	524 520					7, 27°
194.37	1	1	10 019	524 520					27
194.30	2	3	0	514 670					7, 27°
192.08	2	2	0	520 620					27
193.43	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)3d\ ^1F^o_3$	33 820	550 800		6.0	1.5+11	D	7, 27°, 92*
108.97[L]	$3s^23p^3(^2P^o)3d\ ^3F^o_3$	$3s^23p^3(^2P^o)4f\ ^3G_4$			bl				24
108.93[L]	4	5			bl				24
108.97[L]	$3s^23p^3(^2D^o)3d\ ^3G^o_5$	$3s^23p^3(^2D^o)4f\ ^3H_6$			bl				24
108.93[L]	4	5			bl				24
107.472[L]	$3s^23p^3(^4S^o)3d\ ^5D^o_4$	$3s^23p^3(^4S^o)4f\ ^5F_5$							24
107.39[L]	3	4			bl				24
107.34[L]	2	3			bl				24
107.34[L]	1	2			bl				24
107.36[L]	$3s^23p^3(^2D^o)3d\ ^3F^o_4$	$3s^23p^3(^2D^o)4f\ ^3G_5$			bl				24
104.806	$3s^23p^4\ ^3P_0$	$3s^23p^3(^4S^o)4s\ ^3S^o_1$	11 797	965 970					28
104.608	1	1	10 019	965 970					28
103.521	2	1	0	965 970					28
104.310	$3s^23p^4\ ^1S_0$	$3s^23p^3(^2P^o)4s\ ^1P^o_1$	73 545	1 032 090					28
103.269	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)4s\ ^1D^o_2$	33 820	1 002 160					28
102.030	$3s^23p^4\ ^3P_0$	$3s^23p^3(^2D^o)4s\ ^3D^o_1$	11 797	991 860					28
101.854	1	1	10 019	991 860					28
101.808	1	2	10 019	992 220					28
100.787	2	2	0	992 220					28
100.585	2	3	0	994 180					28
100.173	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2P^o)4s\ ^1P^o_1$	33 820	1 032 090					28
84.292	$3s^23p^4\ ^3P_1$	$3s^23p^3(^4S^o)4d\ ^3D^o_2$	10 019	1 196 370					23△, 24°
83.518	2	3	0	1 197 350					23△, 24°
83.068	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)4d\ ^1D^o_2$	33 820	1 237 650					23△, 24°
82.828	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)4d\ ^1F^o_3$	33 820	1 241 140					23△, 24°

Mn XI

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3381.9[C]	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^3\ ^2P^o_{1/2}$	39 384	68 945		M1	4.5+1	C	92*
3240.6[C]	$_{5/2}$	$_{3/2}$	42 702	73 552		M1	4.8+1	C	92*
2925.9[C]	$_{3/2}$	$_{3/2}$	39 384	73 552		M1	1.1+2	C	92*
2538.3[C]	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^3\ ^2D^o_{3/2}$	0	39 384		M1	2.4+1	D	92*
1450.49	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^3\ ^2P^o_{1/2}$	0	68 945		M1	1.0+2	D	29°, 92*
1359.59	$_{3/2}$	$_{3/2}$	0	73 552		M1	2.0+2	D	29, 30°, 92*
414.972[C]	$3s^23p^3\ ^2P^o_{3/2}$	$3s3p^4\ ^2D_{3/2}$	73 552	314 532		9.6 − 4	9.2+6	E	92*
412.662[C]	$_{3/2}$	$_{5/2}$	73 552	315 881		7.2 − 2	4.8+8	D	92*
407.188[C]	$_{1/2}$	$_{3/2}$	68 945	314 532		2.8 − 2	2.8+8	D	92*
393.743	$3s^23p^3\ ^4S^o_{3/2}$	$3s3p^4\ ^4P_{5/2}$	0	253 974		1.9 − 1	1.4+9	D	17, 18°, 26, 27, 92*
382.142	$_{3/2}$	$_{3/2}$	0	261 683		1.3 − 1	1.5+9	D	18°, 26, 27, 92*
377.154	$_{3/2}$	$_{1/2}$	0	265 144		6.8 − 2	1.5+9	D	18°, 27, 92*
367.877	$3s^23p^3\ ^2D^o_{5/2}$	$3s3p^4\ ^2D_{3/2}$	42 702	314 532		5.0 − 3	6.2+7	E	18°, 92*
366.060	$_{5/2}$	$_{5/2}$	42 702	315 881		3.0 − 1	2.5+9	D	18°, 26, 27, 92*
363.510	$_{3/2}$	$_{3/2}$	39 384	314 532	bl	2.3 − 1	3.0+9	D	18°, 26, 92*
361.668[C]	$_{3/2}$	$_{5/2}$	39 384	315 881		3.4 − 3	2.9+7	E	92*
347.404	$3s^23p^3\ ^2P^o_{3/2}$	$3s3p^4\ ^2P_{3/2}$	73 552	361 400					18
341.929	$_{1/2}$	$_{3/2}$	68 945	361 400					18
336.995	$_{1/2}$	$_{1/2}$	68 945	365 689					18
327.288	$3s^23p^3\ ^2P^o_{3/2}$	$3s3p^4\ ^2S_{1/2}$	73 552	379 093					18
322.427	$_{1/2}$	$_{1/2}$	68 945	379 093					18
313.777	$3s^23p^3\ ^2D^o_{5/2}$	$3s3p^4\ ^2P_{3/2}$	42 702	361 400					18°, 26, 27
310.547	$_{3/2}$	$_{3/2}$	39 384	361 400					18°, 27
306.458	$_{3/2}$	$_{1/2}$	39 384	365 689					18°, 27
235.55	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^2P_{3/2}$	42 702	467 240					27
228.52	$_{3/2}$	$_{1/2}$	39 384	476 980					27
230.17[C]	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^4P_{5/2}$	42 702	477 170		3.8 − 2	8.0+8	E	92*
228.42[C]	$_{3/2}$	$_{5/2}$	39 384	477 170		1.2 − 2	2.6+8	E	92*
225.40[C]	$_{3/2}$	$_{1/2}$	39 384	483 040		1.2 − 2	7.9+8	E	92*
226.42[C]	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2D_{3/2}$	73 552	515 210		6.8 − 3	2.2+8	E	92*
226.31[C]	$_{3/2}$	$_{5/2}$	73 552	515 430		3.0 − 1	6.4+9	D	92*
224.08[C]	$_{1/2}$	$_{3/2}$	68 945	515 210		1.8 − 1	5.9+9	D	92*
216.60	$3s^23p^3\ ^2P^o_{1/2}$	$3s^23p^2(^1D)3d\ ^2P_{1/2}$	68 945	530 620					27
215.86	$_{3/2}$	$_{3/2}$	73 552	536 800		1.4	4.8+10	E	27°, 92*
213.75	$_{1/2}$	$_{3/2}$	68 945	536 800		4.0 − 1	1.5+10	E	27°, 92*
211.64[C]	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)3d\ ^2D_{3/2}$	42 702	515 210		2.5 − 1	9.1+9	D	92*
211.54	$_{5/2}$	$_{5/2}$	42 702	515 430		1.9	4.6+10	D	27°, 92*
210.16	$_{3/2}$	$_{3/2}$	39 384	515 210		1.4	5.5+10	D	27°, 92*
210.06[C]	$_{3/2}$	$_{5/2}$	39 384	515 430		6.8 − 2	1.7+9	D	92*
209.57	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)3d\ ^4P_{5/2}$	0	477 170		3.0	7.7+10	D	27°, 31, 92*
208.02	$_{3/2}$	$_{3/2}$	0	480 720		2.0	7.9+10	D	27°, 31, 92*
207.02	$_{3/2}$	$_{1/2}$	0	483 040		1.1	8.3+10	D	27°, 92*
204.98	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^3P)3d\ ^2D_{5/2}$	73 552	561 400					27
204.29	$_{3/2}$	$_{3/2}$	73 552	563 060					27
202.38	$_{1/2}$	$_{3/2}$	68 945	563 060					27
202.39[C]	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)3d\ ^2P_{3/2}$	42 702	536 800		2.4 − 2	9.8+8	E	92*
201.04[C]	$_{3/2}$	$_{3/2}$	39 384	536 800		2.6 − 2	1.1+9	E	92*
200.67	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^2F_{7/2}$	42 702	541 030		4.7	9.7+10	E	6, 7, 27°, 92*
194.01[C]	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2D_{5/2}$	0	515 430		4.8 − 3	1.4+8	E	92*
99.356[L]	$3s^23p^2(^1D)3d\ ^2G_{9/2}$	$3s^23p^2(^1D)4f\ ^2H^o_{11/2}$							24
99.02[L]	$_{7/2}$	$_{9/2}$			bl				24
99.02[L]	$3s^23p^2(^1D)3d\ ^2F_{7/2}$	$3s^23p^2(^3P)4f\ ^2G^o_{9/2}$			bl				24

Mn XI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
98.064^{L}	$3s^23p^2(^3P)3d\ ^4F_{9/2}$	$3s^23p^2(^3P)4f\ ^4G^o_{11/2}$							24
98.023^{L}	$_{7/2}$	$_{9/2}$							24
95.390	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)4s\ ^2D_{3/2}$	73 552	1 121 880					24
94.327	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)4s\ ^2P_{3/2}$	42 702	1 102 840					24
92.75	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)4s\ ^2D_{5/2}$	42 702	1 120 870	bl				24
92.75	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)4s\ ^4P_{1/2}$	0	1 078 200	bl				24
92.240	$_{3/2}$	$_{3/2}$	0	1 084 130					24
91.646	$_{3/2}$	$_{5/2}$	0	1 091 160					24
78.056	$3s^23p^3\ ^2P^o_{1/2}$	$3s^23p^2(^3P)4d\ ^2D_{3/2}$	68 945	1 350 080					24
77.556	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)4d\ ^2D_{5/2}$	73 552	1 362 940					24
77.402	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^2(^3P)4d\ ^2F_{5/2}$	39 384	1 331 340					24
77.270	$_{5/2}$	$_{7/2}$	42 702	1 336 860					24
76.858	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)4d\ ^2S_{1/2}$	73 552	1 374 650					24
76.763	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)4d\ ^4D_{7/2}$	42 702	1 345 410					24
76.380	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^2(^3P)4d\ ^2D_{5/2}$	39 384	1 348 630					24
75.879	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)4d\ ^2F_{7/2}$	42 702	1 360 590					24
75.819	$_{5/2}$	$_{5/2}$	42 702	1 361 630					24
75.477	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)4d\ ^4P_{5/2}$	0	1 324 910					24
75.059	$_{3/2}$	$_{3/2}$	0	1 332 280					24
75.227	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)4d\ ^4F_{5/2}$	0	1 329 310					24

Mn XII

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1}) Lower	Energy Levels (cm^{-1}) Upper	Int.	gf	A (s^{-1})	Acc.	References
3685.5	$3s^23p^2\ ^3P_2$	$3s^23p^2\ ^1D_2$	15 010	42 140		M1	4.4+1	E	32°, 33, 92*, 95
2861^{C}	1	2	7 200	42 140		M1	3.5+1	E	92*
2674^{C}	$3s3p^3\ ^3D^o_3$	$3s3p^3\ ^3P^o_2$	266 610	303 990		M1	5.4+1	E	92*
2535^{C}	2	2	264 550	303 990		M1	4.3+1	E	92*
1322.23	$3s^23p^2\ ^3P_1$	$3s^23p^2\ ^1S_0$	7 200	82 830		M1	6.2+2	E	29, 34°, 92*
552.84	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^5S^o_2$	15 010	195 900					35
529.79	1	2	7 200	195 900					35
485.58^{C}	$3s3p^3\ ^3D^o_3$	$3s^23p3d\ ^3D^o_3$	266 610	472 550		M1	5.0+1	E	92*
445.49^{C}	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^3D^o_3$	42 140	266 610		1.1 − 2	5.2+7	E	92*
400.74^{C}	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3D^o_2$	15 010	264 550		7.5 − 3	6.3+7	D−	92*
397.46	2	3	15 010	266 610		1.9 − 1	1.1+9	D	26, 27°, 92*
388.58	1	2	7 200	264 550		1.4 − 1	1.2+9	D	27°, 92*
386.27	0	1	0	258 890					27
346.40^{C}	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3P^o_1$	15 010	303 690		4.7 − 2	8.6+8	D−	92*
346.04	2	2	15 010	303 990		2.4 − 1	2.7+9	D	27°, 92*
337.29	1	1	7 200	303 690		7.8 − 2	1.5+9	D	27°, 92*
336.94^{C}	1	2	7 200	303 990		3.6 − 2	4.2+8	D	92*
329.28	0	1	0	303 690		5.4 − 2	1.1+9	D	27°, 92*
342.67	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^1D^o_2$	42 140	333 970					27
275.78	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^1P^o_1$	42 140	404 750					27
269.82	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3S^o_1$	15 010	385 630					26, 27°
264.26	1	1	7 200	385 630					27
259.33	0	1	0	385 630					27
237.78	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^1D^o_2$	42 140	462 700					27
232.34^{C}	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^3D^o_3$	42 140	472 550		8.5 − 2	1.5+9	E	92*
228.61	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^3P^o_2$	15 010	452 420					27
224.62	1	2	7 200	452 420					27
217.39	0	1	0	460 000					27
223.56	$3s^23p^2\ ^1S_0$	$3s^23p3d\ ^1P^o_1$	82 830	530 140		1.2	5.2+10	D	27°, 92*
219.54	$3s^23p^2\ ^3P_1$	$3s^23p3d\ ^1D^o_2$	7 200	462 700					27
218.70	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^3D^o_2$	15 010	472 260					27
218.56	2	3	15 010	472 550		3.0	6.1+10	D	27°, 31, 92*
216.12	1	1	7 200	469 900					27
215.03	1	2	7 200	472 260					27
212.81	0	1	0	469 900					27
210.43	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^1F^o_3$	42 140	517 360		3.0	6.4+10	C	27°, 31, 92*
199.06^{C}	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^1F^o_3$	15 010	517 360		8.5 − 2	2.1+9	E	92*
90.701^{L}	$3s^23p3d\ ^3F^o_3$	$3s^23p4f\ ^3G_4$							24, 36°, 47
90.373^{L}	4	5							24, 36°, 47
86.71	$3s^23p^2\ ^3P_2$	$3s^23p4s\ ^3P^o_1$	15 010	1 168 300					36°, 47
85.72	2	2	15 010	1 181 300					36°, 47
85.19	1	2	7 200	1 181 300					36°, 47
71.69	$3s^23p^2\ ^1D_2$	$3s^23p4d\ ^1F^o_3$	42 140	1 437 000					36, 37°, 47
71.32	$3s^23p^2\ ^3P_2$	$3s^23p4d\ ^3D^o_3$	15 010	1 417 100					36, 37°, 47
71.04	1	2	7 200	1 414 900	bl				37
70.72	0	1	0	1 414 000					37
70.89	$3s^23p^2\ ^3P_2$	$3s^23p4d\ ^3F^o_3$	15 010	1 425 600					37

Mn XIII

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
6536.3	$3s^23p\ ^2P^o_{1/2}$	$3s^23p\ ^2P^o_{3/2}$	0	15 295		M1	3.21+1	C+	32°, 33, 92*
559.431^C	$3s3p^2\ ^2P_{3/2}$	$3p^3\ ^4S^o_{3/2}$	367 425	546 178		8.7 − 3	4.6+7	E	92*
517.56	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^4P_{1/2}$	15 295	208 451					35
501.20	3/2	3/2	15 295	214 546					35
482.55	3/2	5/2	15 295	222 463					35
479.27	1/2	1/2	0	208 451					35
438.189^C	$3s3p^2\ ^2P_{3/2}$	$3p^3\ ^2P^o_{1/2}$	367 425	595 637		3.7 − 2	6.4+8	E	92*
434.081^C	3/2	3/2	367 425	597 797		2.6 − 1	2.3+9	D	92*
425.038	1/2	1/2	360 387	595 637		1.6 − 1	2.9+9	D	39°, 92*
397.622^C	$3s^23d\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2F^o_{5/2}$	442 220	693 715		4.0 − 2	2.8+8	E	92*
395.273^C	3/2	5/2	440 725	693 715		1.9 − 1	1.4+9	E	92*
379.393^C	5/2	7/2	442 220	705 799		3.4 − 1	2.0+9	E	92*
389.657^C	$3s3p^2\ ^2S_{1/2}$	$3p^3\ ^2P^o_{1/2}$	339 001	595 637		9.4 − 3	2.0+8	E	92*
386.405^C	1/2	3/2	339 001	597 797		1.5 − 1	1.7+9	D	92*
387.585	$3s3p^2\ ^2D_{3/2}$	$3p^3\ ^2D^o_{3/2}$	276 497	534 492					39
385.827	5/2	5/2	278 099	537 263		3.6 − 1	2.7+9	E	39°, 92*
383.486^C	3/2	5/2	276 497	537 263		3.5 − 2	2.6+8	E	92*
382.845^C	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2D_{3/2}$	15 295	276 497		7.6 − 3	8.6+7	E	27, 92*
380.501	3/2	5/2	15 295	278 099		2.2 − 1	1.7+9	D	26, 27, 39°, 92*
361.659	1/2	3/2	0	276 497		1.5 − 1	1.9+9	D	26, 27, 39°, 92*
374.69	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	$3p^2(^3P)3d\ ^2F_{7/2}$	760 881	1 027 744					41
370.808^C	$3s3p^2\ ^2D_{3/2}$	$3p^3\ ^4S^o_{3/2}$	276 497	546 178		6.0 − 3	7.2+7	E	92*
346.84	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	$3p^2(^3P)3d\ ^4D_{7/2}$	642 337	930 637					41
331.43	$3s3p(^3P^o)3d\ ^4F^o_{9/2}$	$3p^2(^3P)3d\ ^4F_{9/2}$	611 495	913 218					41
330.43^L	5/2	5/2							41
300.11^L	7/2	7/2							41
322.690^C	$3s^23d\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	442 220	752 115		1.8 − 2	3.0+8	E	92*
321.141^C	3/2	3/2	440 725	752 115		2.4 − 2	4.0+8	E	92*
319.76	$3s3p(^3P^o)3d\ ^2F^o_{7/2}$	$3p^2(^1S)3d\ ^2D_{5/2}$	705 799	1 018 534					41
313.801	$3s^23d\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	442 220	760 881		2.7	2.4+10	E	39°, 92*
311.312^C	5/2	5/2	442 220	763 441		8.2 − 2	1.0+9	E	92*
309.857	3/2	5/2	440 725	763 441		2.0	2.4+10	E	39°, 92*
313.34	$3s3p(^3P^o)3d\ ^4F^o_{9/2}$	$3p^2(^3P)3d\ ^4D_{7/2}$	611 495	930 637					41
313.337	$3s3p^2\ ^2D_{3/2}$	$3p^3\ ^2P^o_{1/2}$	276 497	595 637	bl	3.4 − 1	1.2+10	D	39°, 92*
312.802	5/2	3/2	278 099	597 797		5.3 − 1	9.0+9	D	39°, 92*
311.236^C	3/2	3/2	276 497	597 797		6.8 − 2	1.2+9	D	92*
310.68	$3s3p(^3P^o)3d\ ^2F^o_{7/2}$	$3p^2(^3P)3d\ ^2F_{7/2}$	705 799	1 027 744	bl				41
303.17	5/2	5/2	693 715	1 023 639	bl				41
308.922^C	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2S_{1/2}$	15 295	339 001		4.8 − 2	1.6+9	D	27, 92*
294.985	1/2	1/2	0	339 001		3.8 − 1	1.4+10	D	27, 39°, 92*
308.895	$3s3p^2\ ^4P_{5/2}$	$3p^3\ ^4S^o_{3/2}$	222 463	546 178		8.4 − 1	1.5+10	D	26, 27, 38°, 92*
301.525	3/2	3/2	214 546	546 178		6.0 − 1	1.1+10	D	38°, 92*
296.073	1/2	3/2	208 451	546 178		3.0 − 1	5.7+9	D	38°, 92*
293.581	$3s^23d\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2D^o_{3/2}$	442 220	782 845					39
290.539	5/2	5/2	442 220	786 405		1.4	1.9+10	E	39°, 92*
289.285^C	3/2	5/2	440 725	786 405		3.2 − 2	4.2+8	E	92*
293.268	$3s^23d\ ^2D_{3/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	440 725	781 703	bl	7.3 − 1	2.8+10	D	39°, 92*
290.114	3/2	3/2	440 725	785 391					39

Mn XIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
289.774	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2P_{1/2}$	15 295	360 387		4.8 − 1	1.9+10	D	17, 27, 39°, 92*
283.984	$_{3/2}$	$_{3/2}$	15 295	367 425		1.49	3.08+10	C−	17, 26, 27, 39°, 92*
277.469	$_{1/2}$	$_{1/2}$	0	360 387		3.2 − 1	1.4+10	D	17, 26, 27, 39°, 92*
272.154	$_{1/2}$	$_{3/2}$	0	367 425		3.00 − 1	6.8+9	C−	17, 26, 27, 39°, 92*
283.24	$3s3p(^1P^o)3d\ ^2F^o_{5/2}$	$3s3d^2\ ^2G_{7/2}$	763 441	1 116 498					41
281.07	$_{7/2}$	$_{9/2}$	760 881	1 116 664					41
279.90	$3s3p(^3P^o)3d\ ^2D^o_{3/2}$	$3p^2(^3P)3d\ ^2F_{5/2}$	666 369	1 023 639					41
277.09	$_{5/2}$	$_{7/2}$	666 826	1 027 744	bl				41
274.546^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	278 099	642 337		4.6 − 2	6.8+8	E	92*
267.66	$3s3p(^1P^o)3d\ ^2D^o_{5/2}$	$3s3d^2\ ^2F_{7/2}$	786 405	1 160 013					41
265.83	$_{3/2}$	$_{5/2}$	782 845	1 159 025					41
266.583^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	278 099	653 217		2.0 − 2	2.3+8	E	92*
266.429^C	$3s3p^2\ ^4P_{5/2}$	$3p^3\ ^2P^o_{3/2}$	222 463	597 797		6.6 − 3	1.6+8	E	92*
260.926^C	$_{3/2}$	$_{3/2}$	214 546	597 797		1.3 − 2	3.3+8	E	92*
256.841^C	$_{1/2}$	$_{3/2}$	208 451	597 797		5.6 − 3	1.5+8	E	92*
259.950^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	367 425	752 115		4.0 − 1	1.1+10	D	92*
255.279^C	$_{1/2}$	$_{3/2}$	360 387	752 115		2.4 − 2	5.9+8	D	92*
257.234	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2D^o_{5/2}$	278 099	666 826	bl				39
256.497	$_{3/2}$	$_{3/2}$	276 497	666 369					39
252.515^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2F^o_{5/2}$	367 425	763 441		1.2 − 2	2.1+8	E	92*
242.066	$3s3p^2\ ^2S_{1/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	339 001	752 115		1.3	3.6+10	D	39°, 92*
241.384^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	367 425	781 703		1.38 − 1	7.91+9	C−	92*
239.255	$_{3/2}$	$_{3/2}$	367 425	785 391					39
237.369	$_{1/2}$	$_{1/2}$	360 387	781 703		1.1 − 1	6.4+9	D	39°, 92*
240.607^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2F^o_{5/2}$	278 099	693 715		1.1 − 1	2.2+9	E	92*
239.680	$_{3/2}$	$_{5/2}$	276 497	693 715		6.4 − 1	1.3+10	E	39°, 92*
233.767	$_{5/2}$	$_{7/2}$	278 099	705 799	bl	9.6 − 1	1.6+10	E	39°, 92*
238.675	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2D^o_{5/2}$	367 425	786 405		2.9	5.5+10	E	39°, 92*
236.723	$_{1/2}$	$_{3/2}$	360 387	782 845					39
238.167^C	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	222 463	642 337		1.7 − 1	3.4+9	E	92*
233.767	$_{3/2}$	$_{5/2}$	214 546	642 337	bl	1.1	2.3+10	E	39°, 92*
227.98	$_{3/2}$	$_{1/2}$	214 546	653 189		4.0 − 1	2.6+10	D	39, 40°, 92*
227.73	$_{3/2}$	$_{3/2}$	214 546	653 697					39, 40°
224.851^C	$_{1/2}$	$_{1/2}$	208 451	653 189		8.2 − 3	5.4+8	E	92*
235.054	$3s^23p\ ^2P^o_{3/2}$	$3s^23d\ ^2D_{3/2}$	15 295	440 725	bl	2.4 − 1	7.4+9	D	27, 39°, 92*
234.235	$_{3/2}$	$_{5/2}$	15 295	442 220		1.8	3.7+10	D	27, 31, 39°, 92*
226.905	$_{1/2}$	$_{3/2}$	0	440 725		1.0	3.3+10	D	27, 31, 39°, 92*
232.158	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	222 463	653 217		2.45	3.78+10	C−	27, 39°, 92*
231.868	$_{5/2}$	$_{5/2}$	222 463	653 739		1.2	2.5+10	D	39°, 92*
229.355	$_{1/2}$	$_{3/2}$	208 451	644 449					39
228.63	$_{1/2}$	$_{1/2}$	208 451	645 856		6.0 − 1	3.9+10	D	39, 40°, 92*
227.704	$_{3/2}$	$_{5/2}$	214 546	653 739		5.2 − 1	1.2+10	D	39°, 92*
225.886^C	$3s3p^2\ ^2S_{1/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	339 001	781 703		2.6 − 1	1.8+10	D	92*
207.130	$3s3p^2\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	278 099	760 881		1.4	2.6+10	E	39°, 92*
206.040^C	$_{5/2}$	$_{5/2}$	278 099	763 441		5.5 − 2	1.5+9	E	92*
205.350	$_{3/2}$	$_{5/2}$	276 497	763 441		9.2 − 1	2.4+10	E	39°, 92*
206.895^C	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)3d\ ^2F^o_{7/2}$	222 463	705 799		1.5 − 2	3.0+8	E	92*
197.939^C	$3s3p^2\ ^2D_{3/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	276 497	781 703		1.9 − 3	1.7+8	E	92*
185.729^C	$3s3p^2\ ^4P_{5/2}$	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	222 463	760 881		9.6 − 3	2.3+8	E	92*
183.937^C	$3s3p^2\ ^4P_{1/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	208 451	752 115		4.6 − 3	2.2+8	E	92*

Mn XIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
87.40	$3s^23d\ ^2D_{5/2}$	$3s^24f\ ^2F^o_{7/2}$	442 220	1 586 400					24
87.30	$_{3/2}$	$_{5/2}$	440 725	1 586 200					24
83.52^L	$3s3p(^3P^o)3d\ ^4F^o_{7/2}$	$3s3p4f\ ^4G_{9/2}$							24
83.41^L	$_{5/2}$	$_{7/2}$							24
83.23	$_{9/2}$	$_{11/2}$	611 495	1 813 000					24
79.16	$3s3p^2\ ^4P_{5/2}$	$3s3p4s\ ^4P^o_{5/2}$	222 463	1 485 730					24
67.215	$3s^23p\ ^2P^o_{3/2}$	$3s^24d\ ^2D_{5/2}$	15 295	1 503 060					42
66.574	$_{1/2}$	$_{3/2}$	0	1 502 090					42

Mn XIV

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
582.12	$3s3d\ ^1D_2$	$3p3d\ ^1D^o_2$	711 986	883 772	3	1.7 − 1	6.7+8	D−	44°, 92*
518.05	$3s3p\ ^1P^o_1$	$3p^2\ ^1D_2$	328 042	521 074	6	2.9 − 1	1.4+9	E	26, 36, 44°, 47, 92*
471.94	$3s3p\ ^1P^o_1$	$3p^2\ ^3P_2$	328 042	539 919	3				44
430.61	$3s3d\ ^3D_2$	$3p3d\ ^3F^o_2$	634 185	866 417	1	1.1 − 1	7.9+8	D	44°, 92*
429.13	1	2	633 381	866 417	4	4.2 − 1	3.0+9	D−	26, 44°, 92*
418.51	3	3	635 446	874 367	4	1.55 − 1	8.4+8	C	44°, 92*
416.35	2	3	634 185	874 367	5	7.0 − 1	3.8+9	C−	26, 44°, 92*
402.96	3	4	635 446	883 609	7	1.15	5.3+9	C	26, 44°, 92*
358.31	$3s3d\ ^1D_2$	$3p3d\ ^1F^o_3$	711 986	991 071	7	2.2	1.6+10	D−	44°, 92*
354.29	$3s3d\ ^3D_3$	$3p3d\ ^3P^o_2$	635 446	917 698	5				44
339.10	1	1	633 381	928 282	3				44
352.73	$3s3d\ ^3D_2$	$3p3d\ ^3D^o_1$	634 185	917 685	5				44
342.58	3	3	635 446	927 351	8	8.4 − 1	6.8+9	C−	26, 44°, 92*
339.60	2	2	634 185	928 654	6				44
349.67	$3s3p\ ^1P^o_1$	$3p^2\ ^1S_0$	328 042	614 024	7	3.3 − 1	1.8+10	C	26, 44°, 92*
349.44	$3s3p\ ^3P^o_2$	$3p^2\ ^1D_2$	234 905	521 074	6	1.4 − 1	1.6+9	E	44°, 92*
335.98	1	2	223 438	521 074	5	7.2 − 2	8.6+8	E	44°, 92*
343.84	$3s3d\ ^1D_2$	$3p3d\ ^1P^o_1$	711 986	1 002 823	4	6.0 − 1	1.1+10	D−	44°, 92*
343.43	$3s3p\ ^3P^o_2$	$3p^2\ ^3P_1$	234 905	526 089	7	3.5 − 1	6.7+9	C	17, 27, 44°, 92*
339.25	1	0	223 438	518 209	5	2.9 − 1	1.7+10	C−	17, 27, 44°, 92*
330.41	1	1	223 438	526 089	6	2.2 − 1	4.5+9	C	17, 27, 44°, 92*
327.85	2	2	234 905	539 919	8	9.0 − 1	1.1+10	D−	17, 27, 44°, 92*
325.22	0	1	218 604	526 089	7	3.0 − 1	6.3+9	C	17, 27, 44°, 92*
315.98	1	2	223 438	539 919	6	2.9 − 1	3.9+9	D−	17, 27, 44°, 92*
327.288	$3p3d\ ^1P^o_1$	$3d^2\ ^1D_2$	1 002 823	1 308 364					46
311.639	$3p3d\ ^1F^o_3$	$3d^2\ ^1G_4$	991 071	1 311 955	5				45, 46°
304.84	$3s^2\ ^1S_0$	$3s3p\ ^1P^o_1$	0	328 042	10	8.63 − 1	2.06+10	C+	17, 27, 31, 43, 44°, 92*
289.56	$3p^2\ ^1D_2$	$3p3d\ ^3F^o_2$	521 074	866 417	2				44
285.492	$3p3d\ ^3P^o_1$	$3d^2\ ^3F_2$	928 282	1 278 547	2				46
276.131	2	3	917 698	1 279 838	3				45, 46°
284.752	$3p3d\ ^3D^o_2$	$3d^2\ ^3F_3$	928 654	1 279 838	3				45, 46°
282.444	3	4	927 351	1 281 415	5				45, 46°
277.11	1	2	917 685	1 278 547	3				45
275.71	$3p^2\ ^1D_2$	$3p3d\ ^1D^o_2$	521 074	883 772	5				44
264.71	$3p^2\ ^3P_2$	$3p3d\ ^3P^o_2$	539 919	917 698	4				44
255.36	1	2	526 089	917 698	5				44
248.87	1	0	526 089	927 907	3				44
248.63	1	1	526 089	928 282	3				44
260.45	$3s3p\ ^1P^o_1$	$3s3d\ ^1D_2$	328 042	711 986	7	1.9	3.8+10	D−	26, 36, 44°, 47, 92*
258.10	$3p^2\ ^3P_2$	$3p3d\ ^3D^o_3$	539 919	927 351	6				44
257.24	2	2	539 919	928 654	7bl				44
250.33	0	1	518 209	917 685	3				44
248.41	1	2	526 089	928 654	3				44
257.24	$3p^2\ ^1S_0$	$3p3d\ ^1P^o_1$	614 024	1 002 823	7bl				44
251.361	$3p3d\ ^3F^o_4$	$3d^2\ ^3F_4$	883 609	1 281 415	6				45, 46°
246.633	3	3	874 367	1 279 838	3				45, 46°
242.646	2	2	866 417	1 278 547	1				46
250.45	$3s3p\ ^3P^o_2$	$3s3d\ ^3D_2$	234 905	634 185	3	2.4 − 1	5.1+9	C−	44°, 92*
249.66	2	3	234 905	635 446	7	1.34	2.05+10	C−	31, 44°, 92*
243.93	1	1	223 438	633 381	3	2.4 − 1	9.1+9	C−	31, 44°, 92*
243.46	1	2	223 438	634 185	6	7.2 − 1	1.6+10	C−	31, 44°, 92*
241.10	0	1	218 604	633 381	6	3.3 − 1	1.3+10	C−	31, 44°, 92*
246.14	$3p^2\ ^1D_2$	$3p3d\ ^3D^o_3$	521 074	927 351	3				44

Mn XIV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
235.520	$3p3d\ ^1D^o_2$	$3d^2\ ^1D_2$	883 772	1 308 364	4				46
221.65	$3p^2\ ^3P_2$	$3p3d\ ^1F^o_3$	539 919	991 071	2				44
212.77	$3p^2\ ^1D_2$	$3p3d\ ^1F^o_3$	521 074	991 071	4				44
84.09	$3s3d\ ^1D_2$	$3s4f\ ^1F^o_3$	711 986	1 901 300					24
83.78	$3p3d\ ^1F^o_3$	$3p4f\ ^1G_4$	991 071	2 184 700					24
81.05	$3p3d\ ^3D^o_3$	$3p4f\ ^3F_4$	927 351	2 161 200	bl				24
81.05	$_1$	$_2$	917 685	2 151 500	bl				24
80.46	$3p3d\ ^3D^o_3$	$3p4f\ ^3D_3$	927 351	2 170 200					24
80.27	$_2$	$_2$	928 654	2 174 400					24
80.06	$3p3d\ ^3P^o_0$	$3p4f\ ^3D_1$	927 907	2 177 200	bl				24
80.06	$_1$	$_1$	928 282	2 177 200	bl				24
79.826	$3s3d\ ^3D_3$	$3s4f\ ^3F^o_4$	635 446	1 888 200	3				42
79.761	$_2$	$_3$	634 185	1 887 900	2				42
79.720	$_1$	$_2$	633 381	1 887 800	1				42
79.10	$3p3d\ ^1D^o_2$	$3p4f\ ^3F_3$	883 772	2 148 000					24
78.54	$3p3d\ ^3F^o_3$	$3p4f\ ^3G_4$	874 367	2 147 600					24
78.42	$_2$	$_3$	866 417	2 141 600					24
78.35	$_4$	$_5$	883 609	2 159 900					24
75.94	$3p^2\ ^3P_2$	$3p4s\ ^3P^o_2$	539 919	1 856 700					47
74.961	$3s3p\ ^3P^o_2$	$3s4s\ ^3S_1$	234 905	1 568 900					42
74.327	$_1$	$_1$	223 438	1 568 900					42
74.063	$_0$	$_1$	218 604	1 568 900					42
72.45	$3p^2\ ^1D_2$	$3s4f\ ^1F^o_3$	521 074	1 901 300					36°, 47
67.02	$3s3p\ ^1P^o_1$	$3s4d\ ^1D_2$	328 042	1 820 100					24, 36°, 47
64.23	$3p^2\ ^3P_2$	$3p4d\ ^3D^o_3$	539 919	2 096 800					47
64.03	$_1$	$_2$	526 089	2 087 900					47
63.46	$3p^2\ ^1D_2$	$3p4d\ ^3F^o_3$	521 074	2 096 900					47
63.45	$3p^2\ ^1D_2$	$3p4d\ ^1F^o_3$	521 074	2 097 100					47
63.23	$3p^2\ ^3P_2$	$3p4d\ ^3P^o_2$	539 919	2 121 400					47
63.146	$3s3p\ ^3P^o_2$	$3s4d\ ^3D_2$	234 905	1 818 500					42
63.109	$_2$	$_3$	234 905	1 819 500					42
62.713	$_1$	$_1$	223 438	1 818 000					42
62.694	$_1$	$_2$	223 438	1 818 500					42
62.526	$_0$	$_1$	218 604	1 818 000					42
59.325	$3s^2\ ^1S_0$	$3s4p\ ^1P^o_1$	0	1 685 600		3.55 – 1	2.24+11	C	42°, 92*
58.19[T]	$3s3p\ ^3P^o_2$	$3p4p\ ^3P_1$	234 905	1 953 400					47
57.81	$_2$	$_2$	234 905	1 964 700					47
57.97[T]	$3s3p\ ^3P^o_2$	$3p4p\ ^3D_3$	234 905	1 959 900					47
57.71	$3s3p\ ^3P^o_2$	$3p4p\ ^3S_1$	234 905	1 967 700					47
57.224	$3s3d\ ^3D_3$	$3s5f\ ^3F^o_4$	635 446	2 383 000					42°, 47
50.03	$3s3p\ ^3P^o_2$	$3s5s\ ^3S_1$	234 905	2 233 700					47
49.63	$3s3d\ ^3D_3$	$3s6f\ ^3F^o_4$	635 446	2 650 400					47
49.42	$3s3p\ ^1P^o_1$	$3s5d\ ^1D_2$	328 042	2 351 500					47
47.93	$3s3p\ ^3P^o_2$	$3s5d\ ^3D_3$	234 905	2 321 300					47
47.67	$_1$	$_2$	223 438	2 321 200	bl				47
47.38	$_0$	$_1$	218 604	2 329 200					47
43.74	$3s^2\ ^1S_0$	$3s5p\ ^1P^o_1$	0	2 286 200		1.12 – 1	1.3+11	C	47°, 92*

Mn XIV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
43.00	$3s3p\ ^3P^o_2$	$3s6s\ ^3S_1$	234 905	2 560 500					47
41.72	$3s3p\ ^3P^o_2$	$3s6d\ ^3D_3$	234 905	2 631 800					47
41.51	1	2	223 438	2 632 500					47
38.54	$3s^2\ ^1S_0$	$3s6p\ ^1P^o_1$	0	2 594 700					47

Mn XV

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
971.8[C]	$2p^6 4s\ ^2S_{1/2}$	$2p^6 4p\ ^2P^{\circ}_{1/2}$	1 667 500	1 770 400		3.8 − 1	1.3+9	C	92*
912.4[C]	1/2	3/2	1 667 500	1 777 100		7.6 − 1	1.5+9	C	92*
771.0[C]	$2p^6 4p\ ^2P^{\circ}_{3/2}$	$2p^6 4d\ ^2D_{3/2}$	1 777 100	1 906 800		1.8 − 1	4.9+8	C	92*
765.1[C]	3/2	5/2	1 777 100	1 907 800		1.6	3.0+9	C	92*
733.1[C]	1/2	3/2	1 770 400	1 906 800		9.2 − 1	2.9+9	C	92*
384.743[S]	$2p^6 3s\ ^2S_{1/2}$	$2p^6 3p\ ^2P^{\circ}_{1/2}$	0	259 914		2.60 − 1	5.87+9	B	17, 43, 48, 49°, 92*
360.987[S]	1/2	3/2	0	277 018		5.62 − 1	7.19+9	B	17, 31, 49°, 92*
360.4[C]	$2p^6 5d\ ^2D_{3/2}$	$2p^6 6p\ ^2P^{\circ}_{1/2}$	2 491 100	2 768 600		4.8 − 1	1.3+10	C	92*
359.1[C]	5/2	3/2	2 491 700	2 770 200		9.00 − 1	1.16+10	C	92*
358.3[C]	3/2	3/2	2 491 100	2 770 200		1.0 − 1	1.3+9	D	92*
349.3[C]	$2p^6 5f\ ^2F^{\circ}_{5/2}$	$2p^6 6d\ ^2D_{3/2}$	2 519 000	2 805 300		2.7 − 1	3.7+9	C	92*
349.2[C]	7/2	5/2	2 519 300	2 805 700		3.8 − 1	3.5+9	C	92*
348.8[C]	5/2	5/2	2 519 000	2 805 700		1.9 − 2	1.7+8	D	92*
318.6[C]	$2p^6 5p\ ^2P^{\circ}_{3/2}$	$2p^6 6s\ ^2S_{1/2}$	2 428 100	2 742 000		6.4 − 1	2.0+10	C	92*
315.1[C]	1/2	1/2	2 424 600	2 742 000		3.2 − 1	1.1+10	C	92*
303.2[C]	$2p^6 5d\ ^2D_{5/2}$	$2p^6 6f\ ^2F^{\circ}_{5/2}$	2 491 700	2 821 500		1.8 − 1	2.2+9	D	92*
302.9[C]	5/2	7/2	2 491 700	2 821 800		3.7	3.4+10	C	92*
302.7[C]	3/2	5/2	2 491 100	2 821 500		2.6	3.2+10	C	92*
282.184[S]	$2p^6 3p\ ^2P^{\circ}_{3/2}$	$2p^6 3d\ ^2D_{3/2}$	277 018	631 398		1.17 − 1	2.46+9	B	17, 31, 49°, 92*
280.411[S]	3/2	5/2	277 018	633 637		1.07	1.51+10	B	17, 31, 49°, 92*
269.189[S]	1/2	3/2	259 914	631 398		6.20 − 1	1.43+10	B	17, 31, 49°, 92*
265.1[C]	$2p^6 5p\ ^2P^{\circ}_{3/2}$	$2p^6 6d\ ^2D_{3/2}$	2 428 100	2 805 300		9.6 − 2	2.3+9	D	92*
264.8[C]	3/2	5/2	2 428 100	2 805 700		8.4 − 1	1.3+10	C	92*
262.7[C]	1/2	3/2	2 424 600	2 805 300		4.78 − 1	1.15+10	C	92*
254.2[C]	$2p^6 5s\ ^2S_{1/2}$	$2p^6 6p\ ^2P^{\circ}_{1/2}$	2 375 200	2 768 600		1.6 − 1	8.5+9	C	92*
253.2[C]	1/2	3/2	2 375 200	2 770 200		3.30 − 1	8.6+9	C	92*
210.6[C]	$2p^6 5f\ ^2F^{\circ}_{7/2}$	$2p^6 7d\ ^2D_{5/2}$	2 519 300	2 994 200		6.8 − 2	1.7+9	D	92*
210.6[C]	5/2	3/2	2 519 000	2 993 900		4.7 − 2	1.8+9	D	92*
210.4[C]	5/2	5/2	2 519 000	2 994 200		3.5 − 3	8.7+7	E	92*
207.7[C]	$2p^6 5d\ ^2D_{5/2}$	$2p^6 7p\ ^2P^{\circ}_{3/2}$	2 491 700	2 973 100		1.55 − 1	6.0+9	C	92*
207.5[C]	3/2	1/2	2 491 100	2 973 100		8.8 − 2	6.7+9	C	92*
207.5[C]	3/2	3/2	2 491 100	2 973 100		1.8 − 2	6.8+8	D	92*
195.3[C]	$2p^6 5d\ ^2D_{5/2}$	$2p^6 7f\ ^2F^{\circ}_{5/2}$	2 491 700	3 003 800		5.0 − 2	1.5+9	D	92*
195.2[C]	5/2	7/2	2 491 700	3 004 100		1.0	2.2+10	C	92*
195.0[C]	3/2	5/2	2 491 100	3 003 800		6.96 − 1	2.04+10	C	92*
193.1[C]	$2p^6 4d\ ^2D_{3/2}$	$2p^6 5p\ ^2P^{\circ}_{1/2}$	1 906 800	2 424 600		3.2 − 1	2.8+10	C	92*
192.2[C]	5/2	3/2	1 907 800	2 428 100		5.5 − 1	2.5+10	C	92*
191.8[C]	3/2	3/2	1 906 800	2 428 100		6.0 − 2	2.8+9	D	92*
191[C]	$2p^6 5p\ ^2P^{\circ}_{3/2}$	$2p^6 7s\ ^2S_{1/2}$	2 428 100	2 953 000		1.2 − 1	1.1+10	C	92*
189[C]	1/2	1/2	2 424 600	2 953 000		6.16 − 2	5.7+9	C	92*
188.9[C]	$2p^6 4f\ ^2F^{\circ}_{5/2}$	$2p^6 5d\ ^2D_{3/2}$	1 961 600	2 491 100		1.1 − 1	5.1+9	C	92*
188.8[C]	7/2	5/2	1 962 000	2 491 700		1.6 − 1	4.9+9	C	92*
188.6[C]	5/2	5/2	1 961 600	2 491 700		7.8 − 3	2.5+8	D	92*
178.69	$2p^6 4f\ ^2F^{\circ}_{7/2}$	$2p^6 5g\ ^2G_{9/2}$	1 962 000	2 521 630	bl				52
178.61	5/2	7/2	1 961 600	2 521 480	bl				52
176.7[C]	$2p^6 5p\ ^2P^{\circ}_{3/2}$	$2p^6 7d\ ^2D_{3/2}$	2 428 100	2 993 900		3.3 − 2	1.7+9	D	92*
176.6[C]	3/2	5/2	2 428 100	2 994 200		2.9 − 1	1.0+10	C	92*
175.7[C]	1/2	3/2	2 424 600	2 993 900		1.7 − 1	9.1+9	C	92*
167.2[C]	$2p^6 4p\ ^2P^{\circ}_{3/2}$	$2p^6 5s\ ^2S_{1/2}$	1 777 100	2 375 200		4.40 − 1	5.20+10	C	92*
165.3[C]	1/2	1/2	1 770 400	2 375 200		2.22 − 1	2.71+10	C	92*

Mn XV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
163.7C	$2p^65d\ ^2D_{5/2}$	$2p^68p\ ^2P^o_{3/2}$	2 491 700	3 102 700		5.8 – 2	3.6+9	D	92*
163.5C	3/2	1/2	2 491 100	3 102 700		3.2 – 2	3.9+9	D	92*
163.5C	3/2	3/2	2 491 100	3 102 700		6.4 – 3	4.1+8	E	92*
163.63	$2p^64d\ ^2D_{5/2}$	$2p^65f\ ^2F^o_{7/2}$	1 907 800	2 519 300	bl	4.1	1.3+11	C	52°, 92*
163.6C	5/2	5/2	1 907 800	2 519 000		2.0 – 1	8.5+9	D	92*
163.41	3/2	5/2	1 906 800	2 519 000		3.0	1.2+11	C	52°, 92*
158.38C	$2p^63s\ ^2S_{1/2}$	$2p^63d\ ^2D_{3/2}$	0	631 398		E2	6.1+5	C	92*
157.82C	1/2	5/2	0	633 637		E2	6.2+5	C	92*
146C	$2p^65p\ ^2P^o_{3/2}$	$2p^68d\ ^2D_{3/2}$	2 428 100	3 114 000		1.6 – 2	1.3+9	D	92*
145C	3/2	5/2	2 428 100	3 115 600		1.5 – 1	7.7+9	C	92*
145C	1/2	3/2	2 424 600	3 114 000		8.24 – 2	6.5+9	C	92*
140.1C	$2p^64p\ ^2P^o_{3/2}$	$2p^65d\ ^2D_{3/2}$	1 777 100	2 491 100		1.0 – 1	8.7+9	D	92*
139.9C	3/2	5/2	1 777 100	2 491 700		9.2 – 1	5.2+10	C	92*
138.8C	1/2	3/2	1 770 400	2 491 100		5.0 – 1	4.4+10	C	92*
132.1C	$2p^64s\ ^2S_{1/2}$	$2p^65p\ ^2P^o_{1/2}$	1 667 500	2 424 600		1.5 – 1	2.9+10	C	92*
131.5C	1/2	3/2	1 667 500	2 428 100		3.08 – 1	2.96+10	C	92*
116.0C	$2p^64d\ ^2D_{5/2}$	$2p^66p\ ^2P^o_{3/2}$	1 907 800	2 770 200		9.6 – 2	1.2+10	C	92*
116.0C	3/2	1/2	1 906 800	2 768 600		5.2 – 2	1.3+10	C	92*
115.8C	3/2	3/2	1 906 800	2 770 200		1.0 – 2	1.3+9	D	92*
109.4C	$2p^64d\ ^2D_{5/2}$	$2p^66f\ ^2F^o_{7/2}$	1 907 800	2 821 800		1.0	7.2+10	C	92*
109.4C	5/2	5/2	1 907 800	2 821 500		5.0 – 2	4.6+9	D	92*
109.3C	3/2	5/2	1 906 800	2 821 500		7.2 – 1	6.7+10	C	92*
103.6C	$2p^64p\ ^2P^o_{3/2}$	$2p^66s\ ^2S_{1/2}$	1 777 100	2 742 000		8.64 – 2	2.68+10	C	92*
102.9C	1/2	1/2	1 770 400	2 742 000		4.34 – 2	1.37+10	C	92*
97.257C	$2p^64p\ ^2P^o_{3/2}$	$2p^66d\ ^2D_{3/2}$	1 777 100	2 805 300		3.4 – 2	6.1+9	D	92*
97.220C	3/2	5/2	1 777 100	2 805 700		3.1 – 1	3.7+10	C	92*
96.628C	1/2	3/2	1 770 400	2 805 300		1.8 – 1	3.2+10	C	92*
96.880C	$2p^64f\ ^2F^o_{7/2}$	$2p^67d\ ^2D_{5/2}$	1 962 000	2 994 200		9.6 – 3	1.2+9	D	92*
96.871C	5/2	3/2	1 961 600	2 993 900		6.6 – 3	1.2+9	D	92*
96.843C	5/2	5/2	1 961 600	2 994 200		4.7 – 4	5.6+7	E	92*
93.870C	$2p^64d\ ^2D_{5/2}$	$2p^67p\ ^2P^o_{3/2}$	1 907 800	2 973 100		3.5 – 2	6.7+9	D	92*
93.782C	3/2	1/2	1 906 800	2 973 100		2.0 – 2	7.4+9	D	92*
93.782C	3/2	3/2	1 906 800	2 973 100		3.9 – 3	7.4+8	E	92*
91.241C	$2p^64d\ ^2D_{5/2}$	$2p^67f\ ^2F^o_{5/2}$	1 907 800	3 003 800		2.1 – 2	2.8+9	D	92*
91.216C	5/2	7/2	1 907 800	3 004 100		4.3 – 1	4.3+10	C	92*
91.158C	3/2	5/2	1 906 800	3 003 800		2.9 – 1	3.9+10	C	92*
90.818C	$2p^64s\ ^2S_{1/2}$	$2p^66p\ ^2P^o_{1/2}$	1 667 500	2 768 600		5.0 – 2	2.0+10	C	92*
90.686C	1/2	3/2	1 667 500	2 770 200		9.8 – 2	2.0+10	C	92*
87.80	$2p^63d\ ^2D_{3/2}$	$2p^64p\ ^2P^o_{1/2}$	631 398	1 770 400		1.38 – 1	6.0+10	C	24°, 92*
87.47	5/2	3/2	633 637	1 777 100		2.5 – 1	5.4+10	C	24°, 92*
87.283C	3/2	3/2	631 398	1 777 100		2.8 – 2	6.1+9	D	92*
86.78C	$2p^64f\ ^2F^o_{5/2}$	$2p^68d\ ^2D_{3/2}$	1 961 600	3 114 000		3.1 – 3	6.8+8	E	92*
86.69C	7/2	5/2	1 962 000	3 115 600		4.6 – 3	6.7+8	E	92*
86.66C	5/2	5/2	1 961 600	3 115 600		2.2 – 4	3.3+7	E	92*
85.04C	$2p^64p\ ^2P^o_{3/2}$	$2p^67s\ ^2S_{1/2}$	1 777 100	2 953 000		3.3 – 2	1.5+10	D	92*
84.56C	1/2	1/2	1 770 400	2 953 000		1.7 – 2	7.9+9	D	92*
83.689C	$2p^64d\ ^2D_{5/2}$	$2p^68p\ ^2P^o_{3/2}$	1 907 800	3 102 700		1.7 – 2	4.1+9	D	92*
83.619C	3/2	1/2	1 906 800	3 102 700		1.0 – 2	4.7+9	D	92*
83.619C	3/2	3/2	1 906 800	3 102 700		1.9 – 3	4.6+8	E	92*
82.183C	$2p^64p\ ^2P^o_{3/2}$	$2p^67d\ ^2D_{3/2}$	1 777 100	2 993 900		1.7 – 2	4.1+9	D	92*
82.163C	3/2	5/2	1 777 100	2 994 200		1.5 – 1	2.5+10	C	92*
81.733C	1/2	3/2	1 770 400	2 993 900		8.6 – 2	2.1+10	C	92*

Mn XV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
75.303^{C}	$2p^6 3d\ ^2D_{5/2}$	$2p^6 4f\ ^2F^o_{5/2}$	633 637	1 961 600		2.6 – 1	5.2+10	D	92*
75.280^{S}	5/2	7/2	633 637	1 962 000		5.2	7.7+11	C	49°, 50, 92*
75.174^{S}	3/2	5/2	631 398	1 961 600		3.7	7.3+11	C	49°, 50, 92*
74.80^{C}	$2p^6 4p\ ^2P^o_{3/2}$	$2p^6 8d\ ^2D_{3/2}$	1 777 100	3 114 000		9.2 – 3	2.8+9	D	92*
74.71^{C}	3/2	5/2	1 777 100	3 115 600		8.56 – 2	1.71+10	C	92*
74.43^{C}	1/2	3/2	1 770 400	3 114 000		4.78 – 2	1.44+10	C	92*
71.927	$2p^6 3p\ ^2P^o_{3/2}$	$2p^6 4s\ ^2S_{1/2}$	277 018	1 667 500					50°, 51$^{\triangle}$
71.038	1/2	1/2	259 914	1 667 500					50°, 51$^{\triangle}$
61.361	$2p^6 3p\ ^2P^o_{3/2}$	$2p^6 4d\ ^2D_{3/2}$	277 018	1 906 800		1.2 – 1	5.3+10	D	50°, 51$^{\triangle}$, 92*
61.319	3/2	5/2	277 018	1 907 800		1.06	3.13+11	C	50°, 51$^{\triangle}$, 92*
60.720	1/2	3/2	259 914	1 906 800		5.96 – 1	2.69+11	C	50°, 51$^{\triangle}$, 92*
56.484	$2p^6 3s\ ^2S_{1/2}$	$2p^6 4p\ ^2P^o_{1/2}$	0	1 770 400		1.44 – 1	1.51+11	C+	47, 50°, 51$^{\triangle}$, 92*
56.270	1/2	3/2	0	1 777 100		2.70 – 1	1.42+11	C+	47, 50°, 51$^{\triangle}$, 92*
55.766^{C}	$2p^6 3d\ ^2D_{3/2}$	$2p^6 5p\ ^2P^o_{1/2}$	631 398	2 424 600		2.2 – 2	2.3+10	D	92*
55.72	5/2	3/2	633 637	2 428 100		3.9 – 2	2.1+10	D	36°, 47, 51$^{\triangle}$, 92*
55.658^{C}	3/2	3/2	631 398	2 428 100		4.4 – 3	2.3+9	E	92*
53.040^{C}	$2p^6 3d\ ^2D_{5/2}$	$2p^6 5f\ ^2F^o_{5/2}$	633 637	2 519 000		4.9 – 2	1.9+10	D	92*
53.032	5/2	7/2	633 637	2 519 300		9.72 – 1	2.89+11	C	47, 50°, 51$^{\triangle}$, 92*
52.977	3/2	5/2	631 398	2 519 000		6.84 – 1	2.7+11	C	50°, 51$^{\triangle}$, 92*
47.666	$2p^6 3p\ ^2P^o_{3/2}$	$2p^6 5s\ ^2S_{1/2}$	277 018	2 375 200		5.2 – 2	7.4+10	C	47, 51°, 92*
47.270	1/2	1/2	259 914	2 375 200		2.52 – 2	3.77+10	C	47, 51°, 92*
46.804^{C}	$2p^6 3d\ ^2D_{5/2}$	$2p^6 6p\ ^2P^o_{3/2}$	633 637	2 770 200		1.4 – 2	1.1+10	D	92*
46.790^{C}	3/2	1/2	631 398	2 768 600		7.6 – 3	1.2+10	D	92*
46.755^{C}	3/2	3/2	631 398	2 770 200		1.6 – 3	1.2+9	E	92*
45.707^{C}	$2p^6 3d\ ^2D_{5/2}$	$2p^6 6f\ ^2F^o_{5/2}$	633 637	2 821 500		1.8 – 2	9.5+9	D	92*
45.700	5/2	7/2	633 637	2 821 800		3.6 – 1	1.4+11	C	47, 51°, 92*
45.659	3/2	5/2	631 398	2 821 500		2.5 – 1	1.3+11	C	47, 51°, 92*
45.165^{C}	$2p^6 3p\ ^2P^o_{3/2}$	$2p^6 5d\ ^2D_{3/2}$	277 018	2 491 100		3.8 – 2	3.1+10	D	92*
45.154	3/2	5/2	277 018	2 491 700		3.4 – 1	1.9+11	C	47, 50, 51°, 92*
44.820	1/2	3/2	259 914	2 491 100		1.9 – 1	1.6+11	C	47, 51°, 92*
42.745^{C}	$2p^6 3d\ ^2D_{5/2}$	$2p^6 7p\ ^2P^o_{3/2}$	633 637	2 973 100		7.2 – 3	6.5+9	D	92*
42.704^{C}	3/2	1/2	631 398	2 973 100		4.0 – 3	7.4+9	D	92*
42.704^{C}	3/2	3/2	631 398	2 973 100		8.0 – 4	7.2+8	E	92*
42.191^{C}	$2p^6 3d\ ^2D_{5/2}$	$2p^6 7f\ ^2F^o_{5/2}$	633 637	3 003 800		8.4 – 3	5.4+9	D	92*
42.185	5/2	7/2	633 637	3 004 100		1.77 – 1	8.3+10	C	47, 51°, 92*
42.152	3/2	5/2	631 398	3 003 800		1.24 – 1	7.8+10	C	51°, 92*
41.243	$2p^6 3s\ ^2S_{1/2}$	$2p^6 5p\ ^2P^o_{1/2}$	0	2 424 600		4.4 – 2	8.7+10	C	47, 51°, 92*
41.185	1/2	3/2	0	2 428 100		8.8 – 2	8.7+10	C	47, 51°, 92*
40.572	$2p^6 3p\ ^2P^o_{3/2}$	$2p^6 6s\ ^2S_{1/2}$	277 018	2 742 000		2.0 – 2	3.9+10	D	47, 51°, 92*
40.285	1/2	1/2	259 914	2 742 000		9.8 – 3	2.0+10	D	47, 51°, 92*
40.501^{C}	$2p^6 3d\ ^2D_{5/2}$	$2p^6 8p\ ^2P^o_{3/2}$	633 637	3 102 700		4.0 – 3	4.0+9	E	92*
40.465^{C}	3/2	1/2	631 398	3 102 700		2.2 – 3	4.6+9	E	92*
40.465^{C}	3/2	3/2	631 398	3 102 700		4.4 – 4	4.5+8	E	92*
40.151	$2p^6 3d\ ^2D_{5/2}$	$2p^6 8f\ ^2F^o_{7/2}$	633 637	3 124 200					47, 51°
39.553^{C}	$2p^6 3p\ ^2P^o_{3/2}$	$2p^6 6d\ ^2D_{3/2}$	277 018	2 805 300		1.8 – 2	1.9+10	D	92*
39.547	3/2	5/2	277 018	2 805 700		1.56 – 1	1.11+11	C	47, 51°, 92*
39.287	1/2	3/2	259 914	2 805 300		8.74 – 2	9.4+10	C	47, 51°, 92*
38.89	$2p^6 3d\ ^2D_{5/2}$	$2p^6 9f\ ^2F^o_{7/2}$	633 637	3 205 000	bl				47
38.02	$2p^6 3d\ ^2D_{5/2}$	$2p^6 10f\ ^2F^o_{7/2}$	633 637	3 264 000					47
37.42	$2p^6 3d\ ^2D_{5/2}$	$2p^6 11f\ ^2F^o_{7/2}$	633 637	3 306 000	bl				47

Mn XV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
37.4	$2p^63p\ ^2P^o_{3/2}$	$2p^67s\ ^2S_{1/2}$	277 018	2 953 000	bl	9.6 − 3	2.3+10	D	47°, 92*
37.12	$_{1/2}$	$_{1/2}$	259 914	2 953 000		5.0 − 3	1.2+10	D	47°, 92*
36.807[C]	$2p^63p\ ^2P^o_{3/2}$	$2p^67d\ ^2D_{3/2}$	277 018	2 993 900		1.0 − 2	1.2+10	D	92*
36.803	$_{3/2}$	$_{5/2}$	277 018	2 994 200		8.60 − 2	7.0+10	C	47, 51°, 92*
36.577	$_{1/2}$	$_{3/2}$	259 914	2 993 900		4.8 − 2	6.0+10	C	47, 51°, 92*
36.119	$2p^63s\ ^2S_{1/2}$	$2p^66p\ ^2P^o_{1/2}$	0	2 768 600	bl	2.0 − 2	5.2+10	C	51°, 92*
36.099	$_{1/2}$	$_{3/2}$	0	2 770 200		4.0 − 2	5.2+10	C	47, 51°, 92*
35.25[C]	$2p^63p\ ^2P^o_{3/2}$	$2p^68d\ ^2D_{3/2}$	277 018	3 114 000		6.0 − 3	7.9+9	D	92*
35.229	$_{3/2}$	$_{5/2}$	277 018	3 115 600		5.2 − 2	4.7+10	C	47, 51°, 92*
35.04	$_{1/2}$	$_{3/2}$	259 914	3 114 000		2.94 − 2	4.0+10	C	47°, 92*
34.22	$2p^63p\ ^2P^o_{3/2}$	$2p^69d\ ^2D_{5/2}$	277 018	3 199 000					47
34.02	$_{1/2}$	$_{3/2}$	259 914	3 199 000					47
33.635	$2p^63s\ ^2S_{1/2}$	$2p^67p\ ^2P^o_{1/2}$	0	2 973 100					51
33.635	$_{1/2}$	$_{3/2}$	0	2 973 100					47, 51°
33.55	$2p^63p\ ^2P^o_{3/2}$	$2p^610d\ ^2D_{5/2}$	277 018	3 258 000					47
32.230	$2p^63s\ ^2S_{1/2}$	$2p^68p\ ^2P^o_{1/2}$	0	3 102 700					51
32.230	$_{1/2}$	$_{3/2}$	0	3 102 700					47, 51°
31.37	$2p^63s\ ^2S_{1/2}$	$2p^69p\ ^2P^o_{3/2}$	0	3 188 000					47
30.81	$2p^63s\ ^2S_{1/2}$	$2p^610p\ ^2P^o_{3/2}$	0	3 246 000					47

Mn XVI

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
697.088[C]	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_0$	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	5 351 520	5 494 974		3.3 − 3	1.5+7	E	92*
438.577	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_2$	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	5 266 964	5 494 974	2	2.5 − 1	2.9+9	D	58°, 92*
413.382	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_2$	5 281 200	5 523 101	3				58
376.202	2	3	5 266 964	5 532 778	4	7.5 − 1	5.1+9	D	58°, 92*
396.402	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_0$	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{3}{2}]_1$	5 351 520	5 603 789	4bl				58
373.525	1	2	5 360 800	5 628 520	2				58
377.414	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{1}{2}]_1$	5 360 800	5 626 306	2				58
363.918	0	1	5 351 520	5 626 306	1				58
365.169	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_2$	5 281 200	5 555 050	2				58
347.12	2	2	5 266 964	5 555 050	1				58
302.509[C]	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_3$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_2$	5 532 778	5 863 347		2.7 − 2	3.9+8	E	92*
301.513	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_3$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{7}{2}]^o_4$	5 532 778	5 864 439	5bl	1.0	8.5+9	D	58°, 92*
288.003	2	3	5 523 101	5 870 337	2				58
298.648	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{3}{2}]^o_2$	5 626 306	5 961 148	1				58
297.698	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{5}{2}]^o_3$	5 555 050	5 890 952	3bl				58
293.270	1	2	5 542 158	5 883 137	3bl				58
297.698	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{5}{2}]^o_3$	5 628 520	5 964 431	3bl				58
286.998[C]	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{1}{2}]^o_0$	5 494 974	5 843 409		1.1 − 1	8.9+9	D	92*
281.472[C]	1	1	5 494 974	5 850 249		2.7 − 1	7.4+9	D	92*
271.464[C]	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_2$	5 494 974	5 863 347		2.5 − 1	4.5+9	E	92*
69.124	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{3}{2}]^o_1$	$2s^22p^5(^2P^o_{1/2})4f\ ^2[\frac{5}{2}]_2$	6 018 300	7 465 000	5				57
66.503	2	3	5 961 148	7 464 838	30				57°, 60
68.662	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_1$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{5}{2}]_2$	5 923 500	7 379 900	7				57
65.927	2	3	5 863 347	7 380 185	30bl				57°, 60
67.314	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{5}{2}]^o_3$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{9}{2}]_4$	5 890 952	7 376 520	2				57
67.149	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{5}{2}]^o_3$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{5}{2}]_3$	5 890 952	7 380 185	3				57
67.099	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{5}{2}]^o_3$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_4$	5 890 952	7 381 282	60				57°, 60
66.773	2	3	5 883 137	7 380 720	50				57°, 60
66.706	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{5}{2}]^o_3$	$2s^22p^5(^2P^o_{1/2})4f\ ^2[\frac{7}{2}]_4$	5 964 431	7 463 551	60				57°, 60
66.393	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{7}{2}]^o_3$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{9}{2}]_4$	5 870 337	7 376 520	40				57°, 60
66.129	4	5	5 864 439	7 376 639	50				57°, 60
66.209	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{7}{2}]^o_3$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_3$	5 870 337	7 380 720	3				57
65.927	4	4	5 864 439	7 381 282	30bl				57°, 60
66.036	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_2$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{3}{2}]_2$	5 863 347	7 377 669	4				57°, 60
65.508	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{1}{2}]^o_1$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{3}{2}]_1$	5 850 249	7 376 779	4				57
65.470	1	2	5 850 249	7 377 669	8				57
65.216	0	1	5 843 409	7 376 779	6				57
65.153	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{3/2})4s\ (\frac{3}{2},\frac{1}{2})^o_2$	5 555 050	7 089 864	2				57
64.224	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_3$	$2s^22p^5(^2P^o_{3/2})4s\ (\frac{3}{2},\frac{1}{2})^o_2$	5 532 778	7 089 864	5				57
56.700	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_2$	5 555 050	7 318 722	2				57
55.472	1	1	5 542 158	7 344 868	1				57
56.432	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_3$	5 555 050	7 327 149	5				57
56.110	1	2	5 542 158	7 324 359	3				57°, 59
56.207	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_2$	5 626 306	7 405 446	5bl				57°, 59

Mn XVI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	A (s^{-1})	Acc.	References
56.207	$2s^22p^5(^2P^o_{1/2})3p\ ^2[\frac{3}{2}]_2$	$2s^22p^5(^2P^o_{1/2})4d\ ^2[\frac{5}{2}]^o_3$	5 628 520	7 407 660	5bl				57°, 59
55.560	1	2	5 603 789	7 403 649	5				57°, 59, 60
56.032	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_3$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{7}{2}]^o_4$	5 532 778	7 317 468	15				57°, 59
55.962	3	3	5 532 778	7 319 729	1				57
55.659	2	3	5 523 101	7 319 729	10				57°, 60
55.728	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{5}{2}]_3$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{5}{2}]^o_3$	5 532 778	7 327 149	2				57
55.517	2	2	5 523 101	7 324 359	1				57°, 60
55.09	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{1}{2}]^o_0$	5 494 974	7 310 174	1				57
54.988	1	1	5 494 974	7 313 554	1				57
54.832	$2s^22p^5(^2P^o_{3/2})3p\ ^2[\frac{1}{2}]_1$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_2$	5 494 974	7 318 722	2				57
52.344	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})4p\ ^2[\frac{5}{2}]_2$	5 281 200	7 191 600	1				57
51.847	2	3	5 266 964	7 195 714	3				57
52.147	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_2$	$2s^22p^5(^2P^o_{3/2})4p\ ^2[\frac{1}{2}]_1$	5 266 964	7 184 624	2bl				57
52.147	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})4p\ ^2[\frac{3}{2}]_1$	5 281 200	7 198 860	2bl				57
51.999	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{1/2})4p\ ^2[\frac{3}{2}]_2$	5 360 800	7 283 910	2				57
18.935	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	5 281 200		1.2 – 1	7.3+11	C–	54°, 92*
18.654	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	5 360 800		1.1 – 1	7.2+11	C–	54°, 92*
17.095	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{1}{2}]^o_1$	0	5 850 249		1.1 – 2	8.3+10	E	54°, 92*
16.882	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})3d\ ^2[\frac{3}{2}]^o_1$	0	5 923 500		5.3 – 1	4.1+12	D	54°, 92*
16.616	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})3d\ ^2[\frac{3}{2}]^o_1$	0	6 018 300		2.48	2.00+13	C–	54°, 92*
15.312	$2s^22p^6\ ^1S_0$	$2s2p^63p\ ^3P^o_1$	0	6 530 800					54
15.238	$2s^22p^6\ ^1S_0$	$2s2p^63p\ ^1P^o_1$	0	6 562 500					54
14.098	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})4s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	7 092 000	3				55
13.61	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})4d\ ^2[\frac{3}{2}]^o_1$	0	7 344 868					54
13.46	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})4d\ ^2[\frac{3}{2}]^o_1$	0	7 429 000					54
12.510	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})5d\ ^2[\frac{3}{2}]^o_1$	0	7 994 000	5				55
12.373	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})5d\ ^2[\frac{3}{2}]^o_1$	0	8 084 000	2				55
11.971	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})6d\ ^2[\frac{3}{2}]^o_1$	0	8 354 000	1				55
11.853	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})6d\ ^2[\frac{3}{2}]^o_1$	0	8 439 000	2				55

Mn XVII

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1170^{C}	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^5\ ^2P^o_{1/2}$	0	85 500		M1	1.12+4	C+	92*
109.35	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^6\ ^2S_{1/2}$	85 500	1 000 000	10	1.12 − 1	3.14+10	C+	52°, 61, 62, 63, 92*
100.00	3/2	1/2	0	1 000 000	10	2.49 − 1	8.31+10	C+	52°, 61, 62, 63, 92*
17.987	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3s\ ^4P_{3/2}$	85 500	5 644 800					64
17.794	3/2	5/2	0	5 619 900	3	1.8 − 2	6.3+10	E	64°, 92*
17.716	3/2	3/2	0	5 644 800	5				31, 64°, 94
17.807	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3s\ ^2P_{3/2}$	85 500	5 701 100					64
17.729	1/2	1/2	85 500	5 725 800	2	1.2 − 1	1.3+12	D	64°, 92*
17.541	3/2	3/2	0	5 701 100	5				31, 64°
17.465	3/2	1/2	0	5 725 800	3	1.1 − 1	1.2+12	D	64°, 92*
17.550	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3s\ ^2D_{3/2}$	85 500	5 783 500	5	2.0 − 1	1.1+12	D	64°, 92*
17.301	3/2	5/2	0	5 780 000	5	2.5 − 1	9.4+11	D	31, 64°, 92*, 94
17.131	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1S)3s\ ^2S_{1/2}$	85 500	5 922 900	2	7.4 − 2	8.4+11	D	64°, 92*
16.880	3/2	1/2	0	5 922 900	20bl	2.3 − 2	2.7+11	E	64°, 92*
16.278	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3d\ ^4P_{3/2}$	85 500	6 228 900	2				64
16.090	3/2	1/2	0	6 215 000	5				64
16.054	3/2	3/2	0	6 228 900	5				64
15.987	3/2	5/2	0	6 255 100	1				64
16.041	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^4F_{5/2}$	0	6 234 000	6				64
15.958	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^2D_{3/2}$	0	6 266 400	1				64
15.871	3/2	5/2	0	6 300 800	7				31, 55, 64°, 94
15.946	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2S_{1/2}$	85 500	6 356 600	1	1.8 − 1	2.3+12	D	64°, 92*
15.732	3/2	1/2	0	6 356 600	5	9.6 − 1	1.3+13	D	64°, 92*
15.926	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^2F_{5/2}$	0	6 279 000	2				64
15.889	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2P_{3/2}$	85 500	6 379 200	2	3.8 − 1	2.5+12	E	64°, 92*
15.676^{C}	3/2	3/2	0	6 379 200		2.4	1.6+13	E	92*
15.826	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2D_{3/2}$	85 500	6 404 200	6	1.9	1.3+13	E	64°, 92*
15.670	3/2	5/2	0	6 381 600	10				31, 64°, 94
15.615	3/2	3/2	0	6 404 200	3	4.8 − 1	3.3+12	E	64°, 92*
15.570	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1S)3d\ ^2D_{3/2}$	85 500	6 508 100	5	1.7	1.1+13	D	55, 64°, 92*, 94
15.404	3/2	5/2	0	6 491 800	4	2.5 − 1	1.2+12	D	55, 64°, 92*, 94
15.365^{C}	3/2	3/2	0	6 508 100		1.4 − 2	9.9+10	E	92*

Mn XVIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2720^{C}	$2s2p^5\ ^3P^o_1$	$2s2p^5\ ^3P^o_0$	919 450	956 200		M1	2.61+3	C	92*
1895^{C}	2	1	866 690	919 450		M1	3.22+3	C	92*
1359^{C}	$2s^22p^4\ ^3P_2$	$2s^22p^4\ ^3P_1$	0	73 590		M1	8.17+3	C+	92*
1298^{C}	$2s^22p^4\ ^3P_1$	$2s^22p^4\ ^1D_2$	73 590	150 610		M1	5.4+2	D	92*
663.97^{C}	2	2	0	150 610		M1	1.1+4	D	92*
457.81^{C}	$2s^22p^4\ ^3P_1$	$2s^22p^4\ ^1S_0$	73 590	292 020		M1	9.8+4	E	92*
428.14^{C}	$2s2p^5\ ^3P^o_0$	$2s2p^5\ ^1P^o_1$	956 200	1 189 770		M1	5.2+3	D−	92*
369.93^{C}	1	1	919 450	1 189 770		M1	5.9+3	D−	92*
309.52^{C}	2	1	866 690	1 189 770		M1	1.7+4	D−	92*
159.38^{C}	$2s^22p^4\ ^1S_0$	$2s2p^5\ ^3P^o_1$	292 020	919 450		7.4 − 3	6.5+8	E	92*
139.65	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^3P^o_2$	150 610	866 690	3	2.7 − 2	1.8+9	E	52°, 92*
126.09	$2s^22p^4\ ^3P_1$	$2s2p^5\ ^3P^o_2$	73 590	866 690	8	1.17 − 1	9.8+9	C	52°, 62, 63, 92*
118.22	1	1	73 590	919 450	6	7.38 − 2	1.17+10	C	52°, 62, 63, 92*
117.25	0	1	66 560	919 450	7	9.1 − 2	1.5+10	C	52°, 62, 63, 92*
115.38	2	2	0	866 690	11	3.5 − 1	3.6+10	C	52°, 61, 62, 63, 92*
113.30	1	0	73 590	956 200	8	1.06 − 1	5.50+10	C	52°, 62, 63, 92*
108.76	2	1	0	919 450	8	1.47 − 1	2.77+10	C	52°, 61, 62, 63, 92*
122.29	$2s2p^5\ ^1P^o_1$	$2p^6\ ^1S_0$	1 189 770	2 007 500	7	3.36 − 1	1.5+11	C	52°, 67, 92*
111.39	$2s^22p^4\ ^1S_0$	$2s2p^5\ ^1P^o_1$	292 020	1 189 770	5	5.6 − 2	1.0+10	C	52°, 62, 92*
96.23	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^1P^o_1$	150 610	1 189 770	10bl	5.85 − 1	1.4+11	C	52°, 61, 62, 63, 92*
91.90	$2s2p^5\ ^3P^o_1$	$2p^6\ ^1S_0$	919 450	2 007 500	2	1.0 − 2	8.3+9	E	52°, 92*
89.59	$2s^22p^4\ ^3P_1$	$2s2p^5\ ^1P^o_1$	73 590	1 189 770	1	2.5 − 3	6.9+8	E	52°, 92*
89.03	0	1	66 560	1 189 770	1	4.4 − 3	1.2+9	E	52°, 92*
84.05	2	1	0	1 189 770	6	3.4 − 2	1.1+10	E	52°, 92*
16.724	$2s^22p^4\ ^3P_1$	$2s^22p^3(^4S^o)3s\ ^3S^o_1$	73 590	6 052 900	1	7.8 − 2	6.2+11	C−	68°, 92*
16.705^{C}	0	1	66 560	6 052 900		5.2 − 2	4.1+11	C−	92*
16.521	2	1	0	6 052 900	4	2.6 − 1	1.7+12	C−	68°, 92*
16.663^{C}	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3s\ ^3D^o_2$	150 610	6 152 100		2.2 − 2	1.1+11	E	92*
16.589^{C}	2	3	150 610	6 178 600		2.2 − 2	7.6+10	E	92*
16.577	$2s^22p^4\ ^1S_0$	$2s^22p^3(^2P^o)3s\ ^1P^o_1$	292 020	6 324 500	3	1.4 − 1	1.1+12	D	68°, 92*
16.540	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3s\ ^1D^o_2$	150 610	6 196 600	5	3.9 − 1	1.9+12	D	68°, 92*
16.451	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2D^o)3s\ ^3D^o_2$	73 590	6 152 100	4	4.5 − 2	2.2+11	D	68°, 92*
16.444^{C}	1	1	73 590	6 154 800		1.1 − 1	9.4+11	D	92*
16.425	0	1	66 560	6 154 800	3	2.2 − 2	1.8+11	D	68°, 92*
16.255	2	2	0	6 152 100	5	1.6 − 1	8.1+11	D	68°, 92*
16.185	2	3	0	6 178 600	6bl	2.6 − 1	9.5+11	C	68°, 92*
16.332^{C}	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2D^o)3s\ ^1D^o_2$	73 590	6 196 600		4.5 − 2	2.3+11	E	92*
16.138^{C}	2	2	0	6 196 600		2.3 − 2	1.2+11	E	92*
16.197^{C}	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3s\ ^1P^o_1$	150 610	6 324 500		1.1 − 1	9.7+11	D	92*
15.403^{T}	$2s^22p^4\ ^3P_1$	$2s^22p^3(^4S^o)3d\ ^3D^o_2$	73 590	6 565 800?	2				55, 69°
15.238^{T}	2	3	0	6 562 500?	2	1.3	5.6+12	D	55, 69°, 92*
14.877^{T}	$2s^22p^4\ ^3P_2$	$2s^22p^3(^2D^o)3d\ ^3D^o_3$	0	6 721 800?	7	3.8	1.6+13	D	55, 69°, 92*
14.752^{T}	$2s^22p^4\ ^3P_2$	$2s^22p^3(^2P^o)3d\ ^3P^o_2$	0	6 778 700?	4				55, 69°
14.698^{T}	$2s^22p^4\ ^3P_2$	$2s^22p^3(^2P^o)3d\ ^3D^o_3$	0	6 803 600?	2				55, 69°

Mn XIX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
8739^C	$2s2p^4\ ^2D_{3/2}$	$2s2p^4\ ^2D_{5/2}$	981 160	992 600		M1	1.6+1	D	92*
5021^C	$2s2p^4\ ^4P_{3/2}$	$2s2p^4\ ^4P_{1/2}$	765 760	785 670		M1	3.39+2	C	92*
1764^C	$_{5/2}$	$_{3/2}$	709 070	765 760		M1	4.36+3	C	92*
3259^C	$2s^22p^3\ ^2D^o_{3/2}$	$2s^22p^3\ ^2D^o_{5/2}$	131 770	162 450		M1	2.36+2	C	92*
2268^C	$2s2p^4\ ^2S_{1/2}$	$2s2p^4\ ^2P_{3/2}$	1 126 740	1 170 820		M1	1.4+2	D	92*
797.77^C	$_{1/2}$	$_{1/2}$	1 126 740	1 252 090		M1	1.2+4	D	92*
2015^C	$2s^22p^3\ ^2P^o_{1/2}$	$2s^22p^3\ ^2P^o_{3/2}$	242 110	291 730		M1	8.0+2	C	92*
1230^C	$2s2p^4\ ^2P_{3/2}$	$2s2p^4\ ^2P_{1/2}$	1 170 820	1 252 090		M1	7.2+3	C	92*
1111^C	$2p^5\ ^2P^o_{3/2}$	$2p^5\ ^2P^o_{1/2}$	1 844 360	1 934 390		M1	1.31+4	C	92*
906.29^C	$2s^22p^3\ ^2D^o_{3/2}$	$2s^22p^3\ ^2P^o_{1/2}$	131 770	242 110		M1	4.5+3	D	92*
773.51^C	$_{5/2}$	$_{3/2}$	162 450	291 730		M1	8.2+3	D	92*
625.16^C	$_{3/2}$	$_{3/2}$	131 770	291 730		M1	2.7+4	D	92*
758.90^C	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^3\ ^2D^o_{3/2}$	0	131 770		M1	1.0+4	D	92*
615.57^C	$_{3/2}$	$_{5/2}$	0	162 450		M1	6.6+2	D	92*
561.10^C	$2s2p^4\ ^2D_{5/2}$	$2s2p^4\ ^2P_{3/2}$	992 600	1 170 820		M1	3.3+3	D−	92*
527.26^C	$_{3/2}$	$_{3/2}$	981 160	1 170 820		M1	7.8+3	D	92*
369.10^C	$_{3/2}$	$_{1/2}$	981 160	1 252 090		M1	1.3+4	D−	92*
511.54^C	$2s2p^4\ ^4P_{1/2}$	$2s2p^4\ ^2D_{3/2}$	785 670	981 160		M1	1.5+3	D−	92*
464.25^C	$_{3/2}$	$_{3/2}$	765 760	981 160		M1	7.4+3	D	92*
440.84^C	$_{3/2}$	$_{5/2}$	765 760	992 600		M1	1.2+3	D−	92*
352.70^C	$_{5/2}$	$_{5/2}$	709 070	992 600		M1	1.8+4	D	92*
413.04^C	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^3\ ^2P^o_{1/2}$	0	242 110		M1	2.1+4	D	92*
342.78^C	$_{3/2}$	$_{3/2}$	0	291 730		M1	2.2+4	D	92*
277.02^C	$2s2p^4\ ^4P_{3/2}$	$2s2p^4\ ^2S_{1/2}$	765 760	1 126 740		M1	7.0+4	D	92*
239.61^C	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^4P_{5/2}$	291 730	709 070		1.3 − 3	2.6+7	E	92*
210.96^C	$_{3/2}$	$_{3/2}$	291 730	765 760		3.9 − 3	1.5+8	E	92*
183.97^C	$_{1/2}$	$_{1/2}$	242 110	785 670		1.6 − 3	1.6+8	E	92*
216.57^C	$2s2p^4\ ^4P_{5/2}$	$2s2p^4\ ^2P_{3/2}$	709 070	1 170 820		M1	1.1+4	D−	92*
205.62^C	$_{3/2}$	$_{1/2}$	765 760	1 252 090		M1	1.7+4	D−	92*
182.94^C	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^4P_{5/2}$	162 450	709 070		5.8 − 3	1.9+8	E	92*
173.22^C	$_{3/2}$	$_{5/2}$	131 770	709 070		1.1 − 2	4.1+8	E	92*
157.73^C	$_{3/2}$	$_{3/2}$	131 770	765 760		1.2 − 3	7.8+7	E	92*
152.93^C	$_{3/2}$	$_{1/2}$	131 770	785 670		1.5 − 3	2.1+8	E	92*
168.84^C	$2s2p^4\ ^2P_{1/2}$	$2p^5\ ^2P^o_{3/2}$	1 252 090	1 844 360		3.30 − 2	1.93+9	C	92*
148.48	$_{3/2}$	$_{3/2}$	1 170 820	1 844 360		3.9 − 1	3.0+10	C	52°, 92*
146.57	$_{1/2}$	$_{1/2}$	1 252 090	1 934 390		2.0 − 1	3.0+10	C	52°, 92*
130.97	$_{3/2}$	$_{1/2}$	1 170 820	1 934 390		1.62 − 1	3.14+10	C	52°, 92*
145.05^C	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^2D_{3/2}$	291 730	981 160		8.4 − 3	6.7+8	D	92*
142.68	$_{3/2}$	$_{5/2}$	291 730	992 600		1.04 − 1	5.7+9	C	52°, 62, 92*
135.33	$_{1/2}$	$_{3/2}$	242 110	981 160		3.22 − 2	2.93+9	C	52°, 92*
141.03	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^4P_{5/2}$	0	709 070	bl	2.2 − 1	1.3+10	C	52°, 62, 63, 92*
130.59	$_{3/2}$	$_{3/2}$	0	765 760		1.70 − 1	1.66+10	C	52°, 62, 63, 92*
127.28	$_{3/2}$	$_{1/2}$	0	785 670	bl	9.04 − 2	1.86+10	C	52°, 62, 63, 92*
139.36	$2s2p^4\ ^2S_{1/2}$	$2p^5\ ^2P^o_{3/2}$	1 126 740	1 844 360		9.40 − 2	8.1+9	C	52°, 92*
123.82^C	$_{1/2}$	$_{1/2}$	1 126 740	1 934 390		6.8 − 3	1.5+9	D	92*
122.14^C	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^2D_{3/2}$	162 450	981 160		1.3 − 3	1.5+8	E	92*
120.46	$_{5/2}$	$_{5/2}$	162 450	992 600	bl	3.9 − 1	3.0+10	C	52°, 62, 63, 92*
117.74	$_{3/2}$	$_{3/2}$	131 770	981 160		3.2 − 1	3.8+10	C	52°, 62, 63, 92*
116.17^C	$_{3/2}$	$_{5/2}$	131 770	992 600		7.6 − 5	6.3+6	E	92*
119.76	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^2S_{1/2}$	291 730	1 126 740		1.8 − 2	4.1+9	D	52°, 92*
113.04	$_{1/2}$	$_{1/2}$	242 110	1 126 740		1.3 − 1	3.4+10	C	52°, 70, 92*

Mn XIX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
117.41	$2s2p^4\ ^2D_{5/2}$	$2p^5\ ^2P^o_{3/2}$	992 600	1 844 360		3.4 – 1	4.1+10	C	52°, 67, 92*
115.84	$_{3/2}$	$_{3/2}$	981 160	1 844 360		1.19 – 1	1.48+10	C	52°, 67, 92*
104.90	$_{3/2}$	$_{1/2}$	981 160	1 934 390		1.46 – 1	4.44+10	C	52°, 67, 92*
113.75	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^2P_{3/2}$	291 730	1 170 820		7.12 – 2	9.2+9	C	52°, 62, 92*
107.68	$_{1/2}$	$_{3/2}$	242 110	1 170 820		5.56 – 2	8.0+9	C	52°, 62, 92*
104.13	$_{3/2}$	$_{1/2}$	291 730	1 252 090	bl	2.8 – 1	8.7+10	C	52°, 62, 92*
99.01	$_{1/2}$	$_{1/2}$	242 110	1 252 090		1.4 – 2	4.7+9	D	52°, 62, 92*
101.92	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^2D_{3/2}$	0	981 160		6.8 – 3	1.1+9	E	52°, 92*
100.50	$2s^22p^3\ ^2D^o_{3/2}$	$2s2p^4\ ^2S_{1/2}$	131 770	1 126 740		1.2 – 1	4.0+10	E	52°, 70, 92*
99.17	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^2P_{3/2}$	162 450	1 170 820		5.6 – 1	9.5+10	C	52°, 62, 63, 92*
96.24	$_{3/2}$	$_{3/2}$	131 770	1 170 820	bl	8.48 – 2	1.53+10	C	52°, 62, 63, 92*
89.26	$_{3/2}$	$_{1/2}$	131 770	1 252 090		7.12 – 2	2.98+10	C	52°, 62, 92*
94.456^C	$2s2p^4\ ^4P_{1/2}$	$2p^5\ ^2P^o_{3/2}$	785 670	1 844 360		2.0 – 3	3.7+8	E	92*
92.71	$_{3/2}$	$_{3/2}$	765 760	1 844 360		5.6 – 3	1.1+9	E	52°, 92*
88.08	$_{5/2}$	$_{3/2}$	709 070	1 844 360		1.1 – 2	2.3+9	E	52°, 92*
87.053^C	$_{1/2}$	$_{1/2}$	785 670	1 934 390		1.7 – 3	7.4+8	E	92*
85.570^C	$_{3/2}$	$_{1/2}$	765 760	1 934 390		4.0 – 4	1.8+8	E	92*
88.75	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^2S_{1/2}$	0	1 126 740		3.2 – 3	1.4+9	E	52°, 92*
85.41	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^2P_{3/2}$	0	1 170 820		1.5 – 2	3.4+9	E	52°, 92*
14.098^T	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^2(^3P)3d\ ^4P_{3/2}$	0	7 093 200?	bl				55, 69°
14.098^T	$_{3/2}$	$_{5/2}$	0	7 093 200?	bl				55, 69°

Mn XX

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
7308^{C}	$2s2p^3\ ^3P^o_1$	$2s2p^3\ ^3P^o_2$	856 900	870 580		M1	3.4+1	D	92*
4942^{C}	$2s2p^3\ ^3D^o_2$	$2s2p^3\ ^3D^o_3$	722 710	742 940		M1	1.2+2	D	92*
2559^{C}	$2s^22p^2\ ^3P_1$	$2s^22p^2\ ^3P_2$	59 580	98 650		M1	6.4+2	C+	92*
1678^{C}	0	1	0	59 580		M1	3.46+3	C+	92*
1340^{C}	$2p^4\ ^3P_1$	$2p^4\ ^1D_2$	1 623 650	1 698 290		M1	4.7+2	D	92*
655.78^{C}	2	2	1 545 800	1 698 290		M1	1.1+4	D	92*
1285^{C}	$2p^4\ ^3P_2$	$2p^4\ ^3P_1$	1 545 800	1 623 650		M1	9.7+3	C	92*
880.20^{C}	$2s^22p^2\ ^3P_2$	$2s^22p^2\ ^1D_2$	98 650	212 260		M1	9.5+3	D	92*
654.96^{C}	1	2	59 580	212 260		M1	9.6+3	D	92*
785.85^{C}	$2s2p^3\ ^3D^o_1$	$2s2p^3\ ^3P^o_0$	723 090	850 340		M1	1.2+4	D	92*
783.45^{C}	3	2	742 940	870 580		M1	8.1+3	D	92*
747.33^{C}	1	1	723 090	856 900		M1	1.3+4	D	92*
678.01^{C}	1	2	723 090	870 580		M1	1.7+3	D−	92*
676.27^{C}	2	2	722 710	870 580		M1	7.5+3	D	92*
679.99^{C}	$2s2p^3\ ^3S^o_1$	$2s2p^3\ ^1P^o_1$	1 025 510	1 172 570		M1	2.1+4	D	92*
645.45^{C}	$2s2p^3\ ^3P^o_2$	$2s2p^3\ ^3S^o_1$	870 580	1 025 510		M1	1.2+3	D−	92*
593.08^{C}	1	1	856 900	1 025 510		M1	1.1+3	D−	92*
570.87^{C}	0	1	850 340	1 025 510		M1	2.7+3	D−	92*
560.85^{C}	$2s2p^3\ ^3P^o_2$	$2s2p^3\ ^1D^o_2$	870 580	1 048 880		M1	1.0+4	D	92*
520.89^{C}	1	2	856 900	1 048 880		M1	5.0+3	D	92*
365.63^{C}	$2s^22p^2\ ^3P_1$	$2s^22p^2\ ^1S_0$	59 580	333 080		M1	9.4+4	D	92*
357.59^{C}	$2s2p^3\ ^5S^o_2$	$2s2p^3\ ^3D^o_2$	[443 060]	722 710		M1	9.5+3	E	92*
357.10^{C}	2	1	[443 060]	723 090		M1	3.7+3	E	92*
345.63^{C}	$2p^4\ ^3P_1$	$2p^4\ ^1S_0$	1 623 650	1 912 980		M1	1.4+5	D	92*
331.14^{C}	$2s2p^3\ ^3P^o_2$	$2s2p^3\ ^1P^o_1$	870 580	1 172 570		M1	8.7+3	D−	92*
316.79^{C}	1	1	856 900	1 172 570		M1	5.7+3	D−	92*
330.67^{C}	$2s2p^3\ ^3D^o_1$	$2s2p^3\ ^3S^o_1$	723 090	1 025 510		M1	3.7+3	E	92*
330.25^{C}	2	1	722 710	1 025 510		M1	1.0+4	E	92*
306.59^{C}	$2s2p^3\ ^3D^o_2$	$2s2p^3\ ^1D^o_2$	722 710	1 048 880		M1	8.6+3	D−	92*
290.36^{P}	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^5S^o_2$	98 650	[443 060]		1.6 − 3	2.5+7	E	71°, 92*
260.77^{P}	1	2	59 580	[443 060]		1.2 − 3	2.4+7	E	71°, 92*
267.93^{C}	$2s2p^3\ ^1P^o_1$	$2p^4\ ^3P_2$	1 172 570	1 545 800		5.4 − 3	1.0+8	E	92*
221.69^{C}	1	1	1 172 570	1 623 650		1.3 − 2	6.0+8	E	92*
256.40^{C}	$2s^22p^2\ ^1S_0$	$2s2p^3\ ^3D^o_1$	333 080	723 090		1.3 − 3	4.4+7	E	92*
241.64^{C}	$2s2p^3\ ^5S^o_2$	$2s2p^3\ ^3P^o_1$	[443 060]	856 900		M1	2.8+4	D−	92*
233.91^{C}	2	2	[443 060]	870 580		M1	5.0+4	D	92*
222.48^{C}	$2s2p^3\ ^3D^o_1$	$2s2p^3\ ^1P^o_1$	723 090	1 172 570		M1	1.1+4	D−	92*
222.29^{C}	2	1	722 710	1 172 570		M1	3.8+4	D−	92*
201.24^{C}	$2s2p^3\ ^1D^o_2$	$2p^4\ ^3P_2$	1 048 880	1 545 800		2.3 − 2	7.4+8	E	92*
173.98^{C}	2	1	1 048 880	1 623 650		3.1 − 3	2.3+8	E	92*
195.91^{C}	$2s^22p^2\ ^1D_2$	$2s2p^3\ ^3D^o_2$	212 260	722 710		1.0 − 3	3.6+7	E	92*
195.76^{C}	2	1	212 260	723 090		2.8 − 3	1.6+8	E	92*
188.44^{C}	2	3	212 260	742 940		3.0 − 2	8.2+8	E	92*
192.20	$2s2p^3\ ^3S^o_1$	$2p^4\ ^3P_2$	1 025 510	1 545 800		1.8 − 1	6.5+9	C	52°, 92*
167.19	1	1	1 025 510	1 623 650	bl	1.6 − 1	1.3+10	C	52°, 92*
167.12	1	0	1 025 510	1 623 890	bl	6.99 − 2	1.67+10	C	52°, 92*
190.91^{C}	$2s^22p^2\ ^1S_0$	$2s2p^3\ ^3P^o_1$	333 080	856 900		2.2 − 3	1.3+8	E	92*
190.23	$2s2p^3\ ^1P^o_1$	$2p^4\ ^1D_2$	1 172 570	1 698 290		1.24 − 1	4.56+9	C	52°, 92*

Mn XX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
160.14^{C}	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^3D^o_1$	98 650	723 090		4.8 − 4	4.2+7	E	92*
155.21	2	3	98 650	742 940		1.58 − 1	6.2+9	C	52°, 63, 92*
150.80	1	2	59 580	722 710		1.6 − 1	9.2+9	C	52°, 63, 92*
150.71	1	1	59 580	723 090	bl	9.6 − 3	9.4+8	D	52°, 92*
138.30	0	1	0	723 090		9.1 − 2	1.1+10	C	52°, 63, 92*
155.13^{C}	$2s^22p^2\ ^1D_2$	$2s2p^3\ ^3P^o_1$	212 260	856 900		3.2 − 3	3.0+8	E	92*
151.90^{C}		2	212 260	870 580		3.9 − 3	2.3+8	E	92*
153.98	$2s2p^3\ ^1D^o_2$	$2p^4\ ^1D_2$	1 048 880	1 698 290		5.95 − 1	3.35+10	C	52°, 92*
148.10	$2s2p^3\ ^3P^o_2$	$2p^4\ ^3P_2$	870 580	1 545 800		5.90 − 2	3.59+9	C	52°, 92*
145.16	1	2	856 900	1 545 800		5.61 − 2	3.55+9	C	52°, 92*
132.79	2	1	870 580	1 623 650	bl	1.25 − 1	1.58+10	C	52°, 92*
130.42^{C}	1	1	856 900	1 623 650		2.0 − 4	2.6+7	E	92*
130.38	1	0	856 900	1 623 890		4.86 − 2	1.91+10	C	52°, 92*
129.31	0	1	850 340	1 623 650		3.48 − 2	4.63+9	C	52°, 92*
144.42^{C}	$2s^22p^2\ ^1S_0$	$2s2p^3\ ^3S^o_1$	333 080	1 025 510		5.1 − 3	5.4+8	E	92*
135.06	$2s2p^3\ ^1P^o_1$	$2p^4\ ^1S_0$	1 172 570	1 912 980		2.1 − 1	7.8+10	C	52°, 92*
131.88^{C}	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^3P^o_1$	98 650	856 900		2.7 − 2	3.4+9	D	92*
129.55	2	2	98 650	870 580		2.41 − 1	1.92+10	C	52°, 63, 70, 92*
126.46	1	0	59 580	850 340		5.25 − 2	2.19+10	C	52°, 92*
125.42	1	1	59 580	856 900	bl	1.02 − 1	1.44+10	C	52°, 92*
123.30	1	2	59 580	870 580	bl	6.0 − 3	5.3+8	D	52°, 92*
116.70	0	1	0	856 900		2.55 − 2	4.16+9	C	52°, 92*
124.56	$2s2p^3\ ^3D^o_3$	$2p^4\ ^3P_2$	742 940	1 545 800		3.46 − 1	2.98+10	C	52°, 92*
121.55	1	2	723 090	1 545 800	bl	3.30 − 2	2.98+9	C	52°, 92*
121.49	2	2	722 710	1 545 800	bl	1.47 − 1	1.33+10	C	52°, 92*
111.04	1	1	723 090	1 623 650	bl	8.07 − 2	1.46+10	C	52°, 92*
111.01	1	0	723 090	1 623 890	bl	6.45 − 2	3.49+10	C	52°, 92*
111.00	2	1	722 710	1 623 650	bl	1.20 − 1	2.17+10	C	52°, 92*
122.96^{C}	$2s^22p^2\ ^1D_2$	$2s2p^3\ ^3S^o_1$	212 260	1 025 510		1.1 − 3	1.6+8	E	92*
120.82	$2s2p^3\ ^3P^o_2$	$2p^4\ ^1D_2$	870 580	1 698 290		1.7 − 2	1.6+9	E	52°, 92*
118.85^{C}	1	2	856 900	1 698 290		1.0 − 2	9.6+8	E	92*
119.54	$2s^22p^2\ ^1D_2$	$2s2p^3\ ^1D^o_2$	212 260	1 048 880		4.9 − 1	4.6+10	C	52°, 63, 70, 92*
119.12	$2s^22p^2\ ^1S_0$	$2s2p^3\ ^1P^o_1$	333 080	1 172 570		1.08 − 1	1.69+10	C	52°, 92*
112.68^{C}	$2s2p^3\ ^3S^o_1$	$2p^4\ ^1S_0$	1 025 510	1 912 980		9.9 − 3	5.2+9	E	92*
107.89	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^3S^o_1$	98 650	1 025 510		3.1 − 1	5.9+10	C	52°, 63, 70, 92*
103.53	1	1	59 580	1 025 510		1.23 − 1	2.55+10	C	52°, 63, 70, 92*
97.51	0	1	0	1 025 510		4.03 − 2	9.4+9	C	52°, 70, 92*
105.24	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^1D^o_2$	98 650	1 048 880		6.0 − 2	7.2+9	E	52°, 92*
101.08^{C}	1	2	59 580	1 048 880		2.5 − 3	3.3+8	E	92*
104.67	$2s2p^3\ ^3D^o_3$	$2p^4\ ^1D_2$	742 940	1 698 290		3.9 − 2	4.8+9	E	52°, 92*
102.50^{C}	2	2	722 710	1 698 290		5.0 − 3	6.3+8	E	92*
104.13	$2s^22p^2\ ^1D_2$	$2s2p^3\ ^1P^o_1$	212 260	1 172 570	bl	3.2 − 1	6.6+10	C	52°, 63, 70, 92*
94.690^{C}	$2s2p^3\ ^3P^o_1$	$2p^4\ ^1S_0$	856 900	1 912 980		4.5 − 3	3.3+9	E	92*
93.117^{C}	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^1P^o_1$	98 650	1 172 570		5.5 − 4	1.4+8	E	92*
89.85	1	1	59 580	1 172 570		1.6 − 2	4.4+9	E	52°, 92*
90.683^{C}	$2s2p^3\ ^5S^o_2$	$2p^4\ ^3P_2$	[443 060]	1 545 800		6.5 − 3	1.1+9	E	92*
84.703^{C}	2	1	[443 060]	1 623 650		7.5 − 4	2.3+8	E	92*
13.46^{T}	$2s^22p^2\ ^1D_2$	$2s^22p3d\ ^1F^o_3$	212 260	7 642 000?					55, 69°

Mn XXI

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
7228.7^{C}	$2s2p^2\ ^2S_{1/2}$	$2s2p^2\ ^2P_{3/2}$	910 880	924 710		M1	1.03+1	C−	92*
6004.3^{C}	$2s2p^2\ ^2D_{3/2}$	$2s2p^2\ ^2D_{5/2}$	687 540	704 190		M1	4.73+1	C	92*
4134.5^{C}	$2p^3\ ^2D^o_{3/2}$	$2p^3\ ^2D^o_{5/2}$	1 310 890	1 335 070		M1	1.3+2	C	92*
2236.4^{C}	$2p^3\ ^2P^o_{1/2}$	$2p^3\ ^2P^o_{3/2}$	1 472 710	1 517 410		M1	6.7+2	C	92*
2205.8^{C}	$2s2p^2\ ^4P_{1/2}$	$2s2p^2\ ^4P_{3/2}$	379 660	424 980		M1	2.03+3	C	92*
2188.0^{C}	$_{3/2}$	$_{5/2}$	424 980	470 670		M1	1.5+3	C	92*
1006.4^{C}	$2s^22p\ ^2P^o_{1/2}$	$2s^22p\ ^2P^o_{3/2}$	0	99 360		M1	8.8+3	B	92*
952.8^{C}	$2s2p^2\ ^2P_{1/2}$	$2s2p^2\ ^2S_{1/2}$	805 930	910 880		M1	1.1+4	C−	92*
841.9^{C}	$2s2p^2\ ^2P_{1/2}$	$2s2p^2\ ^2P_{3/2}$	805 930	924 710		M1	8.0+3	C	92*
618.0^{C}	$2p^3\ ^2D^o_{3/2}$	$2p^3\ ^2P^o_{1/2}$	1 310 890	1 472 710		M1	8.6+3	D	92*
548.4^{C}	$_{5/2}$	$_{3/2}$	1 335 070	1 517 410		M1	1.3+4	D	92*
484.2^{C}	$_{3/2}$	$_{3/2}$	1 310 890	1 517 410		M1	3.7+4	D	92*
395.69^{C}	$2s2p^2\ ^2P_{3/2}$	$2p^3\ ^4S^o_{3/2}$	924 710	1 177 430		2.4 − 3	2.5+7	E	92*
356.76^{C}	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^4P_{1/2}$	99 360	379 660		4.8 − 4	1.3+7	E	92*
269.32^{C}	$_{3/2}$	$_{5/2}$	99 360	470 670		3.2 − 3	4.8+7	E	92*
263.39^{C}	$_{1/2}$	$_{1/2}$	0	379 660		1.3 − 3	6.1+7	E	92*
258.95^{T}	$2s2p^2\ ^2P_{3/2}$	$2p^3\ ^2D^o_{3/2}$	924 710	1 310 890	bl	1.9 − 3	4.7+7	E	52°, 92*
243.69	$_{3/2}$	$_{5/2}$	924 710	1 335 070		1.70 − 1	3.17+9	C	52°, 92*
198.04	$_{1/2}$	$_{3/2}$	805 930	1 310 890	bl				52
204.13^{C}	$2s2p^2\ ^2D_{3/2}$	$2p^3\ ^4S^o_{3/2}$	687 540	1 177 430		1.9 − 3	7.7+7	E	92*
182.48	$2s2p^2\ ^2P_{3/2}$	$2p^3\ ^2P^o_{1/2}$	924 710	1 472 710		2.3 − 2	2.3+9	D	52°, 92*
168.72	$_{3/2}$	$_{3/2}$	924 710	1 517 410	bl	3.0 − 1	1.8+10	C	52°, 92*
140.55	$_{1/2}$	$_{3/2}$	805 930	1 517 410					52
177.99	$2s2p^2\ ^2S_{1/2}$	$2p^3\ ^2P^o_{1/2}$	910 880	1 472 710					52
164.87	$_{1/2}$	$_{3/2}$	910 880	1 517 410	bl				52
170.02^{C}	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^2D_{3/2}$	99 360	687 540		1.2 − 3	7.2+7	E	92*
165.34	$_{3/2}$	$_{5/2}$	99 360	704 190		1.41 − 1	5.7+9	C	52°, 63, 92*
145.45	$_{1/2}$	$_{3/2}$	0	687 540		1.2 − 1	9.6+9	C	52°, 63, 92*
164.83	$2s2p^2\ ^2D_{5/2}$	$2p^3\ ^2D^o_{3/2}$	704 190	1 310 890	bl	7.38 − 2	4.53+9	C	52°, 92*
160.42	$_{3/2}$	$_{3/2}$	687 540	1 310 890		1.13 − 1	7.3+9	C	52°, 92*
158.51	$_{5/2}$	$_{5/2}$	704 190	1 335 070		2.72 − 1	1.2+10	C	52°, 92*
154.43	$_{3/2}$	$_{5/2}$	687 540	1 335 070		6.24 − 2	2.91+9	C	52°, 92*
141.49	$2s2p^2\ ^4P_{5/2}$	$2p^3\ ^4S^o_{3/2}$	470 670	1 177 430	bl	2.23 − 1	1.85+10	C	52°, 92*
132.90	$_{3/2}$	$_{3/2}$	424 980	1 177 430	bl	1.52 − 1	1.44+10	C	52°, 92*
125.35	$_{1/2}$	$_{3/2}$	379 660	1 177 430	bl	8.72 − 2	9.3+9	C	52°, 92*
127.36	$2s2p^2\ ^2D_{3/2}$	$2p^3\ ^2P^o_{1/2}$	687 540	1 472 710	bl	1.30 − 1	2.67+10	C	52°, 92*
122.97	$_{5/2}$	$_{3/2}$	704 190	1 517 410		1.21 − 1	1.34+10	C	52°, 92*
120.50	$_{3/2}$	$_{3/2}$	687 540	1 517 410	bl	4.12 − 2	4.73+9	C	52°, 92*
124.08	$2s^22p\ ^2P^o_{1/2}$	$2s2p^2\ ^2P_{1/2}$	0	805 930					52°, 63
121.16	$_{3/2}$	$_{3/2}$	99 360	924 710		3.6 − 1	4.1+10	C	52°, 63, 72, 92*
108.14	$_{1/2}$	$_{3/2}$	0	924 710		4.18 − 2	6.0+9	C	52°, 72, 92*
123.23	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^2S_{1/2}$	99 360	910 880	bl				52
109.78	$_{1/2}$	$_{1/2}$	0	910 880					52
119.02^{C}	$2s2p^2\ ^4P_{5/2}$	$2p^3\ ^2D^o_{3/2}$	470 670	1 310 890		9.6 − 4	1.1+8	E	92*
115.69^{T}	$_{5/2}$	$_{5/2}$	470 670	1 335 070		1.7 − 2	1.4+9	E	52°, 92*
112.88^{C}	$_{3/2}$	$_{3/2}$	424 980	1 310 890		1.2 − 2	1.5+9	E	92*
95.535^{C}	$2s2p^2\ ^4P_{5/2}$	$2p^3\ ^2P^o_{3/2}$	470 670	1 517 410		7.2 − 4	1.3+8	E	92*
91.539^{C}	$_{3/2}$	$_{3/2}$	424 980	1 517 410		1.2 − 3	2.5+8	E	92*
91.487^{C}	$_{1/2}$	$_{1/2}$	379 660	1 472 710		4.6 − 4	1.8+8	E	92*

Mn XXII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3755.5^{C}	$1s^22s2p\ ^3P^o_0$	$1s^22s2p\ ^3P^o_1$	333 350	359 970		M1	3.33+2	C+	92*
1293.2^{C}	1	2	359 970	437 300		M1	6.11+3	C+	92*
2487.4^{C}	$1s^22p^2\ ^3P_1$	$1s^22p^2\ ^3P_2$	967 950	1 008 140		M1	7.0+2	C	92*
1736.4^{C}	0	1	910 360	967 950		M1	3.26+3	C	92*
850.92^{C}	$1s^22p^2\ ^3P_2$	$1s^22p^2\ ^1D_2$	1 008 140	1 125 660		M1	1.08+4	C	92*
634.08^{C}	1	2	967 950	1 125 660		M1	1.1+4	D+	92*
496.06^{C}	$1s^22s2p\ ^1P^o_1$	$1s^22p^2\ ^3P_0$	708 770	910 360		8.1 − 4	2.2+7	E	92*
385.83^{C}	1	1	708 770	967 950		3.9 − 4	5.8+6	E	92*
334.03^{C}	1	2	708 770	1 008 140		2.3 − 2	2.8+8	D	92*
368.36^{C}	$1s^22s2p\ ^3P^o_2$	$1s^22s2p\ ^1P^o_1$	437 300	708 770		M1	8.6+3	D	92*
286.70^{C}	1	1	359 970	708 770		M1	1.1+4	D−	92*
266.37^{C}	0	1	333 350	708 770		M1	1.8+4	D	92*
277.80	$1s^22s^2\ ^1S_0$	$1s^22s2p\ ^3P^o_1$	0	359 970		1.3 − 3	3.7+7	D	43, 74°, 92*
271.41^{C}	$1s^22p^2\ ^3P_1$	$1s^22p^2\ ^1S_0$	967 950	1 336 400		M1	1.3+5	D	92*
239.87	$1s^22s2p\ ^1P^o_1$	$1s^22p^2\ ^1D_2$	708 770	1 125 660		1.77 − 1	4.10+9	B	52°, 92*
188.45	$1s^22s2p\ ^3P^o_2$	$1s^22p^2\ ^3P_1$	437 300	967 950		6.75 − 2	4.23+9	B	52°, 92*
181.69	1	0	359 970	910 360		5.76 − 2	1.16+10	B	52°, 92*
175.18	2	2	437 300	1 008 140		1.72 − 1	7.5+9	B	52°, 92*
164.48	1	1	359 970	967 950		4.59 − 2	3.77+9	B	52°, 92*
157.58	0	1	333 350	967 950		6.56 − 2	5.87+9	B	52°, 92*
154.28	1	2	359 970	1 008 140		8.58 − 2	4.81+9	B	52°, 92*
159.33	$1s^22s2p\ ^1P^o_1$	$1s^22p^2\ ^1S_0$	708 770	1 336 400	bl	1.13 − 1	2.98+10	B	52°, 92*
145.27	$1s^22s2p\ ^3P^o_2$	$1s^22p^2\ ^1D_2$	437 300	1 125 660		5.90 − 2	3.73+9	C	52°, 92*
130.60^{C}	1	2	359 970	1 125 660		4.2 − 3	3.3+8	D	92*
141.10	$1s^22s^2\ ^1S_0$	$1s^22s2p\ ^1P^o_1$	0	708 770	bl	1.59 − 1	1.78+10	B	52$^{\triangle}$, 63, 75°, 92*
103.31^{C}	$1s^22s^2\ ^1S_0$	$1s^22p^2\ ^3P_1$	0	967 950		M1	7.8+3	E	92*
99.193^{C}	0	2	0	1 008 140		E2	1.3+3	E	92*
13.58^{C}	$1s^22p^2\ ^1S_0$	$1s^22p3s\ ^1P^o_1$	1 336 400	8 702 000		5.6 − 2	6.8+11	D	92*
13.199	$1s^22p^2\ ^1D_2$	$1s^22p3s\ ^1P^o_1$	1 125 660	8 702 000		1.4 − 1	1.8+12	D	76, 77°, 92*
13.199	$1s^22p^2\ ^3P_1$	$1s^22p3s\ ^3P^o_0$	967 950	8 544 300		5.1 − 2	2.0+12	D	76, 77°, 92*
13.00^{C}	$1s^22p^2\ ^1S_0$	$1s^22p3d\ ^1P^o_1$	1 336 400	9 027 000		1.29	1.70+13	C−	92*
12.935	$1s^22s2p\ ^3P^o_2$	$1s^22s3s\ ^3S_1$	437 300	8 168 000		1.3 − 1	1.7+12	D	76, 77°, 92*
12.816	1	1	359 970	8 168 000		8.1 − 2	1.1+12	D	76, 77°, 92*
12.76^{C}	0	1	333 350	8 168 000		2.7 − 2	3.7+11	D	92*
12.816	$1s^22s2p\ ^1P^o_1$	$1s^22s3d\ ^1D_2$	708 770	8 512 000		1.8	1.5+13	C−	77°, 92*
12.816	$1s^22p^2\ ^1D_2$	$1s^22p3d\ ^1D^o_2$	1 125 660	8 928 000		2.5 − 1	2.0+12	C−	76, 77°, 92*
12.738	$1s^22p^2\ ^1D_2$	$1s^22p3d\ ^3P^o_2$	1 125 660	8 976 000		6.5 − 1	5.4+12	C−	76, 77°, 92*
12.738	$1s^22p^2\ ^3P_2$	$1s^22p3d\ ^3D^o_2$	1 008 140	8 860 000		1.4 − 1	1.2+12	D	76, 77°, 92*
12.706	2	1	1 008 140	8 878 000		1.1 − 2	1.5+11	D	76, 77°, 92*
12.670	1	2	967 950	8 860 000		1.31	1.09+13	C−	76, 77°, 92*
12.656	1	1	967 950	8 878 000		2.8 − 1	3.9+12	C−	76, 77°, 92*
12.580	2	3	1 008 140	8 957 000		3.3	2.0+13	C−	55, 69, 76, 77°, 92*
12.553	0	1	910 360	8 878 000		1.29	1.82+13	C−	76, 77°, 92*
12.656	$1s^22p^2\ ^1D_2$	$1s^22p3d\ ^1P^o_1$	1 125 660	9 027 000		7.5 − 2	1.0+12	D	77°, 92*
12.656	$1s^22p^2\ ^1D_2$	$1s^22p3d\ ^1F^o_3$	1 125 660	9 027 000		5.10	3.03+13	C−	55, 69, 77°, 92*
12.63^{C}	$1s^22p^2\ ^3P_2$	$1s^22p3d\ ^1D^o_2$	1 008 140	8 928 000		2.0 − 1	1.7+12	C−	92*
12.56^{C}	1	2	967 950	8 928 000		1.1	9.4+12	D	92*

Mn XXII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
12.553	$1s^22p^2\ ^3P_2$	$1s^22p3d\ ^3P^\circ_1$	1 008 140	8 975 000		3.7 − 1	5.2+12	C−	76, 77°, 92*
12.553	2	2	1 008 140	8 976 000		1.25	1.06+13	C−	76, 77°, 92*
12.488	1	0	967 950	8 975 600		3.3 − 1	1.4+13	C−	76, 77°, 92*
12.488	1	2	967 950	8 976 000		1.8 − 1	1.5+12	D	76, 77°, 92*
12.488	1	1	967 950	8 975 000		6.9 − 1	9.8+12	C−	76, 77°, 92*
12.40[C]	0	1	910 360	8 975 000		3.3 − 3	4.8+10	D	92*
12.521[C]	$1s^22s2p\ ^1P^\circ_1$	$1s^22p3p\ ^3D_1$	708 770	8 695 400		9.6 − 2	1.4+12	D	92*
12.507	$1s^22s2p\ ^3P^\circ_2$	$1s^22s3d\ ^3D_1$	437 300	8 433 000		3.6 − 2	5.1+11	C−	76, 77°, 92*
12.488	2	3	437 300	8 445 000		3.0	1.8+13	C−	55, 69, 76, 77°, 92*
12.488	2	2	437 300	8 445 000		5.5 − 1	4.7+12	C−	76, 77°, 92*
12.39[C]	1	1	359 970	8 433 000		5.4 − 1	7.8+12	C−	92*
12.368	1	2	359 970	8 445 000		1.6	1.4+13	C−	55, 69, 76, 77°, 92*
12.336	0	1	333 350	8 433 000		7.4 − 1	1.1+13	C−	76, 77°, 92*
12.447	$1s^22p^2\ ^3P_2$	$1s^22p3d\ ^1F^\circ_3$	1 008 140	9 027 000	bl				76, 77°
12.427	$1s^22s2p\ ^1P^\circ_1$	$1s^22p3p\ ^1P_1$	708 770	8 756 000		1.2 − 1	1.7+12	D	76, 77°, 92*
12.271[C]	$1s^22s2p\ ^1P^\circ_1$	$1s^22p3p\ ^3P_2$	708 770	8 858 000		1.8 − 1	1.6+12	D	92*
12.172	$1s^22s2p\ ^1P^\circ_1$	$1s^22p3p\ ^1D_2$	708 770	8 924 000	bl	6.6 − 1	5.9+12	C−	76, 77°, 92*
12.079	$1s^22s2p\ ^1P^\circ_1$	$1s^22s3s\ ^1S_0$	708 770	8 987 600		3.0 − 2	1.1+12	D	76, 77°, 92*
12.017[C]	$1s^22s2p\ ^3P^\circ_2$	$1s^22p3p\ ^3D_2$	437 300	8 759 100		2.1 − 2	1.9+11	D	92*
11.997	1	1	359 970	8 695 400		1.4 − 1	2.2+12	D	76, 77°, 92*
11.959[C]	0	1	333 350	8 695 400		8.3 − 2	1.3+12	D	92*
11.906	2	3	437 300	8 836 400		7.0 − 1	4.7+12	C−	76, 77°, 92*
11.906	1	2	359 970	8 759 100		4.8 − 1	4.5+12	C−	76, 77°, 92*
11.997	$1s^22s^2\ ^1S_0$	$1s^22s3p\ ^3P^\circ_1$	0	8 335 000		2.8 − 1	4.3+12	C−	76, 77°, 92*
11.971	$1s^22s^2\ ^1S_0$	$1s^22s3p\ ^1P^\circ_1$	0	8 354 000		4.2 − 1	6.5+12	C−	76, 77°, 92*
11.906	$1s^22s2p\ ^3P^\circ_1$	$1s^22p3p\ ^1P_1$	359 970	8 756 000					76, 77°
11.876	0	1	333 350	8 756 000					76, 77°
11.876	$1s^22s2p\ ^3P^\circ_2$	$1s^22p3p\ ^3S_1$	437 300	8 857 600					76, 77°
11.876	$1s^22s2p\ ^3P^\circ_2$	$1s^22p3p\ ^3P_2$	437 300	8 858 000		4.8 − 1	4.5+12	C−	77°, 92*
11.876	1	0	359 970	8 780 300		1.2 − 1	5.7+12	D	76, 77°, 92*
11.793	1	2	359 970	8 858 000		2.5 − 2	2.4+11	D	76, 77°, 92*
11.793	$1s^22s2p\ ^3P^\circ_2$	$1s^22p3p\ ^1D_2$	437 300	8 924 000					76, 77°

Mn XXIII

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
920.802^{C}	$1s^22p\ ^2P^o_{1/2}$	$1s^22p\ ^2P^o_{3/2}$	374 654	483 255		M1	1.15+4	B	92*
266.913^{S}	$1s^22s\ ^2S_{1/2}$	$1s^22p\ ^2P^o_{1/2}$	0	374 654		3.70 − 2	1.73+9	B+	43, 52$^{\triangle}$, 74, 79, 80°, 92*
206.930^{S}	1/2	3/2	0	483 255	bl	9.66 − 2	3.76+9	B+	43, 52$^{\triangle}$, 74, 79, 80°, 92*
75.382^{C}	$1s^24p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	[11 508 300]	[12 834 880]		2.3 − 1	6.8+10	D	92*
75.257^{C}	3/2	5/2	[11 508 300]	[12 837 080]		2.10	4.13+11	C+	92*
74.619^{C}	1/2	3/2	[11 494 740]	[12 834 880]		1.17	3.52+11	C+	92*
35.7699^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	[8 655 450]	[11 451 100]					
35.3629^{C}	1/2	1/2	[8 623 280]	[11 451 100]					
34.8495^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	[8 655 450]	[11 524 930]		2.4 − 1	3.2+11	C+	92*
34.7975^{C}	3/2	5/2	[8 655 450]	[11 529 220]		2.1	2.0+12	B	92*
34.4632^{C}	1/2	3/2	[8 623 280]	[11 524 930]		1.1	1.6+12	B	92*
33.6096^{C}	$1s^23s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	[8 519 400]	[11 494 740]		2.8 − 1	8.5+11	C	92*
33.4571^{C}	1/2	3/2	[8 519 400]	[11 508 300]		6.0 − 1	8.9+11	C	92*
24.1446^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	[8 655 450]	[12 797 160]					
23.9585^{C}	1/2	1/2	[8 623 280]	[12 797 160]					
23.9267^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	[8 655 450]	[12 834 880]		5.6 − 2	1.6+11	D	92*
23.9141^{C}	3/2	5/2	[8 655 450]	[12 837 080]		4.96 − 1	9.67+11	C+	92*
23.7439^{C}	1/2	3/2	[8 623 280]	[12 834 880]		2.76 − 1	8.15+11	C+	92*
12.4438^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^23s\ ^2S_{1/2}$	483 255	[8 519 400]					77,81,82
12.2779^{C}	1/2	1/2	374 654	[8 519 400]					77,81,82
12.1778^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^23d\ ^2D_{3/2}$	483 255	[8 694 940]		2.7 − 1	3.1+12	B	77, 82, 92*
12.1627^{C}	3/2	5/2	483 255	[8 705 090]		2.44	1.83+13	B	77, 81, 82, 92*
12.0188^{C}	1/2	3/2	374 654	[8 694 940]		1.34	1.54+13	B	77, 82, 92*
11.5965^{C}	$1s^22s\ ^2S_{1/2}$	$1s^23p\ ^2P^o_{1/2}$	0	[8 623 280]		2.56 − 1	6.34+12	B	77, 82, 92*
11.5534^{C}	1/2	3/2	0	[8 655 450]		4.92 − 1	6.14+12	B	77, 82, 92*
9.11756^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	483 255	[11 451 100]					
9.02817^{C}	1/2	1/2	374 654	[11 451 100]					
9.05660^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	483 255	[11 524 930]		4.8 − 2	9.7+11	C+	82, 92*
9.05308^{C}	3/2	5/2	483 255	[11 529 220]		4.4 − 1	6.0+12	B	77, 82, 92*
8.96839^{C}	1/2	3/2	374 654	[11 524 930]		2.4 − 1	4.9+12	B	77, 82, 92*
8.69963^{C}	$1s^22s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	0	[11 494 740]		6.6 − 2	2.9+12	C+	77, 82, 92*
8.68938^{C}	1/2	3/2	0	[11 508 300]		1.3 − 1	2.9+12	C+	77, 82, 92*
8.12090^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	483 255	[12 797 160]					
8.04991^{C}	1/2	1/2	374 654	[12 797 160]					
8.09610^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	483 255	[12 834 880]		1.8 − 2	4.6+11	D	82, 92*
8.09466^{C}	3/2	5/2	483 255	[12 837 080]		1.62 − 1	2.75+12	C+	77, 82, 92*
8.02554^{C}	1/2	3/2	374 654	[12 834 880]		9.04 − 2	2.34+12	C+	77, 82, 92*
7.80066^{C}	$1s^22s\ ^2S_{1/2}$	$1s^25p\ ^2P^o_{1/2}$	0	[12 819 430]					77,82
7.79643^{C}	1/2	3/2	0	[12 826 380]					77,82
2.0572^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s2s^2\ ^2S_{1/2}$	483 255	[49 092 000]					82
2.0527^{C}	1/2	1/2	374 654	[49 092 000]					82
2.0348^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^4P_{1/2}$	483 255	[49 627 000]					82
2.0326^{C}	3/2	3/2	483 255	[49 680 000]					82
2.0308^{C}	3/2	5/2	483 255	[49 724 000]					82
2.0304^{C}	1/2	1/2	374 654	[49 627 000]					82
2.0282^{C}	1/2	3/2	374 654	[49 680 000]					82
2.0331^{C}	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^4P^o_{1/2}$	0	[49 186 000]					82
2.0320^{C}	1/2	3/2	0	[49 213 000]					82
2.0248^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1D)\ ^2D_{3/2}$	483 255	[49 871 000]					82
2.0234^{C}	3/2	5/2	483 255	[49 903 000]					82
2.0204^{C}	1/2	3/2	374 654	[49 871 000]					82

Mn XXIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2.0243[C]	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^2P_{1/2}$	483 255	[49 883 000]					82
2.0199[C]	1/2	1/2	374 654	[49 883 000]					82
2.0194[C]	3/2	3/2	483 255	[50 001 000]					82
2.0151[C]	1/2	3/2	374 654	[50 001 000]					82
2.0205[C]	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^2P^o_{1/2}$	0	[49 493 000]					82
2.0180[C]	1/2	3/2	0	[49 554 000]					82
2.0136[C]	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^1P^o)\ ^2P^o_{1/2}$	0	[49 662 000]					82
2.0127[C]	1/2	3/2	0	[49 684 000]					82
2.0131[C]	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1S)\ ^2S_{1/2}$	483 255	[50 157 000]					82
2.0088[C]	1/2	1/2	374 654	[50 157 000]					82

Mn XXIV

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
7100^{C}	$1s4p\ ^3P^o_2$	$1s4d\ ^3D_2$	[61 685 000]	[61 699 000]					
5400^{C}	2	3	[61 685 000]	[61 703 400]					
3800^{C}	1	1	[61 672 500]	[61 698 800]					
3770^{C}	1	2	[61 672 500]	[61 699 000]					
3550^{C}	0	1	[61 670 600]	[61 698 800]					
7100^{C}	$1s5s\ ^3S_1$	$1s5p\ ^3P^o_1$	[63 097 900]	[63 111 900]		9.0 − 2	4.0+6	E	92*
4900^{C}	1	2	[63 097 900]	[63 118 300]					
6700^{C}	$1s5s\ ^1S_0$	$1s5p\ ^1P^o_1$	[63 111 600]	[63 126 600]		1.0 − 1	5.0+6	E	92*
3600^{C}	$1s4s\ ^3S_1$	$1s4p\ ^3P^o_1$	[61 644 700]	[61 672 500]		7.2 − 2	1.2+7	E	92*
2480^{C}	1	2	[61 644 700]	[61 685 000]					
3400^{C}	$1s4s\ ^1S_0$	$1s4p\ ^1P^o_1$	[61 671 800]	[61 701 200]		7.9 − 2	1.5+7	E	92*
1520^{C}	$1s3s\ ^3S_1$	$1s3p\ ^3P^o_1$	[58 488 800]	[58 554 500]		5.1 − 2	4.9+7	E	92*
1440^{C}	$1s3s\ ^1S_0$	$1s3p\ ^1P^o_1$	[58 553 000]	[58 622 500]		5.7 − 2	6.1+7	D	92*
449.3^{C}	$1s2s\ ^3S_1$	$1s2p\ ^3P^o_0$	[49 370 240]	[49 592 800]		1.07 − 2	3.55+8	B	92*
421.1^{C}	1	1	[49 370 240]	[49 607 700]		3.21 − 2	4.02+8	B	92*
296.83^{C}	1	2	[49 370 240]	[49 707 130]		8.17 − 2	1.22+9	B	92*
422.69^{C}	$1s2s\ ^1S_0$	$1s2p\ ^1P^o_1$	[49 612 040]	[49 848 620]		3.28 − 2	4.09+8	B	92*
209.04^{C}	$1s2s\ ^3S_1$	$1s2p\ ^1P^o_1$	[49 370 240]	[49 848 620]		5.13 − 3	2.60+8	B	92*
70.90^{C}	$1s4p\ ^1P^o_1$	$1s5s\ ^1S_0$	[61 701 200]	[63 111 600]		1.6 − 1	2.2+11	C	92*
70.78^{C}	$1s4p\ ^3P^o_2$	$1s5s\ ^3S_1$	[61 685 000]	[63 097 900]					
70.16^{C}	1	1	[61 672 500]	[63 097 900]		1.6 − 1	7.3+10	D	92*
68.74^{C}	$1s4s\ ^1S_0$	$1s5p\ ^1P^o_1$	[61 671 800]	[63 126 600]		4.5 − 1	2.1+11	D	92*
68.16^{C}	$1s4s\ ^3S_1$	$1s5p\ ^3P^o_1$	[61 644 700]	[63 111 900]		4.50 − 1	2.15+11	C	92*
32.794^{C}	$1s3p\ ^1P^o_1$	$1s4s\ ^1S_0$	[58 622 500]	[61 671 800]		1.0 − 1	6.3+11	C	92*
32.756^{C}	$1s3d\ ^3D_1$	$1s4p\ ^3P^o_0$	[58 617 700]	[61 670 600]					
32.735^{C}	1	1	[58 617 700]	[61 672 500]					
32.730^{C}	2	1	[58 617 200]	[61 672 500]					
32.718^{C}	3	2	[58 628 600]	[61 685 000]					
32.597^{C}	2	2	[58 617 200]	[61 685 000]					
32.674^{C}	$1s3p\ ^3P^o_2$	$1s4s\ ^3S_1$	[58 584 200]	[61 644 700]					
32.360^{C}	1	1	[58 554 500]	[61 644 700]		1.0 − 1	2.1+11	C−	92*
32.568^{C}	$1s3d\ ^1D_2$	$1s4p\ ^1P^o_1$	[58 630 700]	[61 701 200]		5.5 − 2	1.2+11	C	92*
32.444^{C}	$1s3p\ ^1P^o_1$	$1s4d\ ^1D_2$	[58 622 500]	[61 704 700]		1.9	2.4+12	C	92*
32.105^{C}	$1s3p\ ^3P^o_2$	$1s4d\ ^3D_2$	[58 584 200]	[61 699 000]					
32.060^{C}	2	3	[58 584 200]	[61 703 400]					
31.804^{C}	1	1	[58 554 500]	[61 698 800]					
31.802^{C}	1	2	[58 554 500]	[61 699 000]					
31.760^{C}	0	1	[58 550 200]	[61 698 800]					
31.764^{C}	$1s3s\ ^1S_0$	$1s4p\ ^1P^o_1$	[58 553 000]	[61 701 200]		4.02 − 1	8.9+11	C	92*
31.410^{C}	$1s3s\ ^3S_1$	$1s4p\ ^3P^o_1$	[58 488 800]	[61 672 500]		4.05 − 1	9.1+11	C	92*
31.287^{C}	1	2	[58 488 800]	[61 685 000]					
22.276^{C}	$1s3p\ ^1P^o_1$	$1s5s\ ^1S_0$	[58 622 500]	[63 111 600]		2.3 − 2	3.1+11	C	92*
22.155^{C}	$1s3p\ ^3P^o_2$	$1s5s\ ^3S_1$	[58 584 200]	[63 097 900]					
22.010^{C}	1	1	[58 554 500]	[63 097 900]		2.2 − 2	1.0+11	D	92*
21.865^{C}	$1s3s\ ^1S_0$	$1s5p\ ^1P^o_1$	[58 553 000]	[63 126 600]		1.04 − 1	4.84+11	C+	92*
21.631^{C}	$1s3s\ ^3S_1$	$1s5p\ ^3P^o_1$	[58 488 800]	[63 111 900]		1.0 − 1	4.8+11	C	92*
21.601^{C}	1	2	[58 488 800]	[63 118 300]					
11.488^{C}	$1s2p\ ^1P^o_1$	$1s3s\ ^1S_0$	[49 848 620]	[58 553 000]		4.2 − 2	2.1+12	C+	92*

Mn XXIV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
11.387^{C}	$1s2p\ ^3P^o_2$	$1s3s\ ^3S_1$	[49 707 130]	[58 488 800]					
11.260^{C}	1	1	[49 607 700]	[58 488 800]		4.2 – 2	7.4+11	C–	92*
11.387^{C}	$1s2p\ ^1P^o_1$	$1s3d\ ^1D_2$	[49 848 620]	[58 630 700]		2.1	2.2+13	C+	92*
11.223^{C}	$1s2p\ ^3P^o_2$	$1s3d\ ^3D_2$	[49 707 130]	[58 617 200]					
11.209^{C}	2	3	[49 707 130]	[58 628 600]					
11.099^{C}	1	1	[49 607 700]	[58 617 700]					
11.099^{C}	1	2	[49 607 700]	[58 617 200]					
11.080^{C}	0	1	[49 592 800]	[58 617 700]					
11.098^{C}	$1s2s\ ^1S_0$	$1s3p\ ^1P^o_1$	[49 612 040]	[58 622 500]		3.66 – 1	6.61+12	C	92*
10.888^{C}	$1s2s\ ^3S_1$	$1s3p\ ^3P^o_1$	[49 370 240]	[58 554 500]		3.69 – 1	6.92+12	C	92*
8.4580^{C}	$1s2p\ ^1P^o_1$	$1s4s\ ^1S_0$	[49 848 620]	[61 671 800]		9.3 – 3	8.7+11	C	92*
8.4345^{C}	$1s2p\ ^1P^o_1$	$1s4d\ ^1D_2$	[49 848 620]	[61 704 700]		3.6 – 1	6.8+12	C	92*
8.3769^{C}	$1s2p\ ^3P^o_2$	$1s4s\ ^3S_1$	[49 707 130]	[61 644 700]					
8.3077^{C}	1	1	[49 607 700]	[61 644 700]		9.3 – 3	3.0+11	D	92*
8.3390^{C}	$1s2p\ ^3P^o_2$	$1s4d\ ^3D_2$	[49 707 130]	[61 699 000]					
8.3359^{C}	2	3	[49 707 130]	[61 703 400]					
8.2705^{C}	1	1	[49 607 700]	[61 698 800]					
8.2704^{C}	1	2	[49 607 700]	[61 699 000]					
8.2604^{C}	0	1	[49 592 800]	[61 698 800]					
8.2719^{C}	$1s2s\ ^1S_0$	$1s4p\ ^1P^o_1$	[49 612 040]	[61 701 200]		8.9 – 2	2.9+12	C+	92*
8.1286^{C}	$1s2s\ ^3S_1$	$1s4p\ ^3P^o_1$	[49 370 240]	[61 672 500]		9.0 – 2	3.0+12	C+	92*
8.1203^{C}	1	2	[49 370 240]	[61 685 000]					
7.5398^{C}	$1s2p\ ^1P^o_1$	$1s5s\ ^1S_0$	[49 848 620]	[63 111 600]		3.6 – 3	4.2+11	C	92*
7.4678^{C}	$1s2p\ ^3P^o_2$	$1s5s\ ^3S_1$	[49 707 130]	[63 097 900]					
7.4128^{C}	1	1	[49 607 700]	[63 097 900]		3.6 – 3	1.5+11	D	92*
7.3994^{C}	$1s2s\ ^1S_0$	$1s5p\ ^1P^o_1$	[49 612 040]	[63 126 600]		3.6 – 2	1.5+12	C+	92*
7.2771^{C}	$1s2s\ ^3S_1$	$1s5p\ ^3P^o_1$	[49 370 240]	[63 111 900]		3.6 – 2	1.5+12	C+	92*
7.2738^{C}	1	2	[49 370 240]	[63 118 300]					
2.025512^{C}	$1s^2\ ^1S_0$	$1s2s\ ^3S_1$	0	[49 370 240]		M1	1.42+8	B	92*
2.015816^{C}	$1s^2\ ^1S_0$	$1s2p\ ^3P^o_1$	0	[49 607 700]		5.94 – 2	3.25+13	B	92*
2.011784^{C}	0	2	0	[49 707 130]		M2	4.82+9	B	92*
2.006074^{C}	$1s^2\ ^1S_0$	$1s2p\ ^1P^o_1$	0	[49 848 620]		7.12 – 1	3.93+14	B	92*
1.9607^{C}	$1s2p\ ^1P^o_1$	$2s^2\ ^1S_0$	[49 848 620]	[100 851 000]		3.3 – 2	5.7+13	D	82, 92*
1.9515^{C}	$1s2p\ ^3P^o_1$	$2s^2\ ^1S_0$	[49 607 700]	[100 851 000]		2.1 – 2	3.7+13	D	82, 92*
1.9501^{C}	$1s2p\ ^1P^o_1$	$2p^2\ ^3P_0$	[49 848 620]	[101 126 000]					82
1.9476^{C}	1	1	[49 848 620]	[101 192 000]					82
1.9458^{C}	1	2	[49 848 620]	[101 240 000]		2.3 – 1	8.1+13	D	82, 92*
1.9491^{C}	$1s2s\ ^1S_0$	$2s2p\ ^3P^o_1$	[49 612 040]	[100 917 000]					82
1.9423^{C}	$1s2p\ ^3P^o_2$	$2p^2\ ^3P_1$	[49 707 130]	[101 192 000]		3.4 – 1	2.0+14	C	82, 92*
1.9411^{C}	1	0	[49 607 700]	[101 126 000]		2.6 – 1	4.5+14	C	82, 92*
1.9405^{C}	2	2	[49 707 130]	[101 240 000]		7.5 – 1	2.6+14	C	82, 92*
1.9386^{C}	1	1	[49 607 700]	[101 192 000]		1.9 – 1	1.1+14	C	82, 92*
1.9381^{C}	0	1	[49 592 800]	[101 192 000]		2.7 – 1	1.6+14	C	82, 92*
1.9368^{C}	1	2	[49 607 700]	[101 240 000]		4.2 – 1	1.5+14	C	82, 92*
1.9412^{C}	$1s2s\ ^3S_1$	$2s2p\ ^3P^o_0$	[49 370 240]	[100 885 000]		1.4 – 1	2.4+14	C	82, 92*
1.9400^{C}	1	1	[49 370 240]	[100 917 000]		3.9 – 1	2.3+14	C	82, 92*
1.9361^{C}	1	2	[49 370 240]	[101 020 000]		6.6 – 1	2.4+14	C	82, 92*
1.9404^{C}	$1s2p\ ^1P^o_1$	$2p^2\ ^1D_2$	[49 848 620]	[101 384 000]		1.1	3.8+14	C	82, 92*

Mn XXIV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1.9351[C]	$1s2p\ ^3P^o_2$	$2p^2\ ^1D_2$	[49 707 130]	[101 384 000]		3.1 − 1	1.1+14	C	82, 92*
1.9314[C]	1	2	[49 607 700]	[101 384 000]					82
1.9348[C]	$1s2s\ ^1S_0$	$2s2p\ ^1P^o_1$	[49 612 040]	[101 297 000]		4.0 − 1	2.4+14	C	82, 92*
1.9301[C]	$1s2p\ ^1P^o_1$	$2p^2\ ^1S_0$	[49 848 620]	[101 659 000]		2.3 − 1	4.2+14	C	82, 92*
1.9258[C]	$1s2s\ ^3S_1$	$2s2p\ ^1P^o_1$	[49 370 240]	[101 297 000]					82
1.9212[C]	$1s2p\ ^3P^o_1$	$2p^2\ ^1S_0$	[49 607 700]	[101 659 000]					82
1.70781[C]	$1s^2\ ^1S_0$	$1s3p\ ^3P^o_1$	0	[58 554 500]		1.5 − 2	1.1+13	E	92*
1.70583[C]	$1s^2\ ^1S_0$	$1s3p\ ^1P^o_1$	0	[58 622 500]		1.39 − 1	1.06+14	C+	92*
1.62147[C]	$1s^2\ ^1S_0$	$1s4p\ ^3P^o_1$	0	[61 672 500]		5.1 − 3	4.3+12	E	92*
1.62071[C]	$1s^2\ ^1S_0$	$1s4p\ ^1P^o_1$	0	[61 701 200]		5.1 − 2	4.32+13	C+	92*
1.58449[C]	$1s^2\ ^1S_0$	$1s5p\ ^3P^o_1$	0	[63 111 900]		2.5 − 3	2.2+12	E	92*
1.58412[C]	$1s^2\ ^1S_0$	$1s5p\ ^1P^o_1$	0	[63 126 600]		2.46 − 2	2.18+13	C+	92*

Mn XXV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2377^C	$3s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[61 453 640]	[61 495 690]		4.42 − 2	1.30+7	A	91*
2314^C	$3p\ ^2P^o_{1/2}$	$3d\ ^2D_{3/2}$	[61 452 400]	[61 495 610]		2.84 − 2	8.83+6	A	91*
704.027^C	$2s\ ^2S_{1/2}$	$2p\ ^2P^o_{3/2}$	[51 813 490]	[51 955 530]		2.49 − 2	8.36+7	A	91*
29.9508^C	$3d\ ^2D_{5/2}$	$4f\ ^2F^o_{7/2}$	[61 509 820]	[64 848 630]		5.82	5.41+12	A	91*
29.8511^C	$3p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[61 495 690]	[64 845 650]		2.24	2.79+12	A	91*
29.5329^C	$3s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[61 453 640]	[64 839 690]		6.56 − 1	1.26+12	A	91*
20.4818^C	$3d\ ^2D_{5/2}$	$5f\ ^2F^o_{7/2}$	[61 509 820]	[66 392 200]		8.96 − 1	1.78+12	A	91*
20.4291^C	$3p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[61 495 690]	[66 390 670]		5.03 − 1	1.34+12	A	91*
20.2676^C	$3s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[61 453 640]	[66 387 620]		1.63 − 1	6.63+11	A	91*
10.4665^C	$2p\ ^2P^o_{3/2}$	$3d\ ^2D_{5/2}$	[51 955 530]	[61 509 820]		2.51	2.55+13	A	91*
10.3282^C	$2s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[51 813 490]	[61 495 690]		5.90 − 1	9.22+12	A	91*
7.757880^C	$2p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[51 955 530]	[64 845 650]		4.39 − 1	8.12+12	A	91*
7.676836^C	$2s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[51 813 490]	[64 839 690]		1.39 − 1	3.93+12	A	91*
6.927539^C	$2p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[51 955 530]	[66 390 670]		1.60 − 1	3.71+12	A	91*
6.861473^C	$2s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[51 813 490]	[66 387 620]		5.66 − 2	2.00+12	A	91*
1.930147^C	$1s\ ^2S_{1/2}$	$2p\ ^2P^o_{1/2}$	0	[51 809 520]		2.80 − 1	2.50+14	A	91*
1.924723^C	1/2	3/2	0	[51 955 530]		5.61 − 1	2.52+14	A	91*
1.627276^C	$1s\ ^2S_{1/2}$	$3p\ ^2P^o_{1/2}$	0	[61 452 400]		5.32 − 2	6.70+13	A	91*
1.626130^C	1/2	3/2	0	[61 495 690]		1.06 − 1	6.71+13	A	91*
1.542265^C	$1s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	0	[64 839 690]		3.90 − 2	2.73+13	A	91*
1.506305^C	$1s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	0	[66 387 620]		1.87 − 2	1.38+13	A	91*

2.5.3. References for Comments and Tables for Mn Ions

[1] W. M. Cady, Phys. Rev. **43**, 322 (1933).
[2] W. H. King, J. Phys. B **10**, 3381 (1977).
[3] A. N. Ryabtsev, Opt. Spectrosc. (USSR) **53**, 13 (1982).
[4] J. Sugar and C. Corliss, J. Phys. Chem. Ref. Data **14**, Suppl. 2 (1985).
[5] P. G. Kruger and S. G. Weissberg, Phys. Rev. **52**, 314 (1937).
[6] A. H. Gabriel, B. C. Fawcett, and C. Jordan, Nature **206**, 390 (1965).
[7] A. H. Gabriel, B. C. Fawcett, and C. Jordan, Proc. Phys. Soc. **87**, 825 (1966).
[8] U. Feldman and B. S. Fraenkel, Astrophys. J. **145**, 959 (1966).
[9] R. D. Cowan, Astrophys. J. **147**, 377 (1967).
[10] A. A. Ramonas and A. N. Ryabtsev, Opt. Spectrosc. **48**, 348 (1980).
[11] P. G. Kruger and S. G. Weissberg, Phys. Rev. **48**, 659 (1935).
[12] P. G. Kruger, S. G. Weissberg, and L. W. Phillips, Phys. Rev. **51**, 1090 (1937).
[13] E. Alexander, U. Feldman, and B. S. Fraenkel, J. Opt. Soc. Am. **55**, 650 (1965).
[14] R. Smitt and L. A. Svensson, Phys. Scr. **27**, 364 (1983).
[15] E. Alexander, U. Feldman, B. S. Fraenkel, and S. Hoory, Nature **204**, 176 (1965).
[16] W. J. Wagner and L. L. House, Astrophys. J. **166**, 683 (1971).
[17] B. C. Fawcett and N. J. Peacock, Proc. Phys. Soc. **91**, 973 (1967).
[18] R. Smitt, L. A. Svensson, and M. Outred, Phys. Scr. **13**, 293 (1976).
[19] B. C. Fawcett and A. H. Gabriel, Proc. Phys. Soc. **88**, 262 (1966).
[20] G. E. Bromage, R. D. Cowan, and B. C. Fawcett, Phys. Scr. **15**, 177 (1977).
[21] S. G. Weissberg and P. G. Kruger, Phys. Rev. **49**, 872 (1936).
[22] B. Edlén, Z. Phys. **104**, 407 (1937).
[23] B. C. Fawcett, N. J. Peacock, and R. D. Cowan, J. Phys. B **1**, 295 (1968).
[24] B. C. Fawcett, R. D. Cowan, E. Y. Kononov, and R. W. Hayes, J. Phys. B **5**, 1255 (1972).
[25] W. Lotz, J. Opt. Soc. Am. **57**, 873 (1967).
[26] B. C. Fawcett, J. Phys. B **3**, 1732 (1970).
[27] B. C. Fawcett, J. Phys. B **4**, 1577 (1971).
[28] B. Edlén, Z. Phys. **104**, 188 (1937).
[29] G. D. Sandlin, G. E. Brueckner, and R. Tousey, Astrophys. J. **214**, 898 (1977).
[30] U. Feldman and G. A. Doschek, J. Opt. Soc. Am. **67**, 726 (1977).
[31] B. C. Fawcett, A. H. Gabriel, and P. A. H. Saunders, Proc. Phys. Soc. **90**, 863 (1967).
[32] J. T. Jefferies, F. Q. Orrall, and J. B. Zirker, Solar Phys. **16**, 103 (1971).
[33] J. T. Jefferies, Mem. Soc. Roy. Sci. Liége. **17**, 213 (1969).
[34] G. D. Sandlin and R. Tousey, Astrophys. J. **227**, L107 (1979).
[35] E. Träbert, P. H. Heckmann, R. Hutton, and I. Martinson, J. Opt. Soc. Am. B **5**, 2173 (1988).
[36] B. C. Fawcett, R. D. Cowan, and R. W. Hayes, J. Phys. B **5**, 2143 (1972).
[37] S. O. Kastner, M. Swartz, A. K. Bhatia, and J. Lapides, J. Opt. Soc. Am. **68**, 1558 (1978).
[38] U. Litzén and A. Redfors, Phys. Lett. A **127**, 88 (1988).
[39] A. Redfors and U. Litzén, J. Opt. Soc. Am. B **6**, 1447 (1989).
[40] V. E. Levashov, A. N. Ryabtsev, and S. S. Churilov, Opt. Spectrosc. **69**, 20 (1990).
[41] S. S. Churilov and V. E. Levashov, Phys. Scr. **48**, 425 (1993).
[42] B. Edlén, Z. Phys. **103**, 536 (1936).
[43] K. P. Dere, Astrophys. J. **221**, 1062 (1978).
[44] U. Litzén and A. Redfors, Phys. Scr. **36**, 895 (1987).
[45] V. E. Levashov and S. S. Churilov, Opt. Spectrosc. **65**, 143 (1988).
[46] A. Redfors, Phys. Scr. **38**, 702 (1988).
[47] B. C. Fawcett, R. D. Cowan, and R. W. Hayes, J. Phys. B. **5**, 2143 (1972), Supplementary Publication No. SUP 70005 (1972).
[48] K. G. Widing, G. D. Sandlin, and R. Cowan, Astrophys. J. **169**, 405 (1971).
[49] J. Reader, V. Kaufman, J. Sugar, J. O. Ekberg, U. Feldman, C. M. Brown, J. F. Seely, and W. L. Rowan, J. Opt. Soc. Am. B **4**, 1821 (1987).
[50] B. Edlén, Z. Phys. **100**, 621 (1936).
[51] L. Cohen and W. E. Behring, J. Opt. Soc. Am. **66**, 899 (1976).
[52] K. D. Lawson and N. J. Peacock, J. Phys. B **13**, 3313 (1980).
[53] B. Edlén, Phys. Scr. **17**, 565 (1978).
[54] F. Tyrén, Z. Phys. **111**, 314 (1938).
[55] M. Swartz, S. Kastner, E. Rothe, and W. Neupert, J. Phys. B **4**, 1747 (1971).
[56] S. O. Kastner, Astrophys. J. **275**, 922 (1983).
[57] C. Jupén, U. Litzén, V. Kaufman, and J. Sugar, Phys. Rev. A **35**, 116 (1987).
[58] C. Jupén and U. Litzén, Phys. Scr. **33**, 509 (1986).
[59] S. O. Kastner, W. E. Behring, and L. Cohen, Astrophys. J. **199**, 777 (1975).
[60] B. C. Fawcett, G. E. Bromage, and R. W. Hayes, Mon. Not. Roy. Astron. Soc. **186**, 113 (1979).
[61] B. C. Fawcett, J. Phys. B **4**, 981 (1971).
[62] G. A. Doschek, U. Feldman, R. D. Cowan, and L. Cohen, Astrophys. J. **188**, 417 (1974).
[63] TFR Group, Phys. Lett. **74A**, 57 (1979).
[64] U. Feldman, G. A. Doschek, R. D. Cowan, and L. Cohen, J. Opt. Soc. Am. **63**, 1445 (1973).
[65] K. T. Cheng, unpublished material (1981).
[66] W. C. Martin, unpublished material (1982).
[67] G. A. Doschek, U. Feldman, J. Davis, and R. D. Cowan, Phys. Rev. A **12**, 980 (1975).
[68] G. A. Doschek, U. Feldman, and L. Cohen, J. Opt. Soc. Am. **63**, 1463 (1973).
[69] B. C. Fawcett and R. W. Hayes, Mon. Not. Roy. Astron. Soc. **170**, 185 (1975).
[70] U. Feldman, G. A. Doschek, R. D. Cowan, and L. Cohen, Astrophys. J. **196**, 613 (1975).
[71] B. Edlén, Phys. Scr. **31**, 345 (1985).
[72] G. A. Doschek, U. Feldman, and L. Cohen, J. Opt. Soc. Am. **65**, 463 (1975).
[73] B. Edlén, Phys. Scr. **28**, 483 (1983).
[74] G. D. Sandlin, G. E. Brueckner, V. E. Scherrer, and R. Tousey, Astrophys. J. **205**, L47 (1976).
[75] J. H. Davé, U. Feldman, J. F. Seely, A. Wouters, S. Suckewer, E. Hinnov, and J. L. Schwob, J. Opt. Soc. Am. B **4**, 635 (1987).
[76] V. A. Boiko, S. A. Pikuz, U. I. Safronova, and A. Ya. Faenov, J. Phys. B **10**, 1253 (1977).
[77] V. A. Boiko, A. Ya. Faenov, and S. A. Pikuz, J. Quant. Spectrosc. Radiat. Transfer **19**, 11 (1978).
[78] Y. -K. Kim, W. C. Martin, and A. W. Weiss, J. Opt. Soc. Am. B **5**, 2215 (1988).
[79] K. G. Widing and J. D. Purcell, Astrophys. J. **204**, L151 (1976).
[80] Y. -K. Kim, D. H. Baik, P. Indelicato, and J. P. Desclaux, Phys. Rev. A **44**, 148 (1991).
[81] S. Goldsmith, U. Feldman, L. Oren, and L. Cohen, Astrophys. J. **174**, 209 (1972).
[82] L. A. Vainshtein and U. I. Safronova, Reprint No. 2, Acad. Nauk USSR, Inst. Spectrosc. Moscow (1985).
[83] B. Edlén, Phys. Scr. **19**, 255 (1979).
[84] K. T. Cheng, M. H. Chen, W. R. Johnson, and J. Sapirstein, Phys. Rev. A **50**, 247 (1994).
[85] K. T. Cheng, private communication (1996).
[86] W. R. Johnson and G. Soff, Atom. Data Nucl. Data Tables **33**, 405 (1985).
[87] G. W. F. Drake, *Calculated transition frequencies for helium-like ions*, unpublished (1985).

[88] P. Beiersdorfer, M. Bitter, S. von Goeler, and K. W. Hill, Phys. Rev. A **40**, 150 (1989).

[89] P. J. Mohr, Atom. Data Nucl. Data Tables **29**, 453 (1983).

[90] G. W. Erickson, J. Phys. Chem. Ref. Data **6**, 831 (1977).

[91] W. L. Wiese, M. W. Smith, and B. M. Glennon, Natl. Stand. Ref. Data Ser., Natl. Bur. Stand. (U.S.) **4**, Vol. I, U. S. Govt. Print. Office, Washington, D.C. (1966).

[92] G. A. Martin, J. R. Fuhr, and W. L. Wiese, J. Phys. Chem. Ref. Data **17**, Suppl. 3 (1988).

[93] S. M. Younger and A. W. Weiss, J. Res. Natl. Bur. Stand. Sec. **79A**, 629 (1975).

[94] L. Cohen, U. Feldman, and S. O. Kastner, J. Opt. Soc. Am. **58**, 331 (1968).

[95] L. A. Svensson, Solar Phys. **18**, 232 (1971).

[96] L. A. Vainshtein and U. I. Safronova, Phys. Scr. **31**, 519 (1985).

2.6. Iron

2.6.1. Brief Comments on Each Iron Ion

Fe VII

Ca I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^6 3d^2$ $^3F_2$

Ionization energy 1 008 000 ± 100 cm^{-1}
(124.98 ± 0.01 eV)

Cady [1] classified 33 lines of the $3d^2 - 3d4p$ array. This was followed by Bowen's [2] observation of forbidden lines within the ground configuration. In an extensive analysis Ekberg [3] classified more than 400 lines in the range of 104 − 270 Å as transitions from $3d4p$, $3dnf$ ($n = 4 - 10$), $3p^5 3d^3$, and $3p^5 3d^2 4s$ configurations to the ground configuration with an estimated uncertainty of ±0.003 Å and 20 lines of the $3d4s - 3d4p$ transition array from 1010−1362 Å with an uncertainty of ±0.005 Å. He also gave wavelength values for the forbidden transitions including the lines classified by Bowen. His results are adopted here.

The value for the ionization energy was derived by Ekberg [3] from the nf series.

Fe VIII

K I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^6 3d$ $^2D_{3/2}$

Ionization energy 1 218 380 ± 100 cm^{-1}
(151.061 ± 0.012 eV)

The $3p^6 3d - 3p^5 3d^2$ transition array in the wavelength region of 167 − 233 Å was first identified by Gabriel *et al.* [4] and Cowan and Peacock [5]. Improved wavelengths with an uncertainty of ±0.003 Å were obtained by Ramonas and Ryabtsev [6] for this array.

Cowan [7] classified 17 solar lines in the range 112 − 121 Å, observed by Feldman and Fraenkel [8] as the $3p^6 3d - 3p^5 3d4s$ array. Ramonas and Ryabtsev [6] identified 22 lines in this array. Their wavelengths, with an uncertainty of ±0.003 Å, are adopted here. In addition, the lines at 120.31 Å and 114.05 Å for the $^2D_{5/2} - (^3P^\circ)\ ^4P^\circ_{3/2}$ and $^2D_{3/2} - (^3D^\circ)\ ^4D^\circ_{5/2}$ transitions are included from Cowan's identifications. Ramonas and Ryabtsev interchanged the designations for the levels 879 021 cm^{-1} and 884 331 cm^{-1}.

Measurements of $4p - 5s$, $4p - 6s$, $3d - 4p$, and $3d - nf$ ($n = 4 - 7$) transitions were published by Kruger and Weissberg [9]. The $4p - 5s$ and $4p - 6s$ line identifications were shown to be incorrect by Alexander *et al.* [10] who also remeasured the $3d - 6f$ and $3d - 7f$ transitions. The $3d - 4f$ lines were observed in solar flares by Behring *et al.* [11] and Malinovsky and Heroux [12]. The wavelengths for $3d - 4p$ and $3d - nf$ ($n = 4 - 7$) transitions are from Ramonas and Ryabtsev.

The value for the ionization energy was derived by Sugar and Corliss [13] from the nf series.

Fe IX

Ar I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^6$ $^1S_0$

Ionization energy 1 884 000 ± 3000 cm^{-1}
(233.6 ± 0.4 eV)

From solar observations Sandlin *et al.* [14] identified the following four lines as magnetic-dipole (M1) transitions within the $3p^5 3d$ configurations: $^3F^\circ_4 - {}^1F^\circ_3$ at 2497.5 Å, $^3P^\circ_2 - {}^3D^\circ_2$ at 2042.35±0.01 Å, $^3P^\circ_1 - {}^3D^\circ_2$ at 1841.57±0.02 Å and $^3P^\circ_2 - {}^1F^\circ_3$ at 1917.21±0.02 Å. These wavelengths are in good agreement with those measured by Feldman and Doschek [15].

Five coronal lines in the range 171−245 Å, observed by Behring *et al.* [11], were identified by Svensson *et al.* [16] as the $3p^6 - 3p^5 3d$ resonance transitions. With the known levels of $3p^5 3d$, they identified 10 coronal M1 lines. Edlén and Smitt [17] derived the energies of the $3p^5 3d$ levels from lines observed by Jefferies [18], Jefferies *et al.* [19] and Sandlin *et al.* [14], utilizing the improved solar wavelengths of the resonance transitions by Behring *et al.* [20]. Seven M1 lines above 3000 Å, having an uncertainty of ±0.4 Å, are from Ref. [19] and an additional M1 line at 3000 Å is taken from Ref. [18].

Smitt and Svensson [21] assigned 19 lines in the range 311 − 605 Å to the $3s^2 3p^5 3d - 3s3p^6 3d$ transitions. The uncertainty of their wavelengths is ±0.01 Å.

The $3p - 4s$ transitions were first identified by Kruger *et al.* [22]. There are many solar observations of these lines including the work of Zirin [23] and Feldman *et al.* [24]. The wavelength values of 103.566 Å and 105.208 Å are from Fawcett *et al.* [25] and are quoted here.

The $3p^6$ $^1S_0 - 3p^5 4d$ $^3P^\circ_1$ and $^1P^\circ_1$ transitions were first identified by Alexander *et al.* [10], whose wavelength values were revised to 83.457 Å and 82.430 Å by Fawcett *et al.* [25]

Wagner and House [26] measured 12 lines in the range 111 − 117 Å with an uncertainty of ±0.02 Å, which they assigned to the $3p^5 3d - 3p^5 4f$ array. More accurate measurements of nine of these lines, with an uncertainty of ±0.007 Å, were made with a laboratory plasma by Fawcett *et al.* [25], whose wavelengths are tabulated. Wavelengths for the other transitions, including an additional transition $3p^5 3d$ $^1F^\circ_3 - 3p^5(^2P^\circ_{3/2})4f$ $[^7/_2]_4$ at 118.27 Å, are taken from Swartz *et al.* [27].

Alexander *et al.* [10] identified two lines at 72.85 Å and 73.63 Å as $3p^6$ $^1S_0 - 3p^5 5s$ $(^1/_2, ^1/_2)^\circ_1$ and $3p^6$ $^1S_0 - 3p^5 5s$ $(^3/_2, ^1/_2)^\circ_1$ transitions.

The resonance line from the $3s3p^64p\ ^1P^\circ_1$ level at 72.891±0.005 Å was identified by Kastner *et al.* [28].

The value for the ionization energy was derived by Sugar and Corliss from the $3p^5ns$ series [13].

Fe X

Cl I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^5\ ^2P^\circ_{3/2}$

Ionization energy 2 114 000 ± 1000 cm^{-1} (262.1 ± 0.1 eV)

The M1 line arising from the $3s^23p^5\ ^2P^\circ_{3/2} - ^2P^\circ_{1/2}$ transition was reported by Grotrian [29]. We adopted his wavelength of 6374.51 Å. The analysis by Smitt [30] resulted in the identification of seven lines of the multiplet $3s^23p^4(^3P)3d\ ^4D - 3s3p^5(^3P^\circ)3d\ ^4F^\circ$ and nine lines of $3s^23p^4(^3P)3d\ ^4F - 3s3p^5(^3P^\circ)3d\ ^4F^\circ$ in the ranges 317 – 325 Å and 354 – 367 Å, respectively. From these $3p^43d$ term intervals, he identified 11 coronal lines as M1 transitions. Edlén and Smitt [17] improved the level values with the wavelengths of Jefferies *et al.* [19] and Magnant-Crifo [31] above 3000 Å and of Sandlin *et al.* [14] below 3000 Å.

The $3s^23p^5\ ^2P^\circ_{1/2,3/2} - 3s3p^6\ ^2S_{1/2}$ transitions were identified by Fawcett [32] in a laboratory plasma and by Widing *et al.* [33] in the solar corona. More accurate wavelengths of 365.543±0.008 Å and 345.723±0.008 Å for these transitions were measured by Smitt *et al.* [34]

An analysis of the $3p^5 - 3p^43d$ array was made by Fawcett and Gabriel [35] and Smitt [30]. It was extended by Bromage *et al.* [36] who used wavelengths of solar coronal lines measured by Behring *et al.* [11,20].

The $3p^5 - 3p^44s$ transitions in the range 94 – 98 Å were identified by Edlén [37]. His measurements are quoted.

Wavelengths of the $3p^43d - 3p^44p$, $3p^5 - 3p^44d$ and $3p^43d - 3p^44f$ transitions were observed by Fawcett *et al.* [25] in the range of 75 – 145 Å in a laboratory plasma with an accuracy of ±0.01 Å.

The value for the ionization energy was derived by Edlén [37] by extrapolation.

Fe XI

S I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^4\ ^3P_2$

Ionization energy 2 341 000 cm^{-1} (290.3 eV)

Grotrian [29] identified a solar line at 7891 Å as the $3s^23p^4\ ^3P_2 - ^3P_1$ transition. Edlén [38] confirmed this identification and classified a line at 3986.9 Å in the solar corona as the $3s^23p^4\ ^3P_1 - ^1D_2$ transition. Wavelengths of 7891.8 Å and 3986.8 Å are taken from improved measurements with an accuracy of ±0.4 Å by Jefferies *et al.* [19]. Sandlin *et al.* [14] identified two solar coronal lines at 1467.06 Å and 2648.71 Å with accuracies of ±0.01 Å and ±0.02 Å, respectively, as the $3p^23p^4\ ^3P_1 - ^1S_0$ and $^3P_2 - ^1D_2$ transitions.

The $3s^23p^4\ ^3P - 3s3p^5\ ^3P^\circ$ triplet in the wavelength range 341 – 370 Å was identified in a laboratory plasma by Fawcett [32] and in the solar corona by Widing *et al.* [33]. Smitt *et al.* [34] carried out improved measurements of these lines with an uncertainty of ±0.008 Å. They also identified a new line at 355.837 Å as the $3s^23p^4\ ^1S_0 - 3s3p^5\ ^1P^\circ_1$ transition and attributed a line at 308.544 Å observed by Behring *et al.* [20] to the $3s^23p^4\ ^1D_2 - 3s3p^5\ ^1P^\circ_1$ transition.

Classifications of the $3p^4 - 3p^33d$ transitions in the range 176 – 202 Å were provided by Gabriel *et al.* [39], Fawcett and Gabriel [35], and Fawcett [32] from laboratory plasmas. A more comprehensive classification of this array, using solar wavelengths with an accuracy of ±0.008 Å by Behring *et al.* [11], was reported by Bromage *et al.* [36]. They included newly identified lines in the spectrum analyzed earlier by Fawcett [32]. The $3p^3(^2D^\circ)3d$ level without a major eigenvector component is represented by the symbol $(N)_J$, the index N increasing with energy from the lowest level (N= 1) for each J.

Edlén [40] identified 12 lines in the range 86 – 91 Å as $3p^4 - 3p^34s$ transitions. As later noted by Edlén [38], the classifications of the lines at 86.149 Å as $3p^4\ ^3P_2 - 3p^3(^2D^\circ)4s\ ^1D^\circ_2$ and 89.771 Å as $3p^4\ ^1D_2 - 3p^3(^2D^\circ)4s\ ^3D^\circ_3$ are incorrect.

Fawcett *et al.* [25] classified the $3p^33d - 3p^34p$, $3p^33d - 3p^34f$, and $3p^4 - 3p^34d$ transitions in the ranges 121 – 125 Å, 91 – 94 Å, and 72 – 73 Å, respectively. The uncertainty of the wavelengths is ±0.01 Å.

The value for the ionization energy was derived by Lotz [41] by extrapolation.

Fe XII

P I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^3\ ^4S^\circ_{3/2}$

Ionization energy 2 668 000 cm^{-1} (330.8 eV)

Forbidden transitions between terms in the ground configuration were observed in the solar corona. The $^4S^\circ - ^2P^\circ$ transitions were identified by Burton *et al.* [42], Burton and Ridgeley [43], and Doschek *et al.* [44]. Gabriel *et al.* [45] identified the line at 2169.7 Å as the $^4S^\circ_{3/2} - ^2D^\circ_{5/2}$ transition. More comprehensive observations were made by Sandlin *et al.* [14], who identified five M1 transitions: $^2D^\circ_{3/2} - ^2P^\circ_{3/2}$ at 2565.93±0.06 Å, $^4S^\circ_{3/2} - ^2D^\circ_{3/2}$ at 2405.68±0.01 Å, $^4S^\circ_{3/2} - ^2D^\circ_{5/2}$ at 2169.08±0.02 Å, $^4S^\circ_{3/2} - ^2P^\circ_{1/2}$ at 1349.40±0.01 Å, and $^4S^\circ_{3/2} - ^2P^\circ_{3/2}$ at 1242.00±0.01 Å. For the $^2D^\circ_{3/2} - ^2P^\circ_{1/2}$ transition, Svensson [46] assigned the line of 3072.0 Å measured by Jefferies *et al.* [19].

The classification of the $3s^23p^3 - 3s3p^4$ transitions in the range 283 – 383 Å was given by Fawcett [47] from observations of a laser-produced plasma. Widing *et al.* [33] classified the $^4S^\circ - ^4P$ and the $^2D^\circ_{5/2} - ^4D_{5/2}$ transitions observed in the solar corona. Fawcett [32] and Behring *et al.* [20] obtained wavelengths with an uncertainty of ±0.05 Å from a laboratory plasma, and with an uncertainty of ±0.04 Å from the solar corona. Three wavelengths, 382.83 Å, 335.06 Å, and 283.64 Å, are from the former article and the others are from the latter. These wavelengths were employed by Bromage *et al.* [48] to obtain the $3s3p^4$ levels. The $3s3p^4$ and $3p^23d$ levels without major eigenvector components are represented by the symbol $(N)_J$, the index N increasing with energy from the lowest level (N=1) for each J.

Fawcett [32] and Behring *et al.* [20] identified the $3p^3 - 3p^23d$ transitions in the range 186 – 220 Å. Bromage *et al.* [48] classified 17 lines.

Classifications of the $3p^3 - 3p^24s$, $3p^3 - 3p^24d$, $3p^33d - 3p^34p$, and $3p^33d - 3p^34f$ transitions were made by Fawcett *et al.* [25] with a laboratory plasma. Their wavelengths in the range 65 – 111 Å were measured with an uncertainty of ±0.01 Å.

The value for the ionization energy was obtained by Lotz [41] by extrapolation.

Fe XIII

Si I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^2\ ^3P_0$

Ionization energy 2 912 000 cm^{-1} (361.0 eV)

Wavelengths tabulated as M1 transitions within the $3p^2$ configuration are from the solar coronal observations of Jefferies *et al.* [19] above 3000 Å and from Sandlin *et al.* [14] below 3000 Å. The $3p^2\ ^3P - ^3P$ and $3p^2\ ^3P_2 - ^1D_2$ transitions were first identified by Edlén [38] and the $3p^2\ ^3P_1 - ^1S_0$ transition by Gabriel *et al.* [45].

The $3s^23p^2 - 3s3p^3$ and $3s^23p^2 - 3s^23p3d$ transition arrays were observed in a laboratory plasma by Fawcett [32], who extended the analysis by Fawcett *et al.* [49] and Fawcett [47]. These lines were present in solar coronal observations made by Widing *et al.* [33], Malinovsky and Heroux [12], and Behring *et al.* [20]. The wavelength values with three decimal places in the 197 – 360 Å range are taken from Ref. [20], with the additional identifications by Bromage *et al.* [48]. The line at 227.479 Å classified as $3p^2\ ^1D_2 - 3p3d\ ^3P^\circ_2$ was not included in this compilation because this wavelength is different by 0.68 Å from that calculated from the level values. Uncertainties in the wavelengths vary from ±0.004 to ±0.01 Å. Wavelengths given with two decimal places are from the earlier measurements.

Fawcett *et al.* [25] measured the $3p^2 - 3p4s$, $3p^2 - 3p4d$, $3p3d - 3p4p$, and $3p3d - 3p4f$ transitions in the range 62 – 108 Å with an uncertainty of ±0.01 Å. They showed that the solar line classifications of the $3p^2\ ^3P - 3p4s\ ^3P^\circ$ transitions by Zirin [23], Widing and Sandlin [50] and Behring *et al.* [11] were incorrect. The $3p^2 - 3p4d$ and $3p3d - 3p4f$ transitions were remeasured by Kastner *et al.* [51], from which the wavelengths of the $3p3d\ ^3D^\circ_2 - 3p4f\ ^3F_3$ line at 82.010 Å, the $3p3d\ ^3P^\circ_0 - 3p4f\ ^3D_1$ at 81.154 Å, the $3p3d\ ^1P^\circ_1 - 3p4f\ ^1D_2$ at 85.461 Å, and the $3p^2 - 3p4d$ transitions are taken. It should be noted that the two lines at 82.010 Å and 81.154 Å were tentative identifications.

In a beam-foil spectrum, Träbert *et al.* [52] identified the intersystem lines $3s^23p^2\ ^3P_{1,2} - 3s3p^3\ ^5S^\circ_2$ at 487.20±0.4 Å and 510.37±0.3 Å. One of these, 487.08±0.03 Å, appears in the solar coronal spectrum of Dere [53].

The value for the ionization energy was derived by Lotz [41] by extrapolation.

Fe XIV

Al I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p\ ^2P^\circ_{1/2}$

Ionization energy 3 163 000 cm^{-1} (392.2 eV)

Edlén [38] identified the solar coronal line at 5302.86 Å as the transition $3s^23p\ ^2P^\circ_{1/2} - ^2P^\circ_{3/2}$. This line was also observed by Jefferies *et al.* [19].

The wavelengths of $3s^23p - 3s3p^2$ transitions in the range 252 – 357 Å were measured in laser-produced plasmas by Fawcett and Peacock [54], and Fawcett [47,32]. The $3s^23p\ ^2P^\circ - 3s^23d\ ^2D$ line was first identified by Gabriel *et al.* [39]. Solar coronal line identifications were reported for these transitions by Behring *et al.* [20] with an uncertainty of ±0.005 Å. The fine structure splitting of the term $3s3p^2\ ^4P$ was measured by Litzén and Redfors [55]. An extended analysis of the transitions among all terms in the configurations $3s^23p$, $3s3p^2$, $3s^23d$, $3p^3$, and $3s3p3d$ (except $^4F^\circ$) was reported by Redfors and Litzén [56] with wavelength uncertainties of ±0.02 Å from a laser-produced plasma. Levashov *et al.* [57] found two new lines at 212.145 Å and 212.345 Å of the $3s3p^2\ ^4P_{3/2} - 3s3p(^3P^\circ)3d\ ^4P^\circ_{3/2,1/2}$ transitions. Additional $n = 3$ transitions were identified by Pinnington *et al.* [58] in a beam-foil measurement with an estimated wavelength uncertainty of ±0.1 Å.

The transition arrays $3p^3$, $3s3p3d - 3p^23d$, $3s3d^2$ were reobserved by Churilov and Levashov [59] in a laser-produced plasma with an estimated uncertainty of ±0.01 Å. They determined new values for the energy levels of the configurations with $n = 3$. We have adopted their results except for the $3p^3\ ^2P^\circ_{1/2}$ level of Ref. [56]. It should be noted that the term designations of $3s3p(^3P^\circ)3d\ ^4P^\circ_{1/2,3/2}$ and $3s3p(^1P^\circ)3d\ ^2P^\circ_{3/2}$ have been interchanged with $3s3p(^3P^\circ)3d\ ^4D^\circ_{1/2,3/2}$ and $3s3p(^1P^\circ)3d\ ^2D^\circ_{3/2}$, because of the level crossing at Mn, as shown in the calculation of Redfors and Litzén [56].

Classifications of the $n = 3-4$ transitions were made in the range 58 – 92 Å by Edlén [60] for the $3p-4d$ doublet and by Fawcett *et al.* [25] for the $3d-4p$, $3d-4f$, and $3s3p^2 - 3s3p4s$ lines.

Spin-forbidden transitions $3s^23p\ ^2P^\circ - 3s3p^2\ ^4P$ were observed by Träbert *et al.* [52] in a beam-foil spectrum. Three of these, at 444.25±0.03 Å, 447.36±0.03 Å, and 467.40±0.03 Å, are taken from more accurate solar measurements of Dere [53].

The value for the ionization energy was derived by Lotz [41] by extrapolation.

Fe XV

Mg I isoelectronic sequence

Ground state $1s^22s^22p^63s^2\ ^1S_0$

Ionization energy 3 686 000 cm^{-1} (457 eV)

The line at 7058.6 Å was identified as the M1 transition $^3P^\circ_1 - ^3P^\circ_2$ in the configuration $3s3p$ by Jefferies *et al.* [19].

Transitions among the configurations $3s^2$, $3s3p$, $3s3d$, $3p^2$, and $3p3d$ were identified in the region 198 – 537 Å in a laser-produced spectrum by Churilov *et al.* [61], whose wavelengths and energy levels are adopted in the present compilation. Wavelengths were measured with an uncertainty of ±0.007 Å. Additional identifications completing the levels of $3p3d$ were reported by Litzén and Redfors [62]. Their wavelengths with an uncertainty of ±0.02 Å and their level values were included. The previous measurements of the 3 – 3 transitions by Peacock *et al.* [63], Fawcett [47,32], Fawcett *et al.* [25], Cowan and Widing [64], and Dere [53] were revised and extended by the above work.

The $3p3d - 3d^2$ transitions were first identified by Redfors [65] in the range 226.2 – 290.3 Å and reobserved by Levashov and Churilov [66] and Churilov *et al.* [67], who added four new lines. Wavelengths were given with an uncertainty of ±0.02 Å. The $3d^2\ ^3F$ and ^1G levels are taken from Ref. [65].

The wavelength of 417.258±0.01 Å for the $3s^2\ ^1S_0 - 3s3p\ ^3P^\circ_1$ intercombination line is taken from Behring *et al.* [20]; the identification was made by Cowan and Widing [64]. This line was also observed in tokamak plasmas by Finkenthal *et al.* [68] and Peacock *et al.* [69].

Fawcett *et al.* [25] classified the line $3s3p\ ^1P^\circ_1 - 3s4d\ ^1D_2$ at 59.404 Å, and the line $3s3d\ ^1D_2 - 3s4f\ ^1F^\circ_3$ at 71.029 Å. The latter transition was revised to 73.473 Å by Cowan and Widing [64]. They also suggested identifications of the transitions $3s3p\ ^1P^\circ_1 - 3s4s\ ^1S_0$ at 69.66 Å and $3p^2\ ^1D_2 - 3s4f\ ^1F^\circ_3$ at 63.96 Å.

Classification of the transition arrays $3p3d - 3p4f$ was reported by Fawcett *et al.* [25] and also by Kastner *et al.* [51]. The tabulated wavelengths are from the latter article except for the $3p3d\ ^3F^\circ - 3p4f\ ^3G$ lines, which are from the former. It should be noted that the line $3p3d\ ^3F^\circ_3 - 3p4f\ ^3F_4$ at 68.884 Å given as questionable by Kastner *et al.* has been excluded because it is inconsistent with the $^3F_4$ level obtained from the line at 71.062 Å.

The wavelengths of triplet arrays $3s3p\ ^3P^\circ - 3s4s\ ^3S$ and $3s3p\ ^3P^\circ - 3s5d\ ^3D$ were measured in the ranges of ~65 Å and ~41 Å by Feldman *et al.* [70]. Their wavelengths are uncertain to ±0.01 Å.

Edlén [60] identified the transitions $3s^2\ ^1S_0 - 3s4p\ ^1P^\circ_1$, $3s3p\ ^3P^\circ - 3s4d\ ^3D$, and $3s3d\ ^3D - 3snf\ ^3F^\circ (n = 4, 5)$ in the 50 – 70 Å range. The $3s^2\ ^1S_0 - 3s5p\ ^1P^\circ_1$, $3s3p\ ^3P^\circ_2 - 3s5s\ ^3S_1$, $3s3d\ ^3D_3 - 3s6f\ ^3F^\circ_4$, and $3s3d\ ^1D_2 - 3snf\ ^1F^\circ_3 (n = 5, 6)$ transitions were subsequently identified by Fawcett *et al.* [71]

The $2p^63s3p - 2p^53s^23p$ transitions were tentatively identified by Burkhalter *et al.* [72] who measured the wavelengths in the ~17 Å range with an uncertainty of ±0.01 Å.

The value for the ionization energy was derived by Sugar and Corliss [13] from the $3snf$ series.

Fe XVI

Na I isoelectronic sequence

Ground state $1s^22s^22p^63s\ ^2S_{1/2}$

Ionization energy 3 946 280 ± 300 cm^{-1} (489.276 eV)

The $3s - 3p$ and $3p - 3d$ lines in the region 250 – 360 Å were classified in a laboratory plasma by Peacock *et al.* [63]. Many measurements of these lines were reported in solar coronal and laboratory plasma observations, including those of Peacock *et al.* [69], Feldman *et al.* [70], and Behring *et al.* [20]. An isoelectronic comparison of the measured wavelengths, including the $3d - 4f$ doublet, with Dirac-Fock calculations was made by Reader *et al.* [73] for Ar^{7+} to Xe^{43+}, and least squares adjusted wavelength values were derived from the differences between theory and experiment. The overall uncertainty estimate is ± 0.007 Å. We give these results.

The $3s - 4p$, $3p - 4s$, $3p - nd$, and $3d - nf$ ($n = 4, 5$) transitions were identified by Edlén [74] in the range 39 – 67 Å. The $n = 3-4$ transitions including $3d-4p$ were reobserved by Fawcett *et al.* [25] with an uncertainty of ±0.01 Å. Except for the $3d - 4f$ transitions, their results are adopted here. Edlén's wavelengths are given for the $n = 3 - 5$ transitions.

The $4d\ ^2D - 5f\ ^2F^\circ$ transitions were identified by Lawson and Peacock [75], who also assigned the lines at 156.80 Å and 156.88 Å to the $4f\ ^2F^\circ - 5g\ ^2G$ array.

Transitions between highly excited levels ($5 \leq n \leq 9$) and the $n = 3$ levels were observed by Fawcett *et al.* [71] and Feldman *et al.* [70] with uncertainties of ±0.03 Å and ±0.01 Å.

The lines due to the $2p^63l - 2p^53s3l$ transitions in the range 16 – 18 Å were observed with an uncertainty of ±0.01 Å by Burkhalter *et al.* [72].

Jupén *el al.* [76] identified the line at 248.36±0.05 Å in a beam-foil spectrum as the $2p^53s3p\ ^4D_{7/2}$ – $2p^53s3d\ ^4F_{9/2}$ transition.

The value for the ionization energy was derived by Edlén [77] from a polarization formula applied to the nf series.

Fe XVII

Ne I isoelectronic sequence

Ground state $1s^22s^22p^6\ ^1S_0$

Ionization energy 10 180 000 ± 8000 cm^{-1}
(1262.2 ± 1.0 eV)

Jupén [78] classified 19 lines in solar flare spectra in the region 204 – 410 Å observed by Dere [53] to transitions among the $2p^53s$, $2p^53p$, and $2p^53d$ configurations on the basis of isoelectronic extrapolations. Some of Jupén's identifications were revised by Feldman *et al.* [79] using their own observations. From these they identified a wide line at 1153.20 Å as the $2p^53s\ ^3P^\circ_1 - ^3P^\circ_0$ magnetic-dipole (M1) transition. The uncertainty in the wavelength is estimated as ±0.03 Å. A new study of this spectrum by Buchet *et al.* [80] using a beam-foil light source confirms most of the identifications of Jupén and the corrections suggested by Feldman *et al.* However, Buchet *et al.* identify a line at 296.3 Å as the $2p^53s\ ^3P^\circ_1 - 2p^53p\ ^3P_0$ transition, whereas Feldman *et al.* identify it as the line at 295.98 Å. A second disagreement occurs for the transition $2p^53s\ ^3P^\circ_0 - 2p^53p\ ^1P_1$, for which Feldman *et al.* report 373.41 Å and Buchet *et al.* give 372.93 Å. For the present Fe XVII table we adopt the wavelengths given by Buchet *et al.* [80] supplemented by the lines 340.12 and 373.41 Å given by Feldman *et al.* [79]. These two lines are consistent with the M1 line at 1153.20 Å. For the line at 269.6 Å, classified both as the $2p^53p\ ^3D_2 - 2p^53d\ ^3F^\circ_3$ as well as the $2p^53p\ ^3S_1 - 2p^53d\ ^3P^\circ_0$ transitions, we adopted Dere's wavelengths, 269.41 and 269.88 Å, classified by Jupén.

The $2s^22p^53s - 2s2p^63s$ transitions were identified in a tokamak plasma by Finkenthal *et al.* [81]. Three lines due to the $^3P^\circ_{2,1,0} - ^3S_1$ transitions at 89.77 Å, 90.77 Å, and 98.38 Å are excluded because they give a fine structure splitting of the $^3P^\circ$ term that is inconsistent with that in the present compilation.

The identification of $2p^53p - 2p^54d$ transitions was reported by Kastner *et al.* [82]. From a laser-produced plasma Fawcett *et al.* [83] identified the $2p^53p - 2p^54s$, $2p^53p - 2p^54d$, $2p^53d - 2p^54f$, and $2p^53d - 2p^55f$ lines in the range of 41 – 60 Å. Level designations of $3p$ and $4d$ are given in jK and LS coupling schemes in Ref. [82].

Wavelengths below 18 Å corresponding to transitions from the levels $2p^53s$, $4s$, $2s2p^64s$, $2s2p^63p$, $4p$, and $2p^53d$, $4d$, $5d$, $6d$ to the ground level were measured in a laser-produced plasma by Gordon *et al.* [84] with an uncertainty of ±0.005 Å. These include the lines measured previously by Tyrén [85] and Hutcheon *et al.* [86]. From Ref. [86], we selected only the $2p^6 - 2p^5(^2P^\circ_{3/2})3s$ $(^3/_2,^1/_2)^\circ_2$ transition at 17.097 Å, which was not given in Ref. [84]. Solar observations with an uncertainty of ±0.003 Å were made by Hutcheon *et al.* [87], from which seven lines arising from the transitions from the $2p^55s$, $6s$, $7s$, $2s2p^65p$, and $2p^57d$, $8d$ levels to the ground level were taken.

The value for the ionization energy was derived by Hutcheon *et al.* [87] from the $2p^5ns$ series.

Fe XVIII

F I isoelectronic sequence

Ground state $1s^22s^22p^5\ ^2P^\circ_{3/2}$

Ionization energy 10 944 900 cm^{-1} (1357.00 eV)

The $2s^22p^5\ ^2P^\circ_{3/2} - ^2P^\circ_{1/2}$ magnetic-dipole line was observed in solar coronal spectra by Doschek *et al.* [88] and Sandlin *et al.* [14] and also in tokamak discharges by Suckewer and Hinnov [89], Hinnov and Suckewer [90], Hinnov *et al.* [91], Finkenthal *et al.* [92], and Peacock *et al.* [69]. The most accurate wavelength, 974.86±0.02 Å, is from the last article.

The lines at 93.923±0.004 Å and 103.937±0.004 Å of the $2s^22p^5\ ^2P - 2s2p^6\ ^2S$ doublet are given by Kovalev *et al.* [93]. Peacock *et al.* [69] obtained the wavelengths of 93.929±0.003 Å and 103.941±0.004 Å for these transitions, respectively. The arithmetic mean values are given in this compilation.

Phillips *et al.* [94] provided identifications of the $2s2p^6\ ^2S - 2s2p^5(^3P^\circ)3s\ ^4P^\circ$ lines, including the $^2S_{1/2} - ^4P^\circ_{5/2}$ magnetic-quadrupole transition at 16.337 Å and the $2s2p^6\ ^2S_{1/2} - 2s2p^5(^3P^\circ)3s\ ^2P^\circ_{3/2}$ transition at 16.165 Å, from solar coronal observations.

Following the classifications of $2p^5 - 2p^43s$ and $2p^5 - 2p^43d$ transitions by Fawcett *et al.* [49], many measurements for these transitions have been reported. The tabulated wavelengths in the 10 – 16 Å range are from Gordon *et al.* [84], who revised and extended the work of Feldman *et al.* [95]. The uncertainties of the wavelengths are ±0.005 Å in Ref. [84] and ±0.01 Å in Ref. [95]. The $2p^5\ ^2P^\circ_{3/2} - 2p^4(^3P)3d\ ^2D_{5/2}$ and $2p^5\ ^2P^\circ_{1/2} - 2p^4(^1D)3d\ ^2D_{3/2}$ transitions at 14.373 Å and 14.361 Å are taken from Feldman *et al.* [95]. Four additional lines from Ref. [95] are included in this compilation.

Gordon *et al.* [84] identified the $2s^22p^5 - 2s2p^53p$, $2p^44d$, and $2p^44s$ transition arrays in the range 11 – 14 Å. An additional line at 11.442 Å was identified as $2p^5\ ^2P^\circ_{3/2} - 2p^4(^3P_1)4d\ (1,^5/_2)_{3/2}$ by Boiko *et al.* [96].

The $2p^4(^3\text{P})3d$ and $2s2p^5(^3\text{P}^\circ)3p$ levels without major eigenvector components are represented by the symbol $(\text{N})_J$, the index N increasing with energy from the lowest level (N=1) for each J.

The wavelengths of $2p^5 - 2p^45d$ and $2p^46d$ transitions were measured by Burkhalter *et al.* [97].

The line $1s^22s^22p^5\ ^2\text{P}^\circ_{3/2} - 1s2s^22p^6\ ^2\text{S}_{1/2}$ at 1.92164 Å is from the solar flare observations by Seely *et al.* [98], with an uncertainty of ±0.02 mÅ.

For the ionization energy we use a value calculated by Cheng [99] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [100].

Fe XIX

O I isoelectronic sequence

Ground state $1s^22s^22p^4\ ^3\text{P}_2$

Ionization energy 11 765 000 cm^{-1} (1458.67 eV)

Three M1 lines within the ground configuration were observed in solar flares. The $^3\text{P}_2 - {^3\text{P}_1}$ line at 1118.1 Å was identified by Doschek *et al.* [88]. The other two M1 lines at 592.16 Å and 424.26 Å were classified as $^3\text{P}_2 - {^1\text{D}_2}$ and $^3\text{P}_1 - {^1\text{S}_0}$ transitions by Widing [101]. These lines, except for the $^3\text{P}_1 - {^1\text{S}_0}$ line, were also observed in tokamak discharges by Suckewer and Hinnov [89], Hinnov *et al.* [91], Finkenthal *et al.* [92], and Peacock *et al.* [69]. The wavelengths 1118.060±0.010 Å for $^3\text{P}_2 - {^3\text{P}_1}$ and 592.234±0.006 Å for $^3\text{P}_2 - {^1\text{D}_2}$ were obtained by Peacock *et al.* [69].

Comparing the predictions by Edlén [102] with the measurements of Doschek *et al.* [103] and Breton *et al.* [104] for the $2s^22p^4 - 2s2p^5$ and $2s2p^5 - 2p^6$ transitions in the range from 91 – 120 Å, Kononov [105] pointed out that there appeared to be wavelength deviations of up to 0.03 Å in the measurements, except those of Kovalev *et al.* [93]. Tabulated are the wavelengths from Kovalev *et al.*, the uncertainty of which is ±0.004 Å. Kovalev *et al.* and Lawson and Peacock [75] provided additional intercombination lines due to the $2s^22p^4\ ^3\text{P}_{0,1,2} - 2s2p^5\ ^1\text{P}^\circ_1$, $2s^22p^4\ ^1\text{D}_2 - 2s2p^5\ ^3\text{P}^\circ_2$, and the $2s2p^5\ ^3\text{P}^\circ_1 - 2p^6\ ^1\text{S}_0$ transitions, respectively.

Fawcett *et al.* [106] and Fawcett and Hayes [107] proposed classifications of the $2p^4 - 2p^33d$ transitions, using the wavelengths measured by Cohen and Feldman [108], Swartz *et al.* [109], and Neupert *et al.* [110]. An analysis of the transition arrays $2p^4 - 2p^33s$, $2p^33d$, and $2p^34d$ was made by Gordon *et al.* [84]. Their observations, with a laser-produced plasma, were in the wavelength range of 10 – 15.2 Å. The tabulated wavelengths are from Ref. [84], but omitting the two transitions $2s^22p^4\ ^1\text{D}_2$, $^3\text{P}_1 - 2s^22p^3(^2\text{P}^\circ)4d\ ^3\text{D}^\circ_2$ at 10.644 Å and 10.543 Å. The upper levels calculated with these lines are inconsistent. The uncertainty of the wavelengths is estimated to be ±0.005 Å. Solar coronal observations of the first two arrays were reported by Pye *et al.* [111], McKenzie *et al.* [112] and Phillips *et al.* [94]. The jj and LS percentage compositions are available from Gordon *et al.* [84].

The $2p^4 - 2p^35d$ and $2p^36d$ transitions were identified between 9 Å and 10 Å by Burkhalter *et al.* [97].

The inner-shell $1s^22s^22p^4 - 1s2s^22p^5$ transition at 1.91765±0.00002 Å was identified in a solar flare spectrum by Seely *et al.* [98].

For the ionization energy we use a value calculated by Cheng [99] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [100].

Fe XX

N I isoelectronic sequence

Ground state $1s^22s^22p^3\ ^4\text{S}^\circ_{3/2}$

Ionization energy 12 687 800 cm^{-1} (1573.09 eV)

The $2s^22p^3\ ^2\text{D}^\circ_{3/2} - {^2\text{D}^\circ_{5/2}}$ line at 2665.1±0.3 Å was observed in a tokamak discharge by Suckewer and Hinnov [113,89] and subsequently by Hinnov *et al.* [91]. Another M1 transition, $2s^22p^3\ ^2\text{D}^\circ_{3/2} - {^2\text{P}^\circ_{3/2}}$ at 541.35±0.03 Å, was identified in a solar flare by Widing [101]. This line was also observed in a tokamak plasma by Finkenthal *et al.* [92]. The wavelengths of 309.26 Å and 567.76 Å measured by Sandlin *et al.* [114] and Widing [101], respectively, were assigned to the M1 transitions $2s^22p^3\ ^4\text{S}^\circ_{3/2} - {^2\text{P}^\circ_{3/2}}, {^2\text{D}^\circ_{5/2}}$ by Lawson *et al.* [115]. Edlén [116] confirmed these assignments on the basis of an accurate prediction of the energy intervals along the nitrogen sequence. The wavelength value of 679.24 Å, corresponding to the $2s^22p^3\ ^2\text{D}^\circ_{5/2} - {^2\text{P}^\circ_{3/2}}$ magnetic dipole transition, is from differencing the M1 lines 309.26 Å and 567.76 Å.

Lines of the $2s^22p^3 - 2s2p^4$ array in the 90 – 133 Å range were identified by Doschek *et al.* [103] and also by Feldman *et al.* [117] utilizing laser-produced plasmas. Kononov *et al.* [118] identified the $2s2p^4 - 2p^5$ array, in the wavelength range 98 – 141 Å, from a laser-produced plasma. An extensive analysis of these arrays in the range 80 – 141 Å with an uncertainty of ±0.03 Å was made by Lawson and Peacock [75], who proposed 20 line identifications for the $2s^22p^3 - 2s2p^4$ array and 10 for the $2s2p^4 - 2p^5$ array including intercombination lines. Wavelengths, with an uncertainty of ±0.004 Å, are taken from Kovalev *et al.* [93]. The $2s^22p^3\ ^4\text{S}^\circ_{3/2} - 2s2p^4\ ^4\text{P}_{5/2}$ transition at 132.850±0.06 Å is from Peacock *et al.* [69]. The $^4\text{S}^\circ_{3/2} - {^4\text{P}_{1/2,3/2}}$ transitions at 118.697±0.005 Å and 121.858±0.005 Å were reobserved by Sugar and Rowan [119]. The $2p^5\ ^2\text{P}^\circ_{1/2,3/2}$ levels have been reduced by 210 cm^{-1} in order to make them consistent with measured wavelengths.

Measurements in the range of 8 – 14 Å with an uncertainty of ±0.005 Å were made by Bromage *et al.* [120] with a laser-produced plasma. They identified the $2p^3 - 2p^2 3d$, $2p^2 4d$, and $2p^2 5d$ transitions.

The transitions between the ground configuration and $1s2s^2 2p^4$ were identified in a laboratory plasma by Lie and Elton [121] and in solar flare observations by Feldman *et al.* [122] and Seely *et al.* [98]. The two lines $^4S^\circ_{3/2} - {}^4P_{3/2,5/2}$ at 1.90568 Å and 1.90845 Å are from Ref. [98] with an uncertainty estimate of 0.1 mÅ and the others are from Ref. [122] with an uncertainty estimate of 0.5 mÅ.

For the ionization energy we use a value calculated by Cheng [99] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [100].

Fe XXI

C I isoelectronic sequence

Ground state $1s^2 2s^2 2p^2\ {}^3P_0$

Ionization energy 13 623 800 cm^{-1} (1689.14 eV)

The M1 transition within the ground configuration, $^3P_0 - {}^3P_1$, was first identified at 1354.1±0.1 Å in solar flares by Doschek *et al.* [88]. Sandlin *et al.* [14] measured a more accurate wavelength of 1354.08±0.05 Å for this transition. Three additional M1 lines due to the $^3P_1 - {}^3P_2$, $^3P_{1,2} - {}^1D_2$ transitions in the ground configuration were observed at 2298.0 Å, 786.1 Å, and 585.8 Å with an uncertainty estimate of ±0.3 Å by Hinnov *et al.* [91]. The $^3P_0 - {}^3P_1$ and $^3P_1 - {}^1D_2$ lines were also found in a tokamak plasma spectrum by Finkenthal *et al.* [92].

The $2s^2 2p^2\ {}^3P_{2,1} - 2s2p^3\ {}^5S^\circ_2$ lines at 270.52 and 242.07 Å were identified in solar coronal spectra by Dere [53]. The wavelength accuracy is ±0.03 Å. The other $2s^2 2p^2 - 2s2p^3$ and $2s2p^3 - 2p^4$ transitions, including intercombination transitions, were classified by Lawson and Peacock [75] in an analysis of a laser-produced spectrum in the range 84 – 182 Å. The uncertainty of the wavelengths is ±0.03 Å. The earlier works of Kastner *et al.* [123], Feldman *et al.* [117], and Kononov *et al.* [118] were revised and extended. In recent observations by Sugar and Rowan [119] using tokamak discharges, 17 lines of the $2s^2 2p^2 - 2s2p^3$ array were remeasured with an estimated uncertainty of ±0.005 Å. The spin-forbidden $^1D_2 - {}^3D^\circ_3$ transition of this array at 178.904 Å was observed for the first time. We have adopted their results. We have reduced the $2p^4\ {}^1D_2$ level by 200 cm^{-1} so as to fit with the observed wavelengths. It should be noted that the $2s2p^3\ {}^3D^\circ_2 - 2p^4\ {}^1D_2$ line at 144.79 Å has been omitted because this line does not fit with the level scheme of Ref. [119] and because its line intensity is indicated to be spurious by Lawson and Peacock.

Fawcett *et al.* [106] identified a solar flare line at 12.38 Å classified by Neupert *et al.* [110] as the $2p^2\ {}^3P_2 - 2p3d\ {}^3D^\circ_3$ transition. Bromage and Fawcett [124] revised the earlier tentative identifications of the $2p^2 - 2p3d$ array by Fawcett and Hayes [107] using lines observed by Boiko *et al.* in 1976 with a laser-produced plasma. The wavelengths were published by Boiko *et al.* [96]. We have tabulated the six lines identified in Ref. [124] and the line at 12.38 Å. The other classifications in Ref. [96] are tentative. The uncertainty of the wavelengths is ±0.003 Å. The $2p^2\ {}^3P_{0,1} - 2p3d\ {}^3D^\circ_1$ transitions were identified in solar flares by McKenzie *et al.* [112] and Phillips *et al.* [94], at the wavelengths 12.285±0.002 Å and 12.398±0.002 Å.

Classifications of the $2p^2 - 2p4d$, $2p5d$ transitions were reported by Bromage *et al.* [120], who analyzed the laser-produced plasma spectrum of Boiko *et al.* in the range 8.5 – 9.6 Å. The wavelength uncertainty is ±0.002 Å. Fawcett *et al.* [125] identified three lines at 9.632 Å, 9.476 Å, and 8.573 Å in a solar flare as transitions from the $2p4s\ {}^3P^\circ_1$, $2p4d\ {}^3D^\circ_1$ and $2p5d\ {}^3D^\circ_1$ levels to the ground level. In addition, they provided more accurate wavelengths for the $2p^2\ {}^3P_2 - 2p4d\ {}^3F^\circ_3$ transition and $2p^2\ {}^3P - 2p4d\ {}^3D^\circ$ lines.

The wavelengths due to the $1s^2 2s^2 2p^2 - 1s2s^2 2p^3$ innershell transitions are from solar flare observations by Feldman *et al.* [122] and Seely *et al.* [98] with estimated wavelength uncertainties of ±0.5 mÅ and ±0.15 mÅ, respectively.

For the ionization energy we use a value calculated by Cheng [99] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [100].

Fe XXII

B I isoelectronic sequence

Ground state $1s^2 2s^2 2p\ {}^2P^\circ_{1/2}$

Ionization energy 14 508 400 cm^{-1} (1798.81 eV)

The M1 transition $2s^2 2p\ {}^2P^\circ_{1/2} - {}^2P^\circ_{3/2}$ was first identified in solar flares by Noyes [126] at 845.4±0.2 Å using a prediction of 844 Å by Kastner [127]. This line was also reobserved by Doschek *et al.* [88] in solar flares and subsequently in tokamak discharges by Suckewer and Hinnov [89], Hinnov and Suckewer [90], Hinnov *et al.* [91], and Finkenthal *et al.* [92]. The wavelength value of 845.55±0.1 Å is from Ref. [90].

Sandlin *et al.* [114] tentatively assigned four intercombination lines to the $2s^2 2p\ {}^2P^\circ - 2s2p^2\ {}^4P$ array observed in the solar corona.

Wavelengths in the range 100 – 174 Å observed in a laser-produced plasma were assigned to the $2s^2 2p - 2s2p^2$ and $2s2p^2 - 2p^3$ transitions by Lawson and Peacock [75]. The uncertainty of the wavelengths is estimated to be ±0.03 Å. The earlier classifications by Fawcett and Cowan [128], Doschek *et al.* [129], and Kononov *et al.* [118] were revised and extended. An accurate measurement with a wavelength uncertainty of

±0.005 Å was made by Sugar and Rowan [119] for seven lines of the $2s^22p\ ^2P^\circ - 2s2p^2\ ^2S$, ^2P, and ^2D arrays. Their results are adopted. We have reduced the $2p^3\ ^2D^\circ$ levels by 310 cm^{-1} so as to get a better fit with the observed wavelengths of Ref. [75].

The transition arrays $2s^22p - 2s^23d$, $2s^22p - 2s2p3p$, $2s2p^2 - 2s2p3d$, $2s^22p - 2s^24d$, and $2s2p^2 - 2s2p4d$ were identified by Bromage *et al.* [130], utilizing lines in the range of 8.9 – 12.1 Å observed by Boiko *et al.* [96] in a laser-produced plasma. The uncertainty of the wavelengths is ±0.003 Å. We adopted their identifications, except for the $2s^22p - 2s^24d$ array. To this array and also the $2s^22p - 2s2p4p$ and $2s^22p - 2s^25d$ transitions, Fawcett *et al.* [125] assigned wavelengths of solar flare lines with an uncertainty of ±0.3 mÅ. A very weak line at 11.935±0.002 Å in a solar flare spectrum was identified as the $2s^22p\ ^2P^\circ_{3/2} - 2s^23d\ ^2D_{3/2}$ transition by Phillips *et al.* [94].

The $2s^22p\ ^2P^\circ - 2s^24s\ ^2S$ lines at 9.06±0.03 Å and 9.14±0.03 Å were observed in an exploded wire experiment by Burkhalter *et al.* [97].

Wavelengths at ~1.88 Å due to the inner shell transitions $1s^22s^22p - 1s2s^22p^2$ are taken from the solar flare measurements by Feldman *et al.* [122] and Seely *et al.* [98]. The wavelength uncertainties are ±0.5 mÅ for the $^2P^\circ_{1/2} - {}^2P_{1/2}$, $^2P^\circ_{3/2} - {}^2P_{1/2,3/2}$, and $^2P^\circ_{3/2} - {}^2S_{1/2}$ transitions, and ±0.10 mÅ for the $^2P^\circ_{1/2} - {}^2D_{3/2}$ and $^2P^\circ_{3/2} - {}^2D_{5/2}$ transitions.

For the ionization energy we use a value calculated by Cheng [99] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [100].

Wavelengths in the range 136 – 222 Å, measured in a laser-produced plasma, were assigned to the $2s2p - 2p^2$ array by Lawson and Peacock [75]. The uncertainty of the wavelengths is ±0.03 Å. Edlén [133] has confirmed their identifications for the $2s2p\ ^1P^\circ_1$ and $^3P^\circ_2 - 2p^2\ ^1D_2$ lines at 221.33±0.06 Å and 136.53±0.03 Å.

A comprehensive analysis was made by Bromage *et al.* [130] of the transition arrays $2s^2 - 2snp$, $2s2p - 2snd$, $2s2p - 2pnp$, and $2p^2 - 2pnd$ ($n = 3 - 5$). They used wavelengths of Boiko *et al.* [96] with an uncertainty of ±0.003 Å in the range of 7.4 – 11.9 Å, which are tabulated with additions and substitutions stated below. The $2p3d$ and $2p4d$ levels without major eigenvector components are represented by the symbol $(N)_J$, the index N increasing with energy from the lowest level (N=1) for each J.

The arrays with $n = 3$, including many weak lines, were previously identified by Boiko *et al.* [96]. The wavelengths of $2p^2 - 2p3s$ and $2s2p - 2s3s$ transitions are from Ref. [96].

The $2s2p\ ^3P^\circ_1 - 2p4p\ ^3D_2$ line at 8.289±0.006 Å was given by Fawcett *et al.* [134]. A solar flare spectrum was measured with an uncertainty of ±0.0003 Å by Fawcett *et al.* [125], from which six wavelengths are taken for the $2s^2 - 2s4p$, $2s2p - 2s4d$, and $2s2p - 2s4s$ transition arrays, including the $2s^2\ ^1S_0 - 2s4p\ ^3P^\circ_1$ intercombination line at 8.317 Å.

The $1s^22s^2 - 1s2s^22p$ and $1s^22s2p - 1s2s2p^2$ transitions at ~1.8 Å were identified by Seely *et al.* [98] and Kononov *et al.* [135] in a vacuum spark discharge spectrum. Their wavelength uncertainties are ±0.3 mÅ.

Sugar and Corliss [13] derived the value for the ionization energy from $2snp$ and $2snd$ series.

Fe XXIII

Be I isoelectronic sequence

Ground state $1s^22s^2\ ^1S_0$

Ionization energy 15 797 000 ± 30000 cm^{-1}
(1958.6 ± 3.7 eV)

The M1 transition $2s2p\ ^3P^\circ_1 - {}^3P^\circ_2$ was observed in a tokamak discharge by Hinnov *et al.* [91] and Finkenthal *et al.* [92]. The wavelength 1079.3±0.3 Å was given in Ref. [91].

Two solar flare lines at 132.83 Å and 263.76 Å were identified as the $2s^2\ ^1S_0 - 2s2p\ ^1P^\circ_1$ and $^3P^\circ_1$ transitions by Kastner *et al.* [123] and Widing [131], respectively. In Ref. [131], both of the lines were measured with an uncertainty of ±0.03 Å. These lines were also observed by Sandlin *et al.* [114], Hinnov [132], and Lawson and Peacock [75]. An accurate measurement with a wavelength uncertainty of ±0.005 Å was reported by Sugar and Rowan [119]. Their wavelengths of 263.765 Å and 132.906 Å are quoted. The $2s3p\ ^1P^\circ_1$ level, therefore, has been reduced by 400 cm^{-1}.

Fe XXIV

Li I isoelectronic sequence

Ground state $1s^22s\ ^2S_{1/2}$

Ionization energy 16 500 000 ± 4000 cm^{-1}
(2045.7 ± 0.5 eV)

The $2s\ ^2S - 2p\ ^2P^\circ$ doublet was identified in solar flare spectra by Widing and Purcell [136] and Sandlin *et al.* [114]. These transitions were also observed in tokamak discharges by Hinnov [132], Hinnov *et al.* [137], and Knize [138]. These lines at 192.028±0.005 Å and 255.113±0.005 Å are from new measurements by Reader *et al.* [139]

The $2s - np$ ($n = 3 - 5$), $2p - 3s$, and $2p - nd$ ($n = 3 - 6$) transitions were identified by Neupert *et al.* [110] and also by Fawcett *et al.* [106] for $n = 3$. These identifications were extended by Boiko *et al.* [96] to np ($n = 3 - 5, 7$), ns ($n = 3, 4$), and nd ($n = 3 - 6$) with wavelengths in the range 6.5 – 11.5 Å. They measured the wavelengths with an estimated uncertainty of ±0.003 Å. Three arrays $2p - 4s$, and $2p - 4d$ and $2s - 4p$ were remeasured by

Seely and Feldman [140] and Fawcett *et al.* [125] in solar flares with uncertainties of ±0.0007 Å and ±0.0003 Å, respectively. New measurements were reported by Reader *et al.* [139] for these transitions. They also identified the $n = 3-4$ transitions in a laser-produced plasma for the first time. We adopt their revised values of the energy levels based on the new measurements, and their remeasured wavelengths. For the $2p\ ^2P^\circ_{3/2} - 4d\ ^2D_{3/2}$ line, the wavelength calculated from the known levels is used.

The inner shell transitions $1s^22s - 1s2s2p$ and $1s^22p - 1s2p^2$ were identified by Grineva *et al.* [141], Feldman *et al.* [122], Seely and Feldman [142], and Seely *et al.* [98] in solar flares. They were also observed by Kononov *et al.* [135] with a vacuum spark discharge, and by Bitter *et al.* [143] with a tokamak discharge. The two transitions $1s^22p\ ^2P - 1s2s^2\ ^2S$ near 1.9 Å are from Ref. [98]. Wavelengths are taken from Refs. [142] and [98]. The uncertainty of the wavelengths is estimated to be between ±0.4 mÅ and ±0.04 mÅ. For the missing $1s^22s - 1s2s2p$ and the $1s^22p - 1s2p^2$ transitions, calculated wavelengths are taken from Vainshtein and Safronova [144].

The $1s^23s - 1s2p3s$, $1s^23p - 1s2p3p$, and $1s^23d - 1s2p3d$ transitions in the region of 1.85 Å were provided in Refs. [135] and [142]. The $1s - 3p$ transitions at 1.5960 Å, 1.5926 Å, 1.588 Å were identified in a vacuum spark discharge by Klapisch *et al.* [145]. Since they are identified as a blend of many transitions, we could not give classifications for them and therefore do not include these lines.

The value for the ionization energy was derived by Edlén [146] from a polarization formula applied to the *nd* series.

Fe XXV

He I isoelectronic sequence

Ground state $1s^2\ ^1S_0$

Ionization energy 71 204 370 ± 2600 cm^{-1}
(8828.220 ± 0.3 eV)

The $1s^2\ ^1S_0 - 1s2p\ ^1P^\circ_1$, $^3P^\circ_2$, $^3P^\circ_1$, and $1s^2\ ^1S_0 - 1s2s\ ^3S_1$ lines were observed at 1.85048 Å, 1.85555 Å, 1.85960 Å, and 1.86830 Å, respectively, in a tokamak discharge by Beiersdorfer *et al.* [147]. The first wavelength cited above is calculated from the level energy of Vainshtein and Safronova [148] with an uncertainty of ±0.00004 Å and the remaining are normalized to it. Measured wavelengths for the $1s^2\ ^1S_0 - 1s2p\ ^1P^\circ_1$ transition were obtained by Aglitsky *et al.* [149] and Beiersdorfer *et al.* [150] to be 1.85030±0.00010 Å and 1.85031±0.000030 Å, respectively.

The $1s^2\ ^1S_0 - 1s3p\ ^1P^\circ_1$ and $^3P^\circ_1$ transitions were identified by Klapisch *et al.* [145] at 1.5738 and 1.5755 Å in a spark discharge. No uncertainty is assigned in this paper. The $1s^2\ ^1S_0 - 1snp\ ^{1,3}P^\circ_1$ lines were measured by Indelicato *et al.* [151] at 1.57312±0.000039 Å and 1.57496±0.000040 Å for $n = 3$ and 1.49456±0.000036 Å and 1.49526±0.000036 Å for $n = 4$. For the $n = 5$ singlet Beiersdorfer *et al.* [150] obtained the wavelength 1.46081±0.000035 Å. The earlier measurements of these lines by Morita and Fujita [152] and Aglitskii and Panin [153], including transitions from the $6p$ levels, are less accurate.

The $1s2s - 2s2p$ and $1s2p - 2p^2$ transitions near 1.79 Å were identified by Turechek and Kunze [154] in a spark discharge and by Decaux *et al.* [155] in a tokamak discharge. We give the predicted wavelengths of Vainshtein and Safronova [144] for transitions from the $n = 2$ doubly-excited states.

The $1s2s\ ^3S_1 - 1s2p\ ^3P^\circ_2$ line at 271.02±0.09 Å was observed by Buchet *et al.* [156] in a beam foil experiment. It deviates from Drake's [157] theoretical value by twice its uncertainty.

The multiplet $1s2p\ ^3P^\circ - 1s3d\ ^3D$ and the transitions $1s2p\ ^1P^\circ_1 - 1snd\ ^1D_2 (n = 3, 4)$ were classified by Burkhalter *et al.* [97] as being lines at 10.19 Å, 10.33 Å, 10.41 Å, and 7.75 Å in an exploding wire spectrum.

Cheng *et al.* [158] give calculated total energies for the ground and n=2 singlet states of selected He-like ions. We use a later calculation of both singlet and triplet states by Cheng [159] for all elements from Ti through Cu and Kr for the $n = 1$ and 2 configurations. With these data and the binding energy of the H-like ions [160] we obtain the value for the ionization energy of the He-like ions. For the $1s3l$ states we use the level values from Drake [161].

The levels $1s4l$ and $5l$ calculated by Vainshtein and Safronova [144] have been tabulated after increasing them by 1400 cm^{-1} to correspond with the values of lower n by Drake [161]. All wavelengths have been derived from differences of the adopted energy levels.

The $1s2s - 2s2p$ and $1s2p - 2p^2$ transitions were first identified by Turechek and Kunze [154] with five lines near 1.79 Å . We have adopted the calculated wavelengths of Vainshtein and Safronova [144] without correction for transitions from the $n = 2$ doubly excited states.

Fe XXVI

H I isoelectronic sequence

Ground state $1s\ ^2S_{1/2}$

Ionization energy 74 829 600 ± 20 cm^{-1}
(9277.69 ± 0.002 eV)

The $1s\ ^2S_{1/2} - 2p\ ^2P^\circ_{1/2,3/2}$ transitions were observed by Turechek and Kunze [154], Morita and Fujita [152], Beiersdorfer *et al.* [147], and Decaux *et al.* [155]. We have tabulated the wavelengths from the theoretical level energies calculated by Johnson and Soff [160] for the $n = 2$ shell with an uncertainty of ±20 cm^{-1}. They are in close agreement with those by Mohr [162]. All levels with $n = 3 - 5$ were calculated by Erickson [163]. Erickson's values for the binding energies were corrected to the ground state binding energy given by Johnson and Soff to obtain the predicted wavelengths.

Transition probabilities and oscillator strengths were obtained by scaling the data tabulated for hydrogen spectra by Wiese *et al.* [164]. The scaling was actually performed for the line strengths S, which for a hydrogen-like ion of nuclear charge Z are reduced according to $S_Z = Z^{-2} S_H$, so that

$$S_{\text{Fe XXVI}} = S_H (26)^{-2} = S_H/676.$$

The f and A values were then obtained from the usual numerical conversion formulas, given for example in Ref. [165]. For these conversions the very accurate wavelengths listed in the first column of the Fe XXVI table were used, in which relativistic and QED effects in the energies were taken into account. Relativistic effects in the line strengths are only of the order of $1 - 5\%$ for Fe XXVI, according to the work by Younger and Weiss [166], and have been neglected.

The value for the ionization energy is from Johnson and Soff [160].

2.6.2. Spectroscopic Data for Fe VII through Fe XXVI

Fe VII

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1332.381	$3p^63d4s\ ^1D_2$	$3p^63d4p\ ^1D^o_2$	350 332.6	425 386.1	6	6.5 − 1	4.9+8	D−	3°, 165*
1263.844	$3p^63d4s\ ^3D_3$	$3p^63d4p\ ^1D^o_2$	346 262.2	425 386.1	2				3
1244.442	$_2$	$_2$	345 028.7	425 386.1					3
1239.690	$3p^63d4s\ ^3D_1$	$3p^63d4p\ ^3D^o_1$	344 463.3	425 128.6	5	4.2 − 1	6.2+8	D−	3°, 165*
1226.653	$_3$	$_2$	346 262.2	427 784.7	5	3.1 − 1	2.7+8	D−	3°, 165*
1208.375	$_2$	$_2$	345 028.7	427 784.7	4	6.5 − 1	5.8+8	D−	3°, 165*
1180.823	$_3$	$_3$	346 262.2	430 948.6	4	1.5	1.0+9	D−	3°, 165*
1163.879	$_2$	$_3$	345 028.7	430 948.6	5	3.0 − 2	2.1+7	D−	3°, 165*
1173.915	$3p^63d4s\ ^3D_2$	$3p^63d4p\ ^3F^o_2$	345 028.7	430 213.4	1	1.8 − 3	1.7+6	E	3°, 165*
1166.183	$_1$	$_2$	344 463.3	430 213.4	8	9.9 − 1	9.8+8	D−	3°, 165*
1154.992	$_2$	$_3$	345 028.7	431 609.5	4	1.6	1.1+9	D−	3°, 165*
1141.435	$_3$	$_4$	346 262.2	433 871.2	10	2.2	1.2+9	D−	3°, 165*
1117.580	$3p^63d4s\ ^1D_2$	$3p^63d4p\ ^1F^o_3$	350 332.6	439 811.6	6	1.6	1.2+9	D−	3°, 165*
1095.343	$3p^63d4s\ ^3D_3$	$3p^63d4p\ ^3P^o_2$	346 262.2	437 558.0	6	9.1 − 1	9.9+8	D−	3°, 165*
1087.861	$_2$	$_1$	345 028.7	436 952.2	2	4.8 − 1	9.0+8	D−	3°, 165*
1080.736	$_2$	$_2$	345 028.7	437 558.0		2.7 − 1	3.1+8	D−	3°, 165*
1080.637	$_1$	$_0$	344 463.3	437 001.3	2	2.6 − 1	1.5+9	D−	3°, 165*
1073.953	$3p^63d4s\ ^1D_2$	$3p^63d4p\ ^1P^o_1$	350 332.6	443 447.0	4	7.5 − 1	1.5+9	D−	3°, 165*
1016.072	$3p^63d4s\ ^3D_2$	$3p^63d4p\ ^1P^o_1$	345 028.7	443 447.0					3
1010.260	$_1$	$_1$	344 463.3	443 447.0	1				3
270.363	$3p^63d^2\ ^1S_0$	$3p^63d4p\ ^3P^o_1$	67 078.3	436 952.2					3
265.697	$3p^63d^2\ ^1S_0$	$3p^63d4p\ ^1P^o_1$	67 078.3	443 447.0	8	1.3 − 1	4.1+9	D−	3°, 165*
248.743	$3p^63d^2\ ^1G_4$	$3p^63d4p\ ^3D^o_3$	28 927.3	430 948.6	2				3
247.458	$3p^63d^2\ ^3P_2$	$3p^63d4p\ ^1D^o_2$	21 278.6	425 386.1	7				3
246.943	$_1$	$_2$	20 430.1	425 386.1	3				3
247.098	$3p^63d^2\ ^3P_1$	$3p^63d4p\ ^3D^o_1$	20 430.1	425 128.6	3	1.8 − 2	6.5+8	D−	3°, 165*
246.859	$_0$	$_1$	20 040.3	425 128.6	4	5.1 − 2	1.9+9	D−	3°, 165*
246.000	$_2$	$_2$	21 278.6	427 784.7	5	8.5 − 3	1.9+8	E	3°, 165*
245.488	$_1$	$_2$	20 430.1	427 784.7	7	1.1 − 1	2.3+9	D−	3°, 165*
244.098	$_2$	$_3$	21 278.6	430 948.6	6	1.0 − 1	1.6+9	D−	3°, 165*
245.153	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^1D^o_2$	17 475.5	425 386.1	12	3.2 − 1	7.0+9	D−	3°, 165*
244.541	$3p^63d^2\ ^3P_2$	$3p^63d4p\ ^3F^o_2$	21 278.6	430 213.4	7	1.1 − 4	2.4+6	E	3°, 165*
244.030	$_1$	$_2$	20 430.1	430 213.4	1	8.4 − 3	1.9+8	E	3°, 165*
243.705	$_2$	$_3$	21 278.6	431 609.5	7	3.5 − 2	5.6+8	D−	3°, 165*
243.379	$3p^63d^2\ ^1G_4$	$3p^63d4p\ ^1F^o_3$	28 927.3	439 811.6	13	1.4	2.1+10	D−	3°, 165*
242.284	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^3F^o_2$	17 475.5	430 213.4	7				3
241.467	$_2$	$_3$	17 475.5	431 609.5	4				3
241.853	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^3D^o_3$	17 475.5	430 948.6	3				3
240.572	$3p^63d^2\ ^3P_2$	$3p^63d4p\ ^3P^o_1$	21 278.6	436 952.2	7	1.1 − 1	4.0+9	D−	3°, 165*
240.223	$_2$	$_2$	21 278.6	437 558.0	11	4.4 − 1	1.0+10	D−	3°, 165*
240.083	$_1$	$_1$	20 430.1	436 952.2	6	9.0 − 2	3.5+9	D−	3°, 165*
240.053	$_1$	$_0$	20 430.1	437 001.3	6	1.1 − 1	1.3+10	D−	3°, 165*
239.860	$_0$	$_1$	20 040.3	436 952.2	7	8.9 − 2	3.4+9	D−	3°, 165*
239.734	$_1$	$_2$	20 430.1	437 558.0	7	1.1 − 1	2.5+9	D−	3°, 165*
238.929	$3p^63d^2\ ^3P_2$	$3p^63d4p\ ^1F^o_3$	21 278.6	439 811.6	3				3
238.393	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^3P^o_1$	17 475.5	436 952.2	4				3
238.048	$_2$	$_2$	17 475.5	437 558.0	3				3
236.872	$3p^63d^2\ ^3P_2$	$3p^63d4p\ ^1P^o_1$	21 278.6	443 447.0	5				3
236.180	$_0$	$_1$	20 040.3	443 447.0	2				3
236.778	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^1F^o_3$	17 475.5	439 811.6	5	4.0 − 2	6.8+8	D−	3°, 165*

Fe VII – Continued

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
235.662	$3p^63d^2\ ^3F_3$	$3p^63d4p\ ^1D^o_2$	1 051.5	425 386.1	9				3
235.081	2	2	0.0	425 386.1	3				3
235.221	$3p^63d^2\ ^3F_2$	$3p^63d4p\ ^3D^o_1$	0.0	425 128.6	6	4.3 – 1	1.7+10	D–	3°, 165*
234.337	3	2	1 051.5	427 784.7	11	4.7 – 1	1.1+10	D–	3°, 165*
233.762	2	2	0.0	427 784.7	6	1.4 – 1	3.4+9	D–	3°, 165*
233.308	4	3	2 331.5	430 948.6	10	5.8 – 1	1.0+10	D–	3°, 165*
232.613	3	3	1 051.5	430 948.6	2	2.6 – 1	4.5+9	D–	3°, 165*
232.047	2	3	0.0	430 948.6	5	1.5 – 2	2.6+8	D–	3°, 165*
234.757	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^1P^o_1$	17 475.5	443 447.0	8	2.2 – 1	8.6+9	D–	3°, 165*
233.015	$3p^63d^2\ ^3F_3$	$3p^63d4p\ ^3F^o_2$	1 051.5	430 213.4	15	1.9 – 1	4.6+9	D–	3°, 165*
232.946	4	3	2 331.5	431 609.5	5	3.8 – 1	6.7+9	D–	3°, 165*
232.442	2	2	0.0	430 213.4	11	8.5 – 2	2.1+9	D–	3°, 165*
232.256	3	3	1 051.5	431 609.5	9	1.2 – 1	2.1+9	D–	3°, 165*
231.728	4	4	2 331.5	433 871.2	13	4.4 – 1	6.0+9	D–	3°, 165*
231.693	2	3	0.0	431 609.5	1	1.6 – 2	2.8+8	D–	3°, 165*
231.044	3	4	1 051.5	433 871.2	7	2.9 – 2	4.1+8	D–	3°, 165*
229.828	$3p^63d^2\ ^1G_4$	$3p^5(^2P^o)3d^3(^2G)\ ^1H^o_5$	28 927.3	464 034	6				3
228.584	$3p^63d^2\ ^3F_4$	$3p^63d4p\ ^1F^o_3$	2 331.5	439 811.6	1				3
227.918	3	3	1 051.5	439 811.6					3
225.505	$3p^63d^2\ ^3F_2$	$3p^63d4p\ ^1P^o_1$	0.0	443 447.0	1				3
225.411	$3p^63d^2\ ^1G_4$	$3p^5(^2P^o)3d^3(^2F)\ ^3G^o_5$	28 927.3	472 559	8				3
216.591	$3p^63d^2\ ^3F_4$	$3p^5(^2P^o)3d^3(^2G)\ ^1H^o_5$	2 331.5	464 034	8				3
213.893	$3p^63d^2\ ^1G_4$	$3p^5(^2P^o)3d^3(^2F)\ ^1G^o_4$	28 927.3	496 454	3				3
212.664	$3p^63d^2\ ^3F_4$	$3p^5(^2P^o)3d^3(^2F)\ ^3G^o_5$	2 331.5	472 559	10				3
212.509	4	4	2 331.5	472 903	4				3
208.167	3	3	1 051.5	481 435	6				3
207.712	2	3	0.0	481 435	11				3
207.831	$3p^63d^2\ ^1G_4$	$3p^5(^2P^o)3d^3(^2H)\ ^3G^o_3$	28 927.3	510 086					3
206.096	4	5	28 927.3	514 133	3				3
204.578	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^3(^2H)\ ^3G^o_3$	21 278.6	510 086					3
202.378	$3p^63d^2\ ^3F_4$	$3p^5(^2P^o)3d^3(^2F)\ ^1G^o_4$	2 331.5	496 454	3				3
196.917	$3p^63d^2\ ^3F_4$	$3p^5(^2P^o)3d^3(^2H)\ ^3G^o_4$	2 331.5	510 158	5				3
196.423	3	4	1 051.5	510 158	7				3
196.046	2	3	0.0	510 086	8				3
195.391	4	5	2 331.5	514 133	12				3
193.421	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^3(a^2D)\ ^1D^o_2$	21 278.6	538 290	1				3
192.006	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(a^2D)\ ^1D^o_2$	17 475.5	538 290	8				3
189.756	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^3(^2F)\ ^3D^o_2$	21 278.6	548 274	3				3
189.573	$3p^63d^2\ ^1G_4$	$3p^5(^2P^o)3d^3(^2G)\ ^1F^o_3$	28 927.3	556 422					3
188.396	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(^2F)\ ^3D^o_2$	17 475.5	548 274	8				3
187.235	2	3	17 475.5	551 568	8				3
188.125	$3p^63d^2\ ^1S_0$	$3p^5(^2P^o)3d^3(^2P)\ ^1P^o_1$	67 078.3	598 638	4				3
187.990	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^3(^2F)\ ^1D^o_2$	21 278.6	553 220	4				3
187.692	1	2	20 430.1	553 220	6				3
186.657	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(^2F)\ ^1D^o_2$	17 475.5	553 220	8				3
185.547	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(^2G)\ ^1F^o_3$	17 475.5	556 422	9				3
185.176	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^3(^4P)\ ^3P^o_1$	21 278.6	561 303	3				3
184.886	1	1	20 430.1	561 303	4				3
184.752	0	1	20 040.3	561 303	5				3
183.825	2	2	21 278.6	565 275	9				3
183.539	1	2	20 430.1	565 275	6				3
184.114	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^3(^4F)\ ^3F^o_2$	21 278.6	564 425	3				3

Fe VII – Continued

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
182.740	$3p^63d^2\ ^3F_3$	$3p^5(^2P^\circ)3d^3(^2F)\ ^3D^\circ_2$	1 051.5	548 274	4				3
182.071	4	3	2 331.5	551 568	5				3
181.646	3	3	1 051.5	551 568	3				3
182.221	$3p^63d^2\ ^1D_2$	$3p^5(^2P^\circ)3d^3(^4F)\ ^3F^\circ_3$	17 475.5	566 256	2				3
181.104	$3p^63d^2\ ^3F_3$	$3p^5(^2P^\circ)3d^3(^2F)\ ^1D^\circ_2$	1 051.5	553 220	3				3
180.760	2	2	0.0	553 220	2				3
180.477	$3p^63d^2\ ^3F_4$	$3p^5(^2P^\circ)3d^3(^2G)\ ^1F^\circ_3$	2 331.5	556 422	3				3
180.059	3	3	1 051.5	556 422	5				3
179.720	2	3	0.0	556 422	1				3
179.656	$3p^63d^2\ ^1S_0$	$3p^5(^2P^\circ)3d^3(^4P)\ ^3S^\circ_1$	67 078.3	623 699	1				3
177.555	$3p^63d^2\ ^1S_0$	$3p^5(^2P^\circ)3d^3(b^2D)\ ^1P^\circ_1$	67 078.3	630 283	5				3
177.503	$3p^63d^2\ ^3F_3$	$3p^5(^2P^\circ)3d^3(^4F)\ ^3F^\circ_2$	1 051.5	564 425	5				3
177.329	4	3	2 331.5	566 256	7				3
177.172	2	2	0.0	564 425	9	3.5	1.5+11	D–	3°, 165*
176.928	3	3	1 051.5	566 256	10	7.7	2.4+11	D–	3°, 165*
176.744	4	4	2 331.5	568 118	10	1.1+1	2.7+11	D–	3°, 165*
176.599	2	3	0.0	566 256	5				3
176.345	3	4	1 051.5	568 118	6				3
177.235	$3p^63d^2\ ^3F_3$	$3p^5(^2P^\circ)3d^3(^4P)\ ^3P^\circ_2$	1 051.5	565 275	2				3
176.904	2	2	0.0	565 275	4				3
174.069	$3p^63d^2\ ^1G_4$	$3p^5(^2P^\circ)3d^3(^4F)\ ^3D^\circ_3$	28 927.3	603 419	1				3
173.441	$3p^63d^2\ ^1G_4$	$3p^5(^2P^\circ)3d^3(^2H)\ ^1G^\circ_4$	28 927.3	605 489	9	1.4+1	3.6+11	D–	3°, 165*
173.203	$3p^63d^2\ ^3P_2$	$3p^5(^2P^\circ)3d^3(^2P)\ ^1P^\circ_1$	21 278.6	598 638	3				3
172.948	1	1	20 430.1	598 638					3
172.831	0	1	20 040.3	598 638	1				3
172.069	$3p^63d^2\ ^1D_2$	$3p^5(^2P^\circ)3d^3(^2P)\ ^1P^\circ_1$	17 475.5	598 638	6				3
171.779	$3p^63d^2\ ^3P_2$	$3p^5(^2P^\circ)3d^3(^4F)\ ^3D^\circ_3$	21 278.6	603 419	6				3
171.680	2	2	21 278.6	603 757	4				3
171.529	2	1	21 278.6	604 270	4				3
171.432	1	2	20 430.1	603 757	5				3
171.279	1	1	20 430.1	604 270	3				3
171.166	0	1	20 040.3	604 270	4				3
170.664	$3p^63d^2\ ^1D_2$	$3p^5(^2P^\circ)3d^3(^4F)\ ^3D^\circ_3$	17 475.5	603 419	3				3
170.565	2	2	17 475.5	603 757	1				3
170.417	2	1	17 475.5	604 270	3				3
167.047	$3p^63d^2\ ^3F_2$	$3p^5(^2P^\circ)3d^3(^2P)\ ^1P^\circ_1$	0.0	598 638	4				3
166.365	$3p^63d^2\ ^3F_4$	$3p^5(^2P^\circ)3d^3(^4F)\ ^3D^\circ_3$	2 331.5	603 419	9	8.6	2.9+11	D–	3°, 165*
166.010	3	3	1 051.5	603 419	4				3
165.919	3	2	1 051.5	603 757	8	5.7	2.8+11	D–	3°, 165*
165.724	2	3	0.0	603 419					3
165.630	2	2	0.0	603 757	5				3
165.490	2	1	0.0	604 270	8				3
165.996	$3p^63d^2\ ^3P_2$	$3p^5(^2P^\circ)3d^3(^4P)\ ^3S^\circ_1$	21 278.6	623 699	5				3
165.764	1	1	20 430.1	623 699	5				3
165.658	0	1	20 040.3	623 699	4				3
165.444	$3p^63d^2\ ^3F_3$	$3p^5(^2P^\circ)3d^3(^2H)\ ^1G^\circ_4$	1 051.5	605 489					3
165.087	$3p^63d^2\ ^1S_0$	$3p^63d4f\ ^1P^\circ_1$	67 078.3	672 820	6	8.5 – 1	6.9+10	D–	3°, 165*
164.955	$3p^63d^2\ ^1D_2$	$3p^5(^2P^\circ)3d^3(^4P)\ ^3S^\circ_1$	17 475.5	623 699	3				3
164.203	$3p^63d^2\ ^3P_2$	$3p^5(^2P^\circ)3d^3(b^2D)\ ^1P^\circ_1$	21 278.6	630 283	3				3
163.974	1	1	20 430.1	630 283	1				3
163.183	$3p^63d^2\ ^1D_2$	$3p^5(^2P^\circ)3d^3(b^2D)\ ^1P^\circ_1$	17 475.5	630 283	7				3
158.481	$3p^63d^2\ ^1G_4$	$3p^63d4f\ ^1G^\circ_4$	28 927.3	659 917	7	7.7 – 1	2.3+10	D–	3°, 165*
158.168	$3p^63d^2\ ^1G_4$	$3p^63d4f\ ^3F^\circ_4$	28 927.3	661 169	8				3

Fe VII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
157.689	$3p^63d^2\ ^1G_4$	$3p^63d4f\ ^3G^o_3$	28 927.3	663 097	8				3
157.112	$3p^63d^2\ ^1G_4$	$3p^63d4f\ ^1F^o_3$	28 927.3	665 417	2	4.7 − 2	1.8+9	D−	3°, 165*
156.808	$3p^63d^2\ ^1G_4$	$3p^63d4f\ ^3D^o_3$	28 927.3	666 651	1				3
155.994	$3p^63d^2\ ^1G_4$	$3p^63d4f\ ^1H^o_5$	28 927.3	669 978	7	7.2	1.8+11	D−	3°, 165*
155.632	$3p^63d^2\ ^1D_2$	$3p^63d4f\ ^3F^o_2$	17 475.5	660 015					3
155.549	2	3	17 475.5	660 358					3
155.619	$3p^63d^2\ ^3P_2$	$3p^63d4f\ ^1D^o_2$	21 278.6	663 871					3
155.414	1	2	20 430.1	663 871					3
155.247	$3p^63d^2\ ^3P_2$	$3p^63d4f\ ^1F^o_3$	21 278.6	665 417	2				3
155.150	$3p^63d^2\ ^3P_2$	$3p^63d4f\ ^3D^o_1$	21 278.6	665 832		2.1 − 5	1.9+6	E	3°, 165*
155.124	2	2	21 278.6	665 923		1.5 − 2	8.2+8	D−	3°, 165*
154.949	2	3	21 278.6	666 651	6	2.7	1.0+11	D−	3°, 165*
154.941	1	1	20 430.1	665 832	4	2.6 − 1	2.4+10	D−	3°, 165*
154.921	1	2	20 430.1	665 923	5	1.7	9.7+10	D−	3°, 165*
154.848	0	1	20 040.3	665 832	3	8.3 − 1	7.7+10	D−	3°, 165*
154.888	$3p^63d^2\ ^1D_2$	$3p^63d4f\ ^3G^o_3$	17 475.5	663 097	1				3
154.705	$3p^63d^2\ ^1D_2$	$3p^63d4f\ ^1D^o_2$	17 475.5	663 871	6				3
154.650	$3p^63d^2\ ^3P_2$	$3p^63d4f\ ^3P^o_2$	21 278.6	667 899	6	1.6	8.8+10	D−	3°, 165*
154.565	2	1	21 278.6	668 253	3	3.8 − 1	3.5+10	D−	3°, 165*
154.447	1	2	20 430.1	667 899		2.6 − 3	1.5+8	E	3°, 165*
154.363	1	1	20 430.1	668 253	3	4.5 − 1	4.2+10	D−	3°, 165*
154.307	1	0	20 430.1	668 489	2	3.3 − 1	8.9+10	D−	3°, 165*
154.271	0	1	20 040.3	668 253	1	8.7 − 2	8.1+9	D−	3°, 165*
154.335	$3p^63d^2\ ^1D_2$	$3p^63d4f\ ^1F^o_3$	17 475.5	665 417	7	2.9	1.2+11	D−	3°, 165*
154.216	$3p^63d^2\ ^1D_2$	$3p^63d4f\ ^3D^o_2$	17 475.5	665 923					3
154.042	2	3	17 475.5	666 651	3				3
153.747	$3p^63d^2\ ^1D_2$	$3p^63d4f\ ^3P^o_2$	17 475.5	667 899					3
153.663	2	1	17 475.5	668 253					3
152.072	$3p^63d^2\ ^3F_4$	$3p^63d4f\ ^1G^o_4$	2 331.5	659 917	4				3
151.971	$3p^63d^2\ ^3F_4$	$3p^63d4f\ ^3F^o_3$	2 331.5	660 358	1	6.9 − 2	2.9+9	D−	3°, 165*
151.782	4	4	2 331.5	661 169	7	7.4 − 1	2.4+10	D−	3°, 165*
151.754	3	2	1 051.5	660 015	1	8.4 − 2	5.0+9	D−	3°, 165*
151.675	3	3	1 051.5	660 358	6	9.1 − 1	3.9+10	D−	3°, 165*
151.512	2	2	0.0	660 015	5	9.0 − 1	5.3+10	D−	3°, 165*
151.488	3	4	1 051.5	661 169	3				3
151.432	2	3	0.0	660 358	4	5.0 − 1	2.2+10	D−	3°, 165*
151.145	$3p^63d^2\ ^3F_4$	$3p^63d4f\ ^3G^o_4$	2 331.5	663 950	4	6.5 − 1	2.1+10	D−	3°, 165*
151.046	3	3	1 051.5	663 097	2	5.4 − 1	2.2+10	D−	3°, 165*
151.023	4	5	2 331.5	664 482	8	6.0	1.6+11	D−	3°, 165*
150.852	3	4	1 051.5	663 950	6	4.1	1.3+11	D−	3°, 165*
150.807	2	3	0.0	663 097	6	3.1	1.3+11	D−	3°, 165*
150.530	$3p^63d^2\ ^3F_4$	$3p^63d4f\ ^3D^o_3$	2 331.5	666 651	3	1.6 − 1	6.8+9	D−	3°, 165*
150.403	3	2	1 051.5	665 923	1	1.3 − 1	7.3+9	D−	3°, 165*
150.186	2	1	0.0	665 832	1	7.5 − 2	7.5+9	D−	3°, 165*
150.521	$3p^63d^2\ ^3F_3$	$3p^63d4f\ ^1F^o_3$	1 051.5	665 417	3				3
150.282	2	3	0.0	665 417	2				3
138.841	$3p^63d^2\ ^1G_4$	$3p^5(^2P^o)3d^2(^3F)4s(^2F)\ ^3D^o_3$	28 927.3	749 166					3
138.191	$3p^63d^2\ ^1S_0$	$3p^63d5f\ ^1P^o_1$	67 078.3	790 708	5				3
137.907	$3p^63d^2\ ^3P_1$	$3p^5(^2P^o)3d^2(^3F)4s(^2F)\ ^3D^o_1$	20 430.1	745 556	1				3
137.833	0	1	20 040.3	745 556	2				3
137.802	2	2	21 278.6	746 965	1				3
137.640	1	2	20 430.1	746 965	4				3
137.384	2	3	21 278.6	749 166	6				3
136.671	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^2(^3F)4s(^2F)\ ^3D^o_3$	17 475.5	749 166	2				3

Fe VII – Continued

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
135.488	$3p^6 3d^2\ ^1G_4$	$3p^5(^2P^o)3d^2(^3F)4s(^2F)\ ^3G^o_5$	28 927.3	766 991					3
134.940	4	3	28 927.3	769 991	2				3
134.128	$3p^6 3d^2\ ^3F_2$	$3p^5(^2P^o)3d^2(^3F)4s(^2F)\ ^3D^o_1$	0.0	745 556	4				3
134.063	3	2	1 051.5	746 965	5				3
133.899	4	3	2 331.5	749 166	6				3
133.874	2	2	0.0	746 965	3				3
133.670	3	3	1 051.5	749 166	3				3
133.842	$3p^6 3d^2\ ^3P_2$	$3p^5(^2P^o)3d^2(^3P)4s(^2P)\ ^3P^o_2$	21 278.6	768 425	6				3
133.691	1	2	20 430.1	768 425	4				3
133.274	2	1	21 278.6	771 612	3				3
133.123	1	1	20 430.1	771 612	3				3
133.055	0	1	20 040.3	771 612	3				3
132.792	1	0	20 430.1	773 488	3				3
133.424	$3p^6 3d^2\ ^1G_4$	$3p^5(^2P^o)3d^2(^1G)4s(^2G)\ ^3F^o_3$	28 927.3	778 420					3
133.165	$3p^6 3d^2\ ^1D_2$	$3p^5(^2P^o)3d^2(^3P)4s(^2P)\ ^3P^o_2$	17 475.5	768 425	3				3
132.667	$3p^6 3d^2\ ^1G_4$	$3p^5(^2P^o)3d^2(^3F)4s(^2F)\ ^3F^o_4$	28 927.3	782 690	2				3
132.593	4	3	28 927.3	783 119	3				3
132.407	$3p^6 3d^2\ ^1G_4$	$3p^6 3d5f\ ^1G^o_4$	28 927.3	784 174	8				3
132.355	$3p^6 3d^2\ ^1G_4$	$3p^6 3d5f\ ^3H^o_4$	28 927.3	784 477	3				3
132.120	$3p^6 3d^2\ ^1G_4$	$3p^6 3d5f\ ^3F^o_4$	28 927.3	785 809	4				3
131.782	$3p^6 3d^2\ ^1G_4$	$3p^6 3d5f\ ^3G^o_4$	28 927.3	787 737					3
131.713	4	5	28 927.3	788 146	2				3
131.531	$3p^6 3d^2\ ^1G_4$	$3p^6 3d5f\ ^1F^o_3$	28 927.3	789 215	3				3
131.318	$3p^6 3d^2\ ^1D_2$	$3p^5(^2P^o)3d^2(^1D)4s(^2D)\ ^1D^o_2$	17 475.5	779 009	7				3
131.193	$3p^6 3d^2\ ^1G_4$	$3p^6 3d5f\ ^1H^o_5$	28 927.3	791 168	10				3
130.838	$3p^6 3d^2\ ^3P_1$	$3p^6 3d5f\ ^3F^o_2$	20 430.1	784 733	1				3
130.779	$3p^6 3d^2\ ^3F_4$	$3p^5(^2P^o)3d^2(^3F)4s(^2F)\ ^3G^o_5$	2 331.5	766 991	11				3
130.467	4	4	2 331.5	768 813	3				3
130.248	3	4	1 051.5	768 813	10				3
130.050	3	3	1 051.5	769 991	4				3
129.872	2	3	0.0	769 991	7				3
130.623	$3p^6 3d^2\ ^3P_2$	$3p^6 3d5f\ ^1D^o_2$	21 278.6	786 830					3
130.481	1	2	20 430.1	786 830	2				3
130.608	$3p^6 3d^2\ ^1D_2$	$3p^5(^2P^o)3d^2(^3F)4s(^2F)\ ^3F^o_3$	17 475.5	783 119					3
130.419	$3p^6 3d^2\ ^3P_2$	$3p^6 3d5f\ ^3D^o_2$	21 278.6	788 030	2				3
130.374	2	3	21 278.6	788 303	6				3
130.277	1	2	20 430.1	788 030	4				3
130.221	0	1	20 040.3	787 945	5				3
130.336	$3p^6 3d^2\ ^1D_2$	$3p^6 3d5f\ ^3F^o_2$	17 475.5	784 733	2				3
130.257	$3p^6 3d^2\ ^3P_2$	$3p^6 3d5f\ ^3P^o_2$	21 278.6	788 995	5				3
130.226	2	1	21 278.6	789 172	5				3
130.112	1	2	20 430.1	788 995	3				3
130.017	0	1	20 040.3	789 172	4				3
129.996	$3p^6 3d^2\ ^1D_2$	$3p^6 3d5f\ ^3G^o_3$	17 475.5	786 732	2				3
129.980	$3p^6 3d^2\ ^1D_2$	$3p^6 3d5f\ ^1D^o_2$	17 475.5	786 830	8				3
129.822	$3p^6 3d^2\ ^3P_1$	$3p^6 3d5f\ ^1P^o_1$	20 430.1	790 708					3
129.789	$3p^6 3d^2\ ^1D_2$	$3p^6 3d5f\ ^3D^o_1$	17 475.5	787 945					3
129.777	2	2	17 475.5	788 030	2				3
129.730	2	3	17 475.5	788 303	5				3
129.579	$3p^6 3d^2\ ^1D_2$	$3p^6 3d5f\ ^1F^o_3$	17 475.5	789 215	6				3
129.330	$3p^6 3d^2\ ^1D_2$	$3p^6 3d5f\ ^1P^o_1$	17 475.5	790 708	6				3

Fe VII – Continued

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
129.278	$3p^63d^2\ ^1G_4$	$3p^5(^2P^o)3d^2(^3F)4s(^2F)\ ^1G^o_4$	28 927.3	802 462	1				3
128.852	$3p^63d^2\ ^3F_4$	$3p^5(^2P^o)3d^2(^1G)4s(^2G)\ ^3F^o_3$	2 331.5	778 420	2				3
128.659	4	4	2 331.5	779 575	4				3
128.638	3	3	1 051.5	778 420	4				3
128.449	3	4	1 051.5	779 575	1				3
128.753	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^2(^3F)4s(^4F)\ ^3G^o_3$	17 475.5	794 149	6				3
128.682	$3p^63d^2\ ^1G_4$	$3p^5(^2P^o)3d^2(^1G)4s(^2G)\ ^1H^o_5$	28 927.3	806 033	7				3
128.538	$3p^63d^2\ ^3F_3$	$3p^5(^2P^o)3d^2(^1D)4s(^2D)\ ^1D^o_2$	1 051.5	779 009					3
128.368	2	2	0.0	779 009	3				3
128.417	$3p^63d^2\ ^1G_4$	$3p^5(^2P^o)3d^2(^1D)4s(^2D)\ ^1F^o_3$	28 927.3	807 627					3
128.240	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^2(^1D)4s(^2D)\ ^3F^o_3$	17 475.5	797 257	2				3
128.147	$3p^63d^2\ ^3F_4$	$3p^5(^2P^o)3d^2(^3F)4s(^2F)\ ^3F^o_4$	2 331.5	782 690	8				3
127.867	3	3	1 051.5	783 119	6				3
127.694	2	3	0.0	783 119	6				3
127.852	$3p^63d^2\ ^3F_4$	$3p^63d5f\ ^3H^o_4$	2 331.5	784 477	1				3
127.645	3	4	1 051.5	784 477	6				3
127.763	$3p^63d^2\ ^3F_4$	$3p^63d5f\ ^3F^o_3$	2 331.5	785 012	1				3
127.636	4	4	2 331.5	785 809	9				3
127.604	3	2	1 051.5	784 733	2				3
127.559	3	3	1 051.5	785 012	8				3
127.429	3	4	1 051.5	785 809	6				3
127.388	2	3	0.0	785 012	7				3
127.324	$3p^63d^2\ ^3F_4$	$3p^63d5f\ ^3G^o_4$	2 331.5	787 737	6				3
127.278	3	3	1 051.5	786 732	2				3
127.258	4	5	2 331.5	788 146	9				3
127.118	3	4	1 051.5	787 737	8				3
127.230	$3p^63d^2\ ^3F_4$	$3p^63d5f\ ^3D^o_3$	2 331.5	788 303	2				3
127.069	3	2	1 051.5	788 030	1				3
127.026	3	3	1 051.5	788 303	5				3
126.913	2	1	0.0	787 945	2				3
126.898	2	2	0.0	788 030					3
126.855	2	3	0.0	788 303	4				3
127.169	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^2(^1D)4s(^2D)\ ^1F^o_3$	21 278.6	807 627	1				3
126.875	$3p^63d^2\ ^3F_3$	$3p^63d5f\ ^1F^o_3$	1 051.5	789 215					3
126.705	2	3	0.0	789 215	1				3
126.768	$3p^63d^2\ ^3F_4$	$3p^63d5f\ ^1H^o_5$	2 331.5	791 168	1				3
126.743	$3p^63d^2\ ^3F_2$	$3p^63d5f\ ^3P^o_2$	0.0	788 995					3
126.559	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^2(^1D)4s(^2D)\ ^1F^o_3$	17 475.5	807 627	5				3
126.453	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^2(^3P)4s(^2P)\ ^3D^o_3$	21 278.6	812 086	4				3
126.166	2	2	21 278.6	813 877	2				3
126.032	1	2	20 430.1	813 877	4				3
125.640	2	1	21 278.6	817 195					3
125.508	1	1	20 430.1	817 195	2				3
125.447	0	1	20 040.3	817 195	3				3
126.088	$3p^63d^2\ ^3F_3$	$3p^5(^2P^o)3d^2(^3F)4s(^4F)\ ^3G^o_3$	1 051.5	794 149					3
125.922	2	3	0.0	794 149	2				3
125.524	3	4	1 051.5	797 712	5				3
125.266	4	5	2 331.5	800 633	5				3
125.846	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^2(^3P)4s(^2P)\ ^3D^o_3$	17 475.5	812 086					3
125.565	2	2	17 475.5	813 877	1				3
125.798	$3p^63d^2\ ^3F_4$	$3p^5(^2P^o)3d^2(^1D)4s(^2D)\ ^3F^o_3$	2 331.5	797 257	1				3
125.596	3	3	1 051.5	797 257	1				3
125.431	2	3	0.0	797 257	3				3
124.979	$3p^63d^2\ ^3F_4$	$3p^5(^2P^o)3d^2(^3F)4s(^2F)\ ^1G^o_4$	2 331.5	802 462	2				3
124.779	3	4	1 051.5	802 462	2				3

Fe VII – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
124.648	$3p^63d^2\ ^3P_1$	$3p^5(^2P^o)3d^2(^3P)4s(^4P)\ ^3D^o_1$	20 430.1	822 689	1				3
124.586	0	1	20 040.3	822 689	1				3
124.547	2	2	21 278.6	824 184	2				3
124.415	1	2	20 430.1	824 184	2				3
124.030	2	3	21 278.6	827 533	4				3
124.425	$3p^63d^2\ ^3F_4$	$3p^5(^2P^o)3d^2(^1G)4s(^2G)\ ^1H^o_5$	2 331.5	806 033	1				3
124.384	$3p^63d^2\ ^1G_4$	$3p^5(^2P^o)3d^2(^1G)4s(^2G)\ ^3G^o_5$	28 927.3	832 889	2				3
124.250	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^2(^3P)4s(^4P)\ ^3S^o_1$	21 278.6	826 106	1				3
124.120	1	1	20 430.1	826 106	1				3
124.058	0	1	20 040.3	826 106					3
123.822	$3p^63d^2\ ^3F_2$	$3p^5(^2P^o)3d^2(^1D)4s(^2D)\ ^1F^o_3$	0.0	807 627					3
123.709	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^2(^3P)4s(^2P)\ ^1D^o_2$	21 278.6	829 626	1				3
123.667	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^2(^3P)4s(^4P)\ ^3S^o_1$	17 475.5	826 106					3
123.496	$3p^63d^2\ ^3F_4$	$3p^5(^2P^o)3d^2(^3P)4s(^2P)\ ^3D^o_3$	2 331.5	812 086	2				3
123.029	3	2	1 051.5	813 877	2				3
122.370	2	1	0.0	817 195	1				3
123.130	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^2(^3P)4s(^2P)\ ^1D^o_2$	17 475.5	829 626	2				3
122.520	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^2(^3P)4s(^2P)\ ^3S^o_1$	21 278.6	837 472	2				3
122.392	1	1	20 430.1	837 472	1				3
122.335	0	1	20 040.3	837 472	1				3
121.952	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^2(^3P)4s(^2P)\ ^3S^o_1$	17 475.5	837 472					3
121.555	$3p^63d^2\ ^3F_2$	$3p^5(^2P^o)3d^2(^3P)4s(^4P)\ ^3D^o_1$	0.0	822 689					3
121.490	3	2	1 051.5	824 184	1				3
121.331	2	2	0.0	824 184					3
121.183	4	3	2 331.5	827 533	1				3
121.408	$3p^63d^2\ ^1G_4$	$3p^63d6f\ ^3H^o_4$	28 927.3	852 601	1				3
121.304	$3p^63d^2\ ^1G_4$	$3p^63d6f\ ^1G^o_4$	28 927.3	853 307	3				3
121.090	$3p^63d^2\ ^1G_4$	$3p^63d6f\ ^3F^o_4$	28 927.3	854 767	3				3
120.915	$3p^63d^2\ ^1G_4$	$3p^63d6f\ ^3G^o_4$	28 927.3	855 969					3
120.872	4	5	28 927.3	856 260	1				3
120.789	$3p^63d^2\ ^1G_4$	$3p^63d6f\ ^1F^o_3$	28 927.3	856 797					3
120.636	$3p^63d^2\ ^1G_4$	$3p^63d6f\ ^1H^o_5$	28 927.3	857 881	7				3
120.401	$3p^63d^2\ ^3F_4$	$3p^5(^2P^o)3d^2(^1G)4s(^2G)\ ^3G^o_5$	2 331.5	832 889	3				3
120.214	3	4	1 051.5	832 893	2				3
120.181	3	3	1 051.5	833 128	1				3
120.030	2	3	0.0	833 128	1				3
120.131	$3p^63d^2\ ^3P_2$	$3p^63d6f\ ^3F^o_3$	21 278.6	853 697	1				3
119.978	$3p^63d^2\ ^3P_2$	$3p^63d6f\ ^3G^o_3$	21 278.6	854 760					3
119.896	$3p^63d^2\ ^3P_2$	$3p^63d6f\ ^3D^o_1$	21 278.6	855 346					3
119.813	2	2	21 278.6	855 903	1				3
119.785	2	3	21 278.6	856 109	3				3
119.715	0	1	20 040.3	855 346	3				3
119.692	1	2	20 430.1	855 903	1				3
119.846	$3p^63d^2\ ^3P_1$	$3p^63d6f\ ^1D^o_2$	20 430.1	854 838	3				3
119.686	$3p^63d^2\ ^3P_2$	$3p^63d6f\ ^3P^o_2$	21 278.6	856 811	5				3
119.561	1	2	20 430.1	856 811					3
119.541	1	1	20 430.1	856 975	1				3
119.524	1	0	20 430.1	857 082	1				3
119.482	0	1	20 040.3	856 975					3
119.623	$3p^63d^2\ ^1D_2$	$3p^63d6f\ ^3F^o_2$	17 475.5	853 433	1				3
119.587	2	3	17 475.5	853 697					3
119.435	$3p^63d^2\ ^1D_2$	$3p^63d6f\ ^3G^o_3$	17 475.5	854 760	2				3

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Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
119.422	$3p^63d^2\ ^1D_2$	$3p^63d6f\ ^1D^o_2$	17 475.5	854 838	2				3
119.273	$3p^63d^2\ ^1D_2$	$3p^63d6f\ ^3D^o_2$	17 475.5	855 903	2				3
119.240	2	3	17 475.5	856 109	3				3
119.144	$3p^63d^2\ ^1D_2$	$3p^63d6f\ ^1F^o_3$	17 475.5	856 797	3				3
117.610	$3p^63d^2\ ^3F_4$	$3p^63d6f\ ^3H^o_4$	2 331.5	852 601					3
117.432	3	4	1 051.5	852 601					3
117.512	$3p^63d^2\ ^3F_4$	$3p^63d6f\ ^1G^o_4$	2 331.5	853 307	1				3
117.335	3	4	1 051.5	853 307	2				3
117.459	$3p^63d^2\ ^3F_4$	$3p^63d6f\ ^3F^o_3$	2 331.5	853 697					3
117.310	4	4	2 331.5	854 767	2				3
117.281	3	3	1 051.5	853 697	2				3
117.174	2	2	0.0	853 433	2				3
117.135	3	4	1 051.5	854 767	3				3
117.144	$3p^63d^2\ ^3F_4$	$3p^63d6f\ ^3G^o_4$	2 331.5	855 969	2				3
117.104	4	5	2 331.5	856 260	5				3
116.993	2	3	0.0	854 760	4				3
116.970	3	4	1 051.5	855 969	4				3
117.034	$3p^63d^2\ ^3F_4$	$3p^63d6f\ ^1F^o_3$	2 331.5	856 797					3
116.715	2	3	0.0	856 797	1				3
116.951	$3p^63d^2\ ^3F_3$	$3p^63d6f\ ^3D^o_3$	1 051.5	856 109	1				3
116.836	2	2	0.0	855 903					3
116.809	2	3	0.0	856 109	3				3
116.882	$3p^63d^2\ ^3F_4$	$3p^63d6f\ ^1H^o_5$	2 331.5	857 881	1				3
116.853	$3p^63d^2\ ^3F_3$	$3p^63d6f\ ^3P^o_2$	1 051.5	856 811					3
115.472	$3p^63d^2\ ^1G_4$	$3p^63d7f\ ^3F^o_3$	28 927.3	894 944	1				3
115.281	4	4	28 927.3	896 382	1				3
115.164	$3p^63d^2\ ^1G_4$	$3p^63d7f\ ^3G^o_5$	28 927.3	897 254					3
115.033	$3p^63d^2\ ^1G_4$	$3p^63d7f\ ^1H^o_5$	28 927.3	898 243	4				3
114.490	$3p^63d^2\ ^3P_2$	$3p^63d7f\ ^3F^o_2$	21 278.6	894 718					3
114.356	$3p^63d^2\ ^3P_2$	$3p^63d7f\ ^3G^o_3$	21 278.6	895 744	1				3
113.964	$3p^63d^2\ ^1D_2$	$3p^63d7f\ ^3F^o_3$	17 475.5	894 944	3				3
113.861	$3p^63d^2\ ^1D_2$	$3p^63d7f\ ^3G^o_3$	17 475.5	895 744	2				3
112.030	$3p^63d^2\ ^3F_4$	$3p^63d7f\ ^3F^o_3$	2 331.5	894 944	1				3
111.849	4	4	2 331.5	896 382	2				3
111.691	3	4	1 051.5	896 382					3
112.012	$3p^63d^2\ ^1G_4$	$3p^63d8f\ ^3F^o_3$	28 927.3	921 694	1				3
111.812	4	4	28 927.3	923 282					3
111.767	$3p^63d^2\ ^3F_3$	$3p^63d7f\ ^3G^o_3$	1 051.5	895 744	1				3
111.742	4	5	2 331.5	897 254	4				3
111.638	2	3	0.0	895 744	2				3
111.604	3	4	1 051.5	897 077	3				3
111.663	$3p^63d^2\ ^1G_4$	$3p^63d8f\ ^1H^o_5$	28 927.3	924 479					3
110.593	$3p^63d^2\ ^1D_2$	$3p^63d8f\ ^3F^o_3$	17 475.5	921 694					3
110.205	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^2(^3P)4s(^4P)\ ^3P^o_2$	21 278.6	928 684					3
110.103	1	2	20 430.1	928 684					3
109.742	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^2(^3P)4s(^4P)\ ^3P^o_2$	17 475.5	928 684					3
109.463	$3p^63d^2\ ^1G_4$	$3p^63d9f\ ^1H^o_5$	28 927.3	942 477	1				3
108.620	$3p^63d^2\ ^3F_3$	$3p^63d8f\ ^3F^o_3$	1 051.5	921 694	1				3
108.584	4	4	2 331.5	923 282	2				3
108.495	2	3	0.0	921 694					3

Fe VII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
108.533	$3p^63d^2\ ^3F_4$	$3p^63d8f\ ^3G^\circ_4$	2 331.5	923 716	1				3
108.519	$_4$	$_5$	2 331.5	923 838	3				3
108.381	$_3$	$_4$	1 051.5	923 716	2				3
107.947	$3p^63d^2\ ^1G_4$	$3p^63d10f\ ^1H^\circ_5$	28 927.3	955 307					3
106.418	$3p^63d^2\ ^3F_4$	$3p^63d9f\ ^3G^\circ_5$	2 331.5	942 022					3
106.285	$_3$	$_4$	1 051.5	941 918					3
104.972	$3p^63d^2\ ^3F_4$	$3p^63d10f\ ^3G^\circ_5$	2 331.5	954 966					3
104.838	$_3$	$_4$	1 051.5	954 904					3

Fe VIII

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
232.876	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1G)\ ^2F^o_{5/2}$	1 836	431 250	20				6
231.884	3/2	5/2	0	431 250	200				6
231.097	5/2	7/2	1 836	434 555	260				6
224.305	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1D)\ ^2F^o_{7/2}$	1 836	447 658	500	2.0 − 1	3.4+9	D−	6°, 165*
218.564	5/2	5/2	1 836	459 367	60	1.1 − 2	2.5+8	E	6°, 165*
217.691	3/2	5/2	0	459 367	300	1.5 − 1	3.6+9	D−	6°, 165*
197.362	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1S)\ ^2P^o_{3/2}$	1 836	508 518	230	3.4 − 2	1.4+9	D−	6°, 165*
196.650	3/2	3/2	0	508 518	40	3.9 − 3	1.7+8	E	6°, 165*
192.004	3/2	1/2	0	520 822?	200	1.7 − 2	1.7+9	D−	6°, 165*
195.972	$3p^63d\ ^2D_{3/2}$	$3p^64p\ ^2P^o_{1/2}$	0	510 277	400				6°, 9
194.662	5/2	3/2	1 836	515 550	500				6°, 9
193.967	3/2	3/2	0	515 550	100				6°, 9
187.237	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2F^o_{5/2}$	1 836	535 909	300	2.1 − 1	6.7+9	E	5, 6°, 11, 165*
186.601	3/2	5/2	0	535 909	600	2.9	9.4+10	D−	4, 5, 6°, 11, 39, 165*, 200
185.213	5/2	7/2	1 836	541 755	700	4.3	1.0+11	D−	4, 5, 6°, 11, 39, 165*, 200
168.929	$3p^63d\ ^2D_{3/2}$	$3p^5(^2P^o)3d^2(^3P)\ ^2P^o_{1/2}$	0	591 964	250	1.8	2.1+11	D−	6°, 165*
168.545	5/2	3/2	1 836	595 152	450	3.4	2.0+11	D−	6°, 165*, 178
168.024	3/2	3/2	0	595 152	100	3.8 − 1	2.2+10	E	6°, 165*
168.172	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2D^o_{5/2}$	1 836	596 463	500	7.8	3.1+11	D−	4, 5, 6°, 11, 12, 39, 165*, 178
168.002	5/2	3/2	1 836	597 065	150	5.6 − 1	3.3+10	E	4, 5, 6°, 39, 165*
167.656	3/2	5/2	0	596 463	200	5.6 − 1	2.2+10	E	4, 5, 6°, 39, 165*
167.486	3/2	3/2	0	597 065	400	5.2	3.0+11	D−	4, 5, 6°, 11, 12, 39, 165*, 178
131.255	$3p^63d\ ^2D_{5/2}$	$3p^64f\ ^2F^o_{5/2}$	1 836	763 703	80				6
131.240	5/2	7/2	1 836	763 799	200				6°, 9, 11, 12
130.941	3/2	5/2	0	763 703	150				6°, 9, 11, 12
119.380	$3p^63d\ ^2D_{3/2}$	$3p^53d(^3P^o)4s\ ^2P^o_{1/2}$	0	837 661	15	1.4 − 1	3.4+10	D	6°, 7, 8, 165*
118.907	5/2	3/2	1 836	842 829	25	2.5 − 1	3.0+10	D	6°, 7, 8, 165*
118.648	3/2	3/2	0	842 829	3	3.8 − 2	4.5+9	E	6°, 7, 8, 165*
118.300	$3p^63d\ ^2D_{5/2}$	$3p^53d(^3F^o)4s\ ^4F^o_{7/2}$	1 836	847 145	8				6°, 7, 8
117.661	3/2	5/2	0	849 899	8				6°, 7, 8
117.254	3/2	3/2	0	852 849?	1				6
117.197	$3p^63d\ ^2D_{5/2}$	$3p^53d(^3F^o)4s\ ^2F^o_{7/2}$	1 836	855 100	60	6.0 − 1	3.8+10	D	6°, 7, 8, 165*
116.442	5/2	5/2	1 836	860 615	1	3.2 − 2	2.6+9	E	6°, 7, 8, 165*
116.196	3/2	5/2	0	860 615	35	5.6 − 1	4.5+10	D	6°, 7, 8, 165*
114.564	$3p^63d\ ^2D_{5/2}$	$3p^53d(^3D^o)4s\ ^4D^o_{7/2}$	1 836	874 711	4				6°, 7, 8
114.295	5/2	5/2	1 836	876 765	5				6°, 7, 8
114.05	3/2	5/2	0	876 765					7, 8°
113.963	3/2	3/2	0	877 476	2				6
113.861	3/2	1/2	0	878 264?	1				6
113.763	$3p^63d\ ^2D_{3/2}$	$3p^53d(^1F^o)4s\ ^2F^o_{5/2}$	0	879 021	7				6
112.932	5/2	7/2	1 836	887 325	25	3.2 − 1	2.1+10	D	6°, 7, 8, 165*
113.463	$3p^63d\ ^2D_{3/2}$	$3p^53d(^1D^o)4s\ ^2D^o_{3/2}$	0	881 345	5				6
113.315	5/2	5/2	1 836	884 331	10				6
113.081	3/2	5/2	0	884 331	1				6
112.704	$3p^63d\ ^2D_{5/2}$	$3p^53d(^3D^o)4s\ ^2D^o_{3/2}$	1 836	889 113	2				6°, 7, 8
112.486	5/2	5/2	1 836	890 845	20	4.9 − 1	4.3+10	D	6°, 7, 8, 165*
112.472	3/2	3/2	0	889 113	15	2.7 − 1	3.6+10	D	6°, 7, 8, 165*
112.252	3/2	5/2	0	890 845	1				6°, 7, 8
108.077	$3p^63d\ ^2D_{5/2}$	$3p^65f\ ^2F^o_{7/2}$	1 836	927 102	30				6°, 9
107.868	3/2	5/2	0	927 059	25				6°, 9
98.548	$3p^63d\ ^2D_{5/2}$	$3p^66f\ ^2F^o_{7/2}$	1 836	1 016 570	10				6°, 9, 10
98.371	3/2	5/2	0	1 016 560	8				6°, 9, 10
93.616	$3p^63d\ ^2D_{5/2}$	$3p^67f\ ^2F^o_{7/2}$	1 836	1 070 029	5				6°, 9, 10
93.469	3/2	5/2	0	1 069 873	4				6°, 9, 10

Fe IX

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	*gf*	A (s^{-1})	Acc.	References
4585.3	$3s^23p^53d\ ^3F^o_2$	$3s^23p^53d\ ^3D^o_3$	433 818.8	455 612.2		M1			17, 19°
3800.8	3	3	429 310.9	455 612.2		M1			17, 19°
3471.6	2	2	433 818.8	462 616.6		M1			17, 19°
3355.1	4	3	425 809.8	455 612.2		M1			17, 19°
3000.	3	2	429 310.9	462 616.6		M1			17, 18°
4359.4	$3s^23p^53d\ ^3F^o_2$	$3s^23p^53d\ ^1D^o_2$	433 818.8	456 752.7		M1			17, 19°
3642.7	3	2	429 310.9	456 752.7		M1			17, 19°
3124.0	$3s^23p^53d\ ^3F^o_2$	$3s^23p^53d\ ^1F^o_3$	433 818.8	465 828.4		M1			17, 19°
2497.5	4	3	425 809.8	465 828.4		M1			14°, 15
2042.35	$3s^23p^53d\ ^3P^o_2$	$3s^23p^53d\ ^3D^o_2$	413 669.2	462 616.6		M1			14°, 15
1841.57	1	2	408 315.1	462 616.6		M1			14°, 15, 194
1917.21	$3s^23p^53d\ ^3P^o_2$	$3s^23p^53d\ ^1F^o_3$	413 669.2	465 828.4		M1			14°, 15, 193, 194
604.880	$3s^23p^53d\ ^1P^o_1$	$3s3p^63d\ ^1D_2$	584 546	749 871					21
380.079	$3s^23p^53d\ ^1F^o_3$	$3s3p^63d\ ^3D_3$	465 828.4	728 935	2				21
378.629	$3s^23p^53d\ ^3D^o_2$	$3s3p^63d\ ^3D_1$	462 616.6	726 734					21
377.443	2	2	462 616.6	727 560	2				21
375.773	1	1	460 616	726 734	2				21
374.605	1	2	460 616	727 560					21
369.260	$3s^23p^53d\ ^1D^o_2$	$3s3p^63d\ ^3D_2$	456 752.7	727 560	1				21
352.072	$3s^23p^53d\ ^1F^o_3$	$3s3p^63d\ ^1D_2$	465 828.4	749 871	4				21
348.124	$3s^23p^53d\ ^3D^o_2$	$3s3p^63d\ ^1D_2$	462 616.6	749 871	1				21
339.838	3	2	455 612.2	749 871	2				21
341.390	$3s^23p^53d\ ^3F^o_2$	$3s3p^63d\ ^3D_1$	433 818.8	726 734	4				21
335.294	3	2	429 310.9	727 560	5				21
329.890	4	3	425 809.8	728 935	6				21
341.150	$3s^23p^53d\ ^1D^o_2$	$3s3p^63d\ ^1D_2$	456 752.7	749 871	4				21
319.426	$3s^23p^53d\ ^3P^o_2$	$3s3p^63d\ ^3D_1$	413 669.2	726 734					21
318.586	2	2	413 669.2	727 560	2				21
317.194	2	3	413 669.2	728 935	5				21
313.234	1	2	408 315.1	727 560	4				21
311.563	0	1	405 772	726 734	2				21
244.911	$3s^23p^6\ ^1S_0$	$3s^23p^53d\ ^3P^o_1$	0	408 315.1	20	2.4 − 4	8.9+6	E	16, 17, 20°, 21△, 165*
241.739	0	2	0	413 669.2	30				16, 17, 20°, 21△
218.935	$3s^23p^6\ ^1S_0$	$3s^23p^53d\ ^1D^o_2$	0	456 752.7	5				16, 17, 20°, 21△
217.100	$3s^23p^6\ ^1S_0$	$3s^23p^53d\ ^3D^o_1$	0	460 616	10	4.3 − 3	2.0+8	E	11, 16, 17, 20°, 21△, 165*
171.073	$3s^23p^6\ ^1S_0$	$3s^23p^53d\ ^1P^o_1$	0	584 546	120	2.65	2.01+11	C+	4, 5, 11, 12, 16, 17, 20°, 21△, 24, 39, 165*, 178, 184
118.27	$3s^23p^53d\ ^1F^o_3$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_4$	465 828.4	1 311 750	2				27
116.803	$3s^23p^53d\ ^3D^o_3$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_4$	455 612.2	1 311 750	9	2.9	1.6+11	E	25°, 26, 27△, 165*
116.408	$3s^23p^53d\ ^1F^o_3$	$3s^23p^5(^2P^o_{1/2})4f\ ^2[\frac{7}{2}]_4$	465 828.4	1 324 800	6				26, 27°
115.996	$3s^23p^53d\ ^3D^o_2$	$3s^23p^5(^2P^o_{1/2})4f\ ^2[\frac{7}{2}]_3$	462 616.6	1 324 720	7				25°, 26, 27△
115.353	$3s^23p^53d\ ^1D^o_2$	$3s^23p^5(^2P^o_{1/2})4f\ ^2[\frac{5}{2}]_3$	456 752.7	1 323 660	7				25°, 26, 27△
114.111	$3s^23p^53d\ ^3F^o_2$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_3$	433 818.8	1 310 160	7	1.9	1.4+11	E	25°, 26, 27△, 165*
114.024	$3s^23p^53d\ ^3F^o_3$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{9}{2}]_4$	429 310.9	1 306 320	8	2.8	1.6+11	E	25°, 26, 27△, 165*
113.793	4	5	425 809.8	1 304 600	10	4.3	2.0+11	E	25°, 26, 27△, 165*
112.375	$3s^23p^53d\ ^3P^o_2$	$3s^23p^5(^2P^o_{3/2})4f\ ^2[\frac{3}{2}]_2$	413 669.2	1 302 840	5				26, 27°
112.017	1	1	408 315.1	1 300 920	4				26, 27°
111.791	1	2	408 315.1	1 302 840	5	1.2	1.2+11	E	25°, 26, 27△, 165*
111.713	0	1	405 772	1 300 920	3	5.6 − 1	1.0+11	E	25°, 26, 27△, 165*

Fe IX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
112.096	$3s^2 3p^5 3d\ ^3P^o_2$	$3s^2 3p^5 (^2P^o_{3/2}) 4f\ ^2[\frac{5}{2}]_3$	413 669.2	1 305 760	8	2.1	1.6+11	E	25°, 26, 27△, 165*
105.208	$3s^2 3p^6\ ^1S_0$	$3s^2 3p^5 (^2P^o_{3/2}) 4s\ (\frac{3}{2}, \frac{1}{2})^o_1$	0	950 500	30	1.6 – 1	3.2+10	D	11△, 12, 22, 23, 24, 25°, 50, 165*, 183
103.566	$3s^2 3p^6\ ^1S_0$	$3s^2 3p^5 (^2P^o_{1/2}) 4s\ (\frac{1}{2}, \frac{1}{2})^o_1$	0	965 570	35	2.5 – 1	5.2+10	D	11△, 12, 22, 23, 24, 25°, 50, 165*, 183
83.457	$3s^2 3p^6\ ^1S_0$	$3s^2 3p^5 4d\ ^3P^o_1$	0	1 198 220	15	3.1 – 1	9.9+10	D	10, 11△, 12, 25°, 27, 165*, 184
82.430	$3s^2 3p^6\ ^1S_0$	$3s^2 3p^5 4d\ ^1P^o_1$	0	1 213 150	20	1.7 – 1	5.6+10	D	10, 11△, 12, 25°, 27, 165*, 184
73.63	$3s^2 3p^6\ ^1S_0$	$3s^2 3p^5 (^2P^o_{3/2}) 5s\ (\frac{3}{2}, \frac{1}{2})^o_1$	0	1 358 140	2				10°, 27
72.891	$3s^2 3p^6\ ^1S_0$	$3s 3p^6 4p\ ^1P^o_1$	0	1 371 910					28
72.85	$3s^2 3p^6\ ^1S_0$	$3s^2 3p^5 (^2P^o_{1/2}) 5s\ (\frac{1}{2}, \frac{1}{2})^o_1$	0	1 372 670	1				10

Fe X

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
6374.51	$3p^5\ ^2P^o_{3/2}$	$3p^5\ ^2P^o_{1/2}$	0.0	15 683.1		M1	6.94+1	C	18, 19, 29°, 31, 195*
5539.1	$3p^4(^3P)3d\ ^4F_{7/2}$	$3p^4(^3P)3d\ ^2F_{7/2}$	422 795	440 840		M1			17, 19°, 30, 31
4311.8	9/2	7/2	417 653	440 840		M1			17, 19°, 30, 31
3577.1	$3p^4(^3P)3d\ ^4F_{7/2}$	$3p^4(^1D)3d\ ^2G_{9/2}$	422 795	450 751		M1	6.2	E	17, 19°, 30, 31, 165*
3533.6	7/2	7/2	422 795	451 084		M1	1.4+1	E	17, 19°, 30, 31, 165*
3020.1	9/2	9/2	417 653	450 751		M1	5.5+1	E	17°, 30, 165*
3454.2	$3p^4(^3P)3d\ ^4D_{7/2}$	$3p^4(^3P)3d\ ^4F_{9/2}$	388 709	417 653		M1	1.2+1	E	17, 19°, 30, 31, 165*
1918.25	$3p^4(^3P)3d\ ^4D_{7/2}$	$3p^4(^3P)3d\ ^2F_{7/2}$	388 709	440 840		M1			14°, 17, 30
1611.70	$3p^4(^3P)3d\ ^4D_{7/2}$	$3p^4(^1D)3d\ ^2G_{9/2}$	388 709	450 751		M1	4.0	E	14°, 17, 30, 165*
1603.21	7/2	7/2	388 709	451 084		M1	2.0+1	E	14°, 17, 30, 165*
1582.56	$3p^4(^3P)3d\ ^4F_{7/2}$	$3p^4(^1D)3d\ ^2F_{7/2}$	422 795	485 983		M1			14°, 17, 30
1463.49	9/2	7/2	417 653	485 983		M1	7.0+1	E	14°, 17, 30, 165*
366.667	$3s^23p^4(^3P)3d\ ^4F_{5/2}$	$3s3p^5(^3P^o)3d\ ^4F^o_{7/2}$	426 763	699 492	1				30
365.144	7/2	9/2	422 795	696 661					30
364.589	3/2	5/2	428 298	702 585					30
362.547	5/2	5/2	426 763	702 585	2				30
361.409	7/2	7/2	422 795	699 492	1				30
360.833	3/2	3/2	428 298	705 430	1				30
358.867	5/2	3/2	426 763	705 430					30
358.414	9/2	9/2	417 653	696 661	4				30
354.824	9/2	7/2	417 653	699 492					30
365.543	$3s^23p^5\ ^2P^o_{1/2}$	$3s3p^6\ ^2S_{1/2}$	15 683.1	289 249	1	6.8 − 2	1.7+9	E	20△, 32, 33, 34°, 165*
345.723	3/2	1/2	0.0	289 249	10	1.40 − 1	3.9+9	E	20△, 32, 33, 34°, 47, 165*
324.726	$3s^23p^4(^3P)3d\ ^4D_{7/2}$	$3s3p^5(^3P^o)3d\ ^4F^o_{9/2}$	388 709	696 661	5				30
321.766	7/2	7/2	388 709	699 492	5				30
321.766	5/2	7/2	388 709	699 492	5				30
319.936	3/2	5/2	390 050	702 585	2				30
318.599	5/2	5/2	388 709	702 585	3				30
318.599	1/2	3/2	391 555	705 430	3				30
317.043	3/2	3/2	390 050	705 430					30
257.262	$3p^5\ ^2P^o_{3/2}$	$3p^4(^3P)3d\ ^4D_{5/2}$	0.0	388 709	45				20°, 30, 36
256.38	3/2	3/2	0.0	390 050	10				20°, 30, 36, 178
242.36C	$3p^5\ ^2P^o_{1/2}$	$3p^4(^3P)3d\ ^4F_{3/2}$	15 683.1	428 298		4.4 − 4	1.2+7	E	165*
234.356	3/2	5/2	0.0	426 763	15	1.1 − 3	2.2+7	E	20°, 30, 36, 165*
240.243	$3p^5\ ^2P^o_{1/2}$	$3p^4(^1D)3d\ ^2P_{3/2}$	15 683.1	431 928					36
238.72	$3p^5\ ^2P^o_{1/2}$	$3p^4(^1D)3d\ ^2D_{3/2}$	15 683.1	434 614					36
230.089	3/2	3/2	0.0	434 614					36°, 178
238.60C	$3p^5\ ^2P^o_{1/2}$	$3p^4(^3P)3d\ ^4P_{1/2}$	15 683.1	434 800		8.8 − 4	5.1+7	E	165*
229.99	3/2	1/2	0.0	434 800		3.3 − 3	2.1+8	E	36°, 165*
226.31	3/2	5/2	0.0	441 853					36
220.882	$3p^5\ ^2P^o_{3/2}$	$3p^4(^3P)3d\ ^2F_{5/2}$	0.0	452 730?		3.9 − 4	8.8+6	E	36°, 165*
209.776	$3p^5\ ^2P^o_{3/2}$	$3p^4(^1D)3d\ ^2F_{5/2}$	0.0	476 699?		4.4 − 3	1.1+8	E	36°, 165*
201.556	$3p^5\ ^2P^o_{1/2}$	$3p^4(^1S)3d\ ^2D_{3/2}$	15 683.1	511 800		1.7 − 2	6.8+8	E	36°, 165*
195.399	3/2	3/2	0.0	511 800		4.0 − 3	1.8+8	E	36°, 165*
190.044	$3p^5\ ^2P^o_{1/2}$	$3p^4(^1D)3d\ ^2S_{1/2}$	15 683.1	541 879	50	4.52 − 1	4.18+10	C−	11°, 12, 20, 35, 36, 165*, 178
184.542	3/2	1/2	0.0	541 879	60	1.2	1.2+11	C−	11°, 12, 20, 35, 36, 165*, 178
182.310	$3p^5\ ^2P^o_{1/2}$	$3p^4(^3P)3d\ ^2P_{3/2}$	15 683.1	564 198	30				5, 11°, 12, 20, 35, 36, 184
180.407	1/2	1/2	15 683.1	569 985	90				5, 11°, 35, 36, 178, 184
177.243	3/2	3/2	0.0	564 198	80				5, 11°, 12, 20, 35, 36, 39, 184
175.474	3/2	1/2	0.0	569 985	30				5, 11°, 12, 35, 36, 184

Fe x – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	A (s^{-1})	Acc.	References
175.266	$3p^5\ ^2P^o_{1/2}$	$3p^4(^3P)3d\ ^2D_{3/2}$	15 683.1	586 244	50	3.18	1.72+11	C	5, 11°, 12, 35, 36, 39, 165*, 178, 184, 192
174.534	3/2	5/2	0.0	572 954	90	4.96	1.8+11	C	5, 11°, 12, 35, 36, 39, 165*, 178, 184, 192
170.58	3/2	3/2	0.0	586 244	10	9.6 – 2	5.4+9	D	5, 11△, 35°, 36, 165*, 184, 192
144.328	$3p^4(^1D)3d\ ^2F_{7/2}$	$3p^4(^1D)4p\ ^2D^o_{5/2}$	485 983	1 178 850		2.6 – 1	1.4+10	D	25°, 165*
140.678	$3p^4(^1D)3d\ ^2G_{7/2}$	$3p^4(^1D)4p\ ^2F^o_{5/2}$	451 084	1 161 930		3.0 – 1	1.7+10	E	25°, 165*
139.868	9/2	7/2	450 751	1 165 710		5.2 – 1	2.2+10	D	25°, 165*
140.296	$3p^4(^3P)3d\ ^4F_{9/2}$	$3p^4(^3P)4p\ ^4D^o_{7/2}$	417 653	1 130 430		5.2 – 1	2.2+10	D	25°, 165*
137.027	$3p^4(^3P)3d\ ^4D_{7/2}$	$3p^4(^3P)4p\ ^4P^o_{5/2}$	388 709	1 118 490		2.4 – 1	1.4+10	D	25°, 165*
104.638	$3p^4(^1D)3d\ ^2F_{7/2}$	$3p^4(^1D)4f\ ^2G^o_{9/2}$	485 983	1 441 660		3.4	2.1+11	D	25°, 165*
104.248	5/2	7/2	476 699?	1 435 950		1.9	1.4+11	D	25°, 165*
103.724	$3p^4(^3P)3d\ ^2F_{5/2}$	$3p^4(^3P)4f\ ^2G^o_{7/2}$	452 730?	1 416 800		2.2	1.7+11	E	25°, 165*
103.164	7/2	9/2	440 840	1 408 650					25
103.319^{L}	$3p^4(^1S)3d\ ^2D_{5/2}$	$3p^4(^1S)4f\ ^2F^o_{7/2}$				3.3	2.6+11	D	25°, 165*
102.829	3/2	5/2	511 800	1 484 290		2.0	2.1+11	D	25°, 165*
102.348	$3p^4(^3P)3d\ ^4F_{7/2}$	$3p^4(^3P)4f\ ^4G^o_{9/2}$	422 795	1 399 850					25
102.095	9/2	11/2	417 653	1 397 130		5.5	2.9+11	D	25°, 165*
101.846	3/2	5/2	428 298	1 410 170		1.6	1.7+11	E	25°, 165*
101.733	5/2	7/2	426 763	1 409 730		2.3	1.8+11	D	25°, 165*
102.192	$3p^4(^1D)3d\ ^2G_{9/2}$	$3p^4(^1D)4f\ ^2H^o_{11/2}$	450 751	1 429 300		5.5	2.9+11	D	25°, 165*
101.435	$3p^4(^3P)3d\ ^4F_{7/2}$	$3p^4(^3P)4f\ ^2G^o_{9/2}$	422 795	1 408 650					25
100.026	$3p^4(^3P)3d\ ^4D_{7/2}$	$3p^4(^3P)4f\ ^4F^o_{9/2}$	388 709	1 388 450		3.9	2.6+11	D	25°, 165*
97.838	$3p^5\ ^2P^o_{3/2}$	$3p^4(^3P)4s\ ^4P_{5/2}$	0.0	1 022 100	20				11△, 12, 37°, 50, 184
97.122	3/2	3/2	0.0	1 029 630	25	2.0 – 1	3.5+10	D	11△, 12, 37°, 50, 165*, 184
97.591	$3p^5\ ^2P^o_{1/2}$	$3p^4(^3P)4s\ ^2P_{3/2}$	15 683.1	1 040 350		4.0 – 2	7.0+9	E	23, 37°, 50, 165*, 184
96.788	1/2	1/2	15 683.1	1 048 890	2	2.2 – 1	7.8+10	D	23, 37°, 50, 165*, 184
96.122	3/2	3/2	0.0	1 040 350	30	4.8 – 1	8.7+10	D	11△, 12, 37°, 50, 165*, 178, 184
95.338	3/2	1/2	0.0	1 048 890	1	1.6 – 1	5.9+10	D	37°, 50, 165*, 184
95.374	$3p^5\ ^2P^o_{1/2}$	$3p^4(^1D)4s\ ^2D_{3/2}$	15 683.1	1 064 190	15	3.0 – 1	5.5+10	D	11△, 12, 23, 37°, 50, 165*, 184
94.012	3/2	5/2	0.0	1 063 690	35	3.7 – 1	4.7+10	D	11△, 12, 23, 37°, 50, 165*, 184
78.769	$3p^5\ ^2P^o_{1/2}$	$3p^4(^3P)4d\ ^2D_{3/2}$	15 683.1	1 285 180	4	1.5 – 1	4.0+10	E	25°, 165*, 184△
77.865	3/2	5/2	0.0	1 284 270	8	8.8 – 1	1.6+11	D	25°, 165*, 184△
77.812	3/2	3/2	0.0	1 285 180		2.9 – 1	8.0+10	E	25°, 165*
78.151	$3p^5\ ^2P^o_{1/2}$	$3p^4(^3P)4d\ ^2P_{3/2}$	15 683.1	1 295 260		1.6 – 1	4.4+10	D	25°, 165*
77.728	$3p^5\ ^2P^o_{3/2}$	$3p^4(^3P)4d\ ^4F_{5/2}$	0.0	1 286 540		1.5 – 1	2.8+10	D	25°, 165*
77.627	$3p^5\ ^2P^o_{3/2}$	$3p^4(^3P)4d\ ^2F_{5/2}$	0.0	1 288 210		2.6 – 1	4.8+10	D	25°, 165*
76.822	$3p^5\ ^2P^o_{1/2}$	$3p^4(^1D)4d\ ^2P_{1/2}$	15 683.1	1 317 390		3.2 – 1	1.8+11	D	25°, 165*
76.006	3/2	3/2	0.0	1 315 690		4.4 – 1	1.3+11	D	25°, 165*
76.495	$3p^5\ ^2P^o_{1/2}$	$3p^4(^1D)4d\ ^2D_{3/2}$	15 683.1	1 322 960		4.8 – 1	1.4+11	D	25°, 165*
75.685	3/2	5/2	0.0	1 321 270		4.0 – 1	7.8+10	D	25°, 165*

Fe XI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
7891.8	$3p^4\ ^3P_2$	$3p^4\ ^3P_1$	0.0	12 667.9		M1	4.37+1	C	19°, 29, 38, 195*
3986.8	$3p^4\ ^3P_1$	$3p^4\ ^1D_2$	12 667.9	37 743.6		M1	9.44	C	19°, 38, 195*
2648.71	2	2	0.0	37 743.6		M1	9.23+1	C	14°, 195*
1467.06	$3p^4\ ^3P_1$	$3p^4\ ^1S_0$	12 667.9	80 814.7		M1	9.90+2	C	14°, 42, 43, 44, 46, 193, 194, 195*
406.811[C]	$3s^23p^4\ ^1D_2$	$3s3p^5\ ^3P^o_2$	37 743.6	283 558		5.0 − 3	4.0+7	E	165*
369.154	$3s^23p^4\ ^3P_1$	$3s3p^5\ ^3P^o_2$	12 667.9	283 558	2	5.4 − 2	5.3+8	C	20, 32, 34°, 165*
358.621	0	1	14 312	293 158	2	4.1 − 2	7.1+8	C	32, 33, 34°, 165*
356.519	1	1	12 667.9	293 158	1	3.0 − 2	5.2+8	C	20, 32, 33, 34°, 165*
352.661	2	2	0.0	283 558	6	1.6 − 1	1.7+9	C	20, 32, 33, 34°, 47, 165*
349.046	1	0	12 667.9	299 163	2	4.2 − 2	2.3+9	C	32, 33, 34°, 165*
341.113	2	1	0.0	293 158	3	6.0 − 2	1.1+9	C	20, 32, 33, 34°, 165*
355.837	$3s^23p^4\ ^1S_0$	$3s3p^5\ ^1P^o_1$	80 814.7	361 842		9.4 − 3	1.7+8	D	34°, 165*
308.544	$3s^23p^4\ ^1D_2$	$3s3p^5\ ^1P^o_1$	37 743.6	361 842		3.2 − 1	7.5+9	C	20°, 33, 165*, 178
276.364[C]	$3s^23p^4\ ^3P_2$	$3s3p^5\ ^1P^o_1$	0.0	361 842		7.0 − 3	2.0+8	E	165*
201.737	$3p^4\ ^1D_2$	$3p^3(^2D^o)3d\ ^3S^o_1$	37 743.6	533 450		1.2	6.3+10	E	36°, 165*
201.575	$3p^4\ ^3P_2$	$3p^3(^2P^o)3d\ ^3P^o_2$	0.0	496 090		1.1 − 1	3.6+9	D	36°, 165*, 178
198.549	$3p^4\ ^1D_2$	$3p^3(^2D^o)3d\ ^3P^o_1$	37 743.6	541 390					32, 36°
192.819	$3p^4\ ^3P_1$	$3p^3(^2D^o)3d\ ^3P^o_2$	12 667.9	531 290	50	6.0 − 1	2.2+10	D	11°, 12, 20, 32, 35, 36, 165*, 178,184
189.735	0	1	14 312	541 390					36
189.129	1	1	12 667.9	541 390					36°, 178
189.017	1	0	12 667.9	541 720		7.5 − 1	1.4+11	D	36°, 165*
188.219	2	2	0.0	531 290	70	3.0	1.1+11	D	11°, 12, 20, 32, 35, 36, 165*, 178,184
192.641	$3p^4\ ^3P_0$	$3p^3(^2D^o)3d\ ^3S^o_1$	14 312	533 450					36
192.020	1	1	12 667.9	533 450					36°, 178
187.446	2	1	0.0	533 450					36
189.940	$3p^4\ ^3P_2$	$3p^3(^2D^o)3d\ (5)^o_1$	0.0	526 480					36
184.800	$3p^4\ ^1D_2$	$3p^3(^2D^o)3d\ ^1D^o_2$	37 743.6	578 860	30	3.2	1.2+11	D	11°, 12, 35, 36, 165*, 184
184.41	$3p^4\ ^1S_0$	$3p^3(^2P^o)3d\ ^1P^o_1$	80 814.7	623 080		2.19	1.43+11	C	32, 36°, 165*
182.173	$3p^4\ ^3P_1$	$3p^3(^4S^o)3d\ ^3D^o_2$	12 667.9	561 610	60				4, 11°, 12, 20, 36, 39, 178, 184
181.140	0	1	14 312	566 380	40				4, 11°, 12, 36, 39, 178, 184
180.600	1	1	12 667.9	566 380	30				11°, 12, 32, 36
180.407	2	3	0.0	554 300	90				4, 11°, 12, 36, 39, 178, 184
178.060	2	2	0.0	561 610	40				4, 11°, 12, 20, 36, 39, 178, 184
179.762	$3p^4\ ^1D_2$	$3p^3(^2D^o)3d\ ^1F^o_3$	37 743.6	594 030	40	5.65	1.67+11	C	11°, 12, 36, 39, 165*, 178
176.620	$3p^4\ ^3P_1$	$3p^3(^2D^o)3d\ ^1D^o_2$	12 667.9	578 860		2.0 − 1	8.6+9	D	36°, 165*
124.725[L]	$3p^3(^2D^o)3d\ ^1G^o_4$	$3p^3(^2D^o)4p\ ^1F_3$				3.6 − 1	2.2+10	D	25°, 165*
123.822[L]	$3p^3(^2D^o)3d\ ^3G^o_3$	$3p^3(^2D^o)4p\ ^3F_2$				2.5 − 1	2.2+10	E	25°, 165*
123.49[L]	5	4				5.5 − 1	2.7+10	D	25°, 165*
123.49[L]	4	3				2.7 − 1	1.7+10	E	25°, 165*
123.572[L]	$3p^3(^2P^o)3d\ ^3F^o_3$	$3p^3(^2P^o)4p\ ^3D_2$				4.1 − 1	3.6+10	E	25°, 165*
121.747[L]	$3p^3(^4S^o)3d\ ^5D^o_3$	$3p^3(^4S^o)4p\ ^5P_2$				2.3 − 1	2.1+10	D	25°, 165*
121.419[L]	4	3				4.5 − 1	2.9+10	D	25°, 165*
93.433[L]	$3p^3(^2D^o)3d\ ^1G^o_4$	$3p^3(^2D^o)4f\ ^1H_5$				4.6	3.2+11	D	25°, 165*
93.018[L]	$3p^3(^2P^o)3d\ ^3F^o_2$	$3p^3(^2P^o)4f\ ^3G_3$							25
92.9[L]	$3p^3(^2D^o)3d\ ^3D^o_3$	$3p^3(^2P^o)4f\ ^3F_4$							25
92.8[L]	2	3							25
92.87[L]	$3p^3(^2D^o)3d\ ^3G^o_5$	$3p^3(^2D^o)4f\ ^3H_6$				6.6	3.9+11	D	25°, 165*
92.87[L]	3	4				4.0	3.4+11	D	25°, 165*
92.81[L]	4	5							25

Fe XI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
91.733[L]	$3p^3(^4S^o)3d\ ^5D^o_4$	$3p^3(^4S^o)4f\ ^5F_5$				5.7	4.1+11	D	25°, 165*
91.63[L]	1	2				1.4	2.3+11	D	25°, 165*
91.63[L]	3	4				3.9	3.4+11	D	25°, 165*
91.63[L]	2	3				2.5	2.8+11	D	25°, 165*
91.63[L]	$3p^3(^2D^o)3d\ ^3F^o_4$	$3p^3(^2D^o)4f\ ^3G_5$							25
91.472[L]	3	4				2.9	2.5+11	D	25°, 165*
91.394[L]	2	3				2.3	2.6+11	D	25°, 165*
90.345	$3p^4\ ^3P_0$	$3p^3(^4S^o)4s\ ^3S^o_1$	14 312	1 121 230		8. − 2	2.+10	E	40°, 50, 165*
90.205	1	1	12 667.9	1 121 230	1	2.0 − 1	5.5+10	D	40°, 50, 165*, 178
89.185	2	1	0.0	1 121 230	25	4.6 − 1	1.3+11	D	11△, 40°, 50, 165*
89.8614[C]	$3p^4\ ^1S_0$	$3p^3(^2P^o)4s\ ^1P^o_1$	80 814.7	1 193 640		2.5 − 1	6.9+10	D	165*
89.104	$3p^4\ ^1D_2$	$3p^3(^2D^o)4s\ ^1D^o_2$	37 743.6	1 160 030	20	8.0 − 1	1.3+11	D	11△, 12, 40°, 165*
88.167	$3p^4\ ^3P_0$	$3p^3(^2D^o)4s\ ^3D^o_1$	14 312	1 148 590		6. − 2	2.+10	E	40°, 165*
88.029	1	1	12 667.9	1 148 590		1.4 − 1	4.0+10	D	12, 23, 40°, 50, 165*
87.995	1	2	12 667.9	1 149 100		1.3 − 1	2.2+10	D	12, 23, 40°, 165*
87.025	2	2	0.0	1 149 100	25	2.0 − 1	3.5+10	D	11△, 12, 40°, 50, 165*
86.772	2	3	0.0	1 152 450	30	4.3 − 1	5.4+10	D	11△, 12, 23, 40°, 50, 165*
86.513	$3p^4\ ^1D_2$	$3p^3(^2P^o)4s\ ^1P^o_1$	37 743.6	1 193 640	1	2.8 − 1	8.3+10	D	40°, 165*
72.635	$3p^4\ ^3P_2$	$3p^3(^4S^o)4d\ ^3D^o_3$	0.0	1 376 750		9.0 − 1	1.6+11	D	25°, 165*
72.310	$3p^4\ ^1D_2$	$3p^3(^2D^o)4d\ ^1D^o_2$	37 743.6	1 420 680		6.0 − 1	1.5+11	D	25°, 165*
72.166	$3p^4\ ^1D_2$	$3p^3(^2D^o)4d\ ^1F^o_3$	37 743.6	1 423 440		1.6	2.9+11	D	25°, 165*

Fe XII

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3072.0	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^3\ ^2P^o_{1/2}$	41 566	74 109		M1	7.21+1	C	19°, 46, 195*
2565.93	3/2	3/2	41 566	80 515		M1	2.00+2	C	14°, 195*
2405.68	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^3\ ^2D^o_{3/2}$	0	41 566		M1	4.81+1	C	14°, 195*
2169.08	3/2	5/2	0	46 075		M1	1.84	C	14°, 45, 195*
1349.40	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^3\ ^2P^o_{1/2}$	0	74 109		M1	1.73+2	C	14°, 42, 43, 44, 45, 195*
1242.00	3/2	3/2	0	80 515		M1	3.17+2	C	14°, 42, 43, 44, 45, 195*
385.35[C]	$3s^23p^3\ ^2P^o_{3/2}$	$3s3p^4\ ^2D_{3/2}$	80 515	340 020		1.6 − 3	1.9+7	E	165*
382.83	3/2	5/2	80 515	341 703		7.6 − 2	5.8+8	D	32°, 48, 165*
376.07[C]	1/2	3/2	74 109	340 020		2.6 − 2	3.0+8	D	165*
364.468	$3s^23p^3\ ^4S^o_{3/2}$	$3s3p^4\ ^4P_{5/2}$	0	274 373	35	1.9 − 1	1.6+9	D	20°, 32, 33, 48, 165*
352.107	3/2	3/2	0	284 005	20	1.3 − 1	1.7+9	D	20°, 32, 33, 48, 165*
346.852	3/2	1/2	0	288 307	10	6.4 − 2	1.8+9	D	20°, 32, 33, 48, 165*
340.20[C]	$3s^23p^3\ ^2D^o_{5/2}$	$3s3p^4\ ^2D_{3/2}$	46 075	340 020		3.4 − 3	4.9+7	E	165*
338.263	5/2	5/2	46 075	341 703	8	2.9 − 1	2.9+9	D	20°, 33, 47, 48, 165*
335.06	3/2	3/2	41 566	340 020		2.4 − 1	3.5+9	D	32°, 47, 165*
333.18[C]	3/2	5/2	41 566	341 703		2.3 − 3	2.3+7	E	165*
291.010	$3s^23p^3\ ^2D^o_{5/2}$	$3s3p^4\ ^2P_{3/2}$	46 075	389 706	10				20°, 32, 48, 178
283.64	3/2	1/2	41 566	394 120					32°, 48, 178
230.79	$3s^23p^3\ ^2P^o_{3/2}$	$3s3p^4\ (3)_{1/2}$	80 515	513 850					48
229.24[C]	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^3P)3d\ ^4P_{3/2}$	80 515	516 740		5.2 − 3	1.7+8	E	165*
224.39[C]	1/2	1/2	74 109	519 770		3.6 − 3	2.3+8	E	165*
219.438	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^23d\ (3)_{3/2}$	46 075	501 800	10				20°, 32, 48
217.271	3/2	3/2	41 566	501 800					20°, 48
218.562	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1S)3d\ ^2D_{5/2}$	80 515	538 040					48
214.39[C]	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^4P_{5/2}$	46 075	512 510		4.6 − 2	1.1+9	E	165*
212.47[C]	5/2	3/2	46 075	516 740		6.6 − 3	2.5+8	E	165*
212.34[C]	3/2	5/2	41 566	512 510		1.7 − 2	4.2+8	E	165*
209.12[C]	3/2	1/2	41 566	519 770		2.3 − 2	1.8+9	E	165*
211.738	$3s^23p^3\ ^2D^o_{3/2}$	$3s3p^4\ (3)_{1/2}$	41 566	513 850					20°, 32, 48
211.19[C]	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2D_{3/2}$	80 515	554 030		9.6 − 3	3.6+8	E	165*
210.932	3/2	5/2	80 515	554 610		2.7 − 1	6.8+9	D	48°, 165*
208.410	1/2	3/2	74 109	554 030		1.7 − 1	6.7+9	D	48°, 165*
208.318	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1S)3d\ ^2D_{3/2}$	46 075	526 120					48
206.368	3/2	3/2	41 566	526 120					48
203.272	5/2	5/2	46 075	538 040					48
201.493	3/2	5/2	41 566	538 040					48
204.743	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2P_{1/2}$	80 515	568 940					48
202.090	1/2	1/2	74 109	568 940					32, 48°
201.121	3/2	3/2	80 515	577 740	15	1.2	5.1+10	D	20°, 32, 48, 165*
198.555	1/2	3/2	74 109	577 740	7	3.8 − 1	1.6+10	D	20°, 32, 48, 165*, 178
200.356	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2S_{1/2}$	80 515	579 630					48
196.923	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)3d\ ^2D_{3/2}$	46 075	554 030		2.5 − 1	1.1+10	D	48°, 165*
196.640	5/2	5/2	46 075	554 610	6	1.7	4.9+10	D	20°, 32, 48, 165*
195.119	3/2	3/2	41 566	554 030	90	1.4	6.1+10	D	20°, 48, 165*
194.920	3/2	5/2	41 566	554 610		5.6 − 2	1.7+9	D	48°, 165*
195.119	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)3d\ ^4P_{5/2}$	0	512 510	90	3.0	8.6+10	D	11, 12, 20°, 32, 48, 49, 165*, 178
193.509	3/2	3/2	0	516 740	60	2.0	9.1+10	D	11, 12, 20°, 32, 48, 49, 165*, 178
192.394	3/2	1/2	0	519 770	25	1.0	9.0+10	D	11, 12, 20°, 32, 48, 49, 165*
194.61	$3s^23p^3\ ^4S^o_{3/2}$	$3s3p^4\ (3)_{1/2}$	0	513 850					48

Fe XII – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
191.045	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^3P)3d\ ^2D_{5/2}$	80 515	603 930					20°, 32, 48, 178
190.459	3/2	3/2	80 515	605 480					48
188.216	1/2	3/2	74 109	605 480	50				20°, 32, 48, 178
190.06	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^1S)3d\ ^2D_{3/2}$	0	526 120					48
189.561	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2P_{1/2}$	41 566	568 940					48
188.09^C	5/2	3/2	46 075	577 740		2.1 − 2	9.9+8	E	165*
186.51^C	3/2	3/2	41 566	577 740		2.9 − 2	1.4+9	E	165*
188.45	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^2F_{5/2}$	46 075	576 740					48
186.880	5/2	7/2	46 075	581 180	15	4.4	1.0+11	D	11, 12, 20°, 32, 39, 48, 165*, 178, 184
186.856	3/2	5/2	41 566	576 740					48°, 178
180.31^C	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2D_{5/2}$	0	554 610		5.2 − 3	1.7+8	E	165*
179.265	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^2D_{5/2}$	46 075	603 930					48°, 178
110.732^L	$3s^23p^2(^1D)3d\ ^2G_{7/2}$	$3s^23p^2(^1D)4p\ ^2F^o_{5/2}$				1.4 − 1	1.3+10	D	25°, 165*
110.591^L	9/2	7/2				4.6 − 1	3.1+10	D	25°, 165*
109.712^L	$3s^23p^2(^3P)3d\ ^4D_{5/2}$	$3s^23p^2(^3P)4p\ ^2D^o_{3/2}$							25
109.509^L	$3s^23p^2(^1D)3d\ ^2F_{7/2}$	$3s^23p^2(^3P)4p\ ^2D^o_{5/2}$							25
109.015^L	$3s^23p^2(^3P)3d\ ^4D_{7/2}$	$3s^23p^2(^3P)4p\ ^4P^o_{5/2}$							25
108.862^L	$3s^23p^2(^3P)3d\ ^4F_{5/2}$	$3s^23p^2(^3P)4p\ ^4D^o_{3/2}$				2.3 − 1	3.2+10	D	25°, 165*
108.605^L	7/2	5/2				3.5 − 1	3.3+10	D	25°, 165*
108.440^L	9/2	7/2				4.7 − 1	3.3+10	D	25°, 165*
85.669	$3s^23p^2(^1S)3d\ ^2D_{5/2}$	$3s^23p^2(^1S)4f\ ^2F^o_{7/2}$	538 040	1 705 300					25
85.477^L	$3s^23p^2(^1D)3d\ ^2G_{9/2}$	$3s^23p^2(^1D)4f\ ^2H^o_{11/2}$				6.0	4.6+11	D	25°, 165*
85.14^L	7/2	9/2				3.7	3.4+11	D	25°, 165*
85.14	$3s^23p^2(^3P)3d\ ^2F_{7/2}$	$3s^23p^2(^3P)4f\ ^2G^o_{9/2}$	581 180	1 756 000					25
84.86	5/2	7/2	576 740	1 755 000					25
84.85^L	$3s^23p^2(^3P)3d\ ^4D_{5/2}$	$3s^23p^2(^3P)4f\ ^4F^o_{7/2}$				2.0	2.3+11	D	25°, 165*
84.768^L	7/2	9/2							25
84.52^L	$3s^23p^2(^3P)3d\ ^4F_{9/2}$	$3s^23p^2(^3P)4f\ ^4G^o_{11/2}$				6.7	5.2+11	D	25°, 165*
84.52^L	5/2	7/2				3.4	4.0+11	D	25°, 165*
84.48^L	7/2	9/2				5.3	4.9+11	D	25°, 165*
84.48^L	3/2	5/2				2.9	4.5+11	D	25°, 165*
82.837	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)4s\ ^2D_{5/2}$	80 515	1 287 700		1.2 − 1	1.9+10	D	25°, 165*
82.744	3/2	3/2	80 515	1 289 060		3.1 − 1	7.6+10	D	25°, 165*, 178
82.226	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^2(^3P)4s\ ^2P_{1/2}$	41 566	1 257 730		3.8 − 1	1.9+11	D	25°, 165*
81.943	5/2	3/2	46 075	1 266 360		5.8 − 1	1.4+11	D	25°, 165*, 178
81.651	3/2	3/2	41 566	1 266 360		4.0 − 2	1.0+10	E	25°, 165*, 178
80.5	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)4s\ ^2D_{5/2}$	46 075	1 287 700		5.1 − 1	8.7+10	D	25°, 165*
80.160	3/2	3/2	41 566	1 289 060		2.3 − 1	6.0+10	D	25°, 165*
80.5	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)4s\ ^4P_{1/2}$	0	1 242 000		1.4 − 1	7.2+10	D	12, 25°, 165*
80.022	3/2	3/2	0	1 249 660		2.6 − 1	6.8+10	D	12, 25°, 165*
79.488	3/2	5/2	0	1 258 050		3.8 − 1	6.7+10	D	12, 25°, 165*
68.382	$3s^23p^3\ ^2P^o_{1/2}$	$3s^23p^2(^3P)4d\ ^2D_{3/2}$	74 109	1 536 480		4.8 − 1	1.7+11	D	25°, 165*
67.972	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)4d\ ^2D_{5/2}$	80 515	1 551 640					25
67.821	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^2(^3P)4d\ ^2F_{5/2}$	41 566	1 516 030		5.6 − 1	1.4+11	D	25°, 165*
67.702	5/2	7/2	46 075	1 523 140					25
67.291	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)4d\ ^4D_{7/2}$	46 075	1 532 160					25

Fe XII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
67.164	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)4d\ ^2S_{1/2}$	80 515	1 569 410		1.5 − 1	1.1+11	D	25°, 165*
66.960	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^2(^3P)4d\ ^2D_{5/2}$	41 566	1 534 990		6.4 − 1	1.6+11	D	25°, 165*
66.526	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)4d\ ^2F_{7/2}$	46 075	1 549 250		9.0 − 1	1.7+11	D	25°, 165*
66.43	$5/2$	$5/2$	46 075	1 551 400					25
66.297	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)4d\ ^4P_{5/2}$	0	1 508 360					25
65.905	$3/2$	$3/2$	0	1 517 340		5.2 − 1	2.0+11	D	25°, 165*
66.225	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^2(^1D)4d\ ^2D_{5/2}$	41 566	1 551 640					25
66.047	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)4d\ ^4F_{5/2}$	0	1 514 070					25
65.805	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)4d\ ^2P_{3/2}$	46 075	1 565 720		1.3 − 1	5.1+10	D	25°, 165*

Fe XIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
10797.9	$3s^23p^2\ ^3P_1$	$3s^23p^2\ ^3P_2$	9 302.5	18 561.0		M1	9.87	C	19°, 38, 195*
10746.8	$_0$	$_1$	0.0	9 302.5		M1	1.40+1	C	19°, 38, 195*
3388.5	$3s^23p^2\ ^3P_2$	$3s^23p^2\ ^1D_2$	18 561.0	48 068		M1	5.75+1	C	19°, 32, 38, 195*
2578.77	$_1$	$_2$	9 302.5	48 068		M1	4.57+1	C	14°, 195*
1216.43	$3s^23p^2\ ^3P_1$	$3s^23p^2\ ^1S_0$	9 302.5	91 508		M1	1.01+3	C	14°, 32, 44, 45, 193, 195*
510.12	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^5S^o_2$	18 561.0	214 608					52°, 208
487.08	$_1$	$_2$	9 302.5	214 608					52, 53°, 208
419.92^C	$3s^23p^2\ ^1S_0$	$3s3p^3\ ^3P^o_1$	91 508	329 647		1.7 − 3	2.1+7	E	165*
412.98^C	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^3D^o_3$	48 068	290 210		1.4 − 2	7.8+7	E	165*
372.240^C	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3D^o_1$	18 561.0	287 205		7.5 − 4	1.2+7	E	165*
372.03^C	$_2$	$_2$	18 561.0	287 360		5.0 − 3	5.0+7	D−	165*
368.12	$_2$	$_3$	18 561.0	290 210		1.8 − 1	1.3+9	D	32°, 33, 165*
359.837	$_1$	$_1$	9 302.5	287 205	4	2.0 − 2	3.3+8	D−	20°, 33, 165*
359.63	$_1$	$_2$	9 302.5	287 360		1.4 − 1	1.5+9	D	32°, 33, 165*
348.184	$_0$	$_1$	0.0	287 205	20	6.9 − 2	1.3+9	E	20°, 33, 165*
321.455^C	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3P^o_1$	18 561.0	329 647		4.2 − 2	8.9+8	D−	165*
320.800	$_2$	$_2$	18 561.0	330 279	7	2.5 − 1	3.2+9	D	20°, 32, 165*
312.164	$_1$	$_1$	9 302.5	329 647	8	8.1 − 2	1.8+9	D	20°, 48, 165*
311.552	$_1$	$_2$	9 302.5	330 279	2	3.0 − 2	4.2+8	D	20°, 165*
303.355^C	$_0$	$_1$	0.0	329 647		5.1 − 2	1.2+9	D	165*
318.21	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^1D^o_2$	48 068	362 330					32
256.42	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^1P^o_1$	48 068	438 050					47°, 178
251.953	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3S^o_1$	18 561.0	415 462	40				12, 20°, 33, 47, 178
246.208	$_1$	$_1$	9 302.5	415 462	20				12, 20°, 33, 47
240.713	$_0$	$_1$	0.0	415 462	20				12, 20°, 33, 47, 178
233.234	$3s^23p^2\ ^3P_1$	$3s3p^3\ ^1P^o_1$	9 302.5	438 050					20°, 48
221.822	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^1D^o_2$	48 068	498 870	15				20°, 32, 48
216.88	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^3D^o_3$	48 068	509 176		1.1 − 1	2.2+9	E	33°, 165*
216.88	$_2$	$_2$	48 068	509 250					33
213.770	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^3P^o_2$	18 561.0	486 358	7				20°, 32
209.916	$_2$	$_1$	18 561.0	494 942	15				20
209.617	$_1$	$_2$	9 302.5	486 358	6				20°, 32
202.424	$_1$	$_0$	9 302.5	503 340	7	2.9 − 1	4.6+10	D	20°, 48, 165*
202.044	$_0$	$_1$	0.0	494 942	65				20°, 32
208.679	$3s^23p^2\ ^1S_0$	$3s^23p3d\ ^1P^o_1$	91 508	570 690		1.1	5.6+10	D	20°, 32, 48, 165*
204.942	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^3D^o_1$	18 561.0	506 502	5				12, 20°, 33
203.826	$_2$	$_3$	18 561.0	509 176	20	2.9	6.5+10	D	11, 12, 20°, 33, 48, 49, 165*, 184
203.793	$_2$	$_2$	18 561.0	509 250	8				12, 20°, 32, 33
201.121	$_1$	$_1$	9 302.5	506 502	16				12, 20°, 32, 33
200.021	$_1$	$_2$	9 302.5	509 250	5				12, 20°, 32, 33
197.434	$_0$	$_1$	0.0	506 502	2				12, 20°, 33
204.263	$3s^23p^2\ ^3P_1$	$3s^23p3d\ ^1D^o_2$	9 302.5	498 870					20°, 32, 48
196.525	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^1F^o_3$	48 068	556 870	4	2.8	6.8+10	C	11, 12, 20°, 32, 48, 49, 165*, 184
191.24	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^1P^o_1$	48 068	570 690					32
185.77^C	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^1F^o_3$	18 561.0	556 870		1.1 − 1	3.0+9	E	165*
175.23^C	$3s^23p^2\ ^3P_0$	$3s^23p3d\ ^1P^o_1$	0.0	570 690		6.1 − 3	4.4+8	D	165*
107.384	$3s^23p3d\ ^1F^o_3$	$3s^23p4p\ ^1D_2$	556 870	1 488 110		1.5	1.8+11	D	25°, 165*
98.826^L	$3s^23p3d\ ^3F^o_2$	$3s^23p4p\ ^3D_1$				1.7 − 1	3.9+10	E	25°, 165*
98.523^L	$_3$	$_2$				2.8 − 1	3.8+10	D	25°, 165*
98.128^L	$_4$	$_3$				4.1 − 1	4.1+10	D	25°, 165*
98.387	$3s^23p3d\ ^1D^o_2$	$3s^23p4p\ ^1P_1$	498 870	1 515 260					25

Fe XIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
85.461	$3s^23p3d\ ^1P^o_1$	$3s^23p4f\ ^1D_2$	570 690	1 740 800					51
84.275	$3s^23p3d\ ^1F^o_3$	$3s^23p4f\ ^1G_4$	556 870	1 743 460		5.3	5.5+11	D	25°, 51, 165*
82.010	$3s^23p3d\ ^3D^o_2$	$3s^23p4f\ ^3F_3$	509 250	1 728 600?					51
81.161	3	4	509 176	1 741 290					25
81.154	$3s^23p3d\ ^3P^o_0$	$3s^23p4f\ ^3D_1$	503 340	1 735 600?					51
78.77[L]	$3s^23p3d\ ^3F^o_3$	$3s^23p4f\ ^3G_4$							25°, 51
78.56[L]	2	3							25
78.462[L]	4	5				6.4	6.3+11	D	25°, 51, 165*
76.117	$3s^23p^2\ ^1D_2$	$3s^23p4s\ ^1P^o_1$	48 068	1 361 830		5.5 − 1	2.1+11	D	25°, 165*
75.892	$3s^23p^2\ ^3P_2$	$3s^23p4s\ ^3P^o_1$	18 561.0	1 336 220		2.0 − 1	7.7+10	D	12, 25°, 165*
74.845	2	2	18 561.0	1 354 680		4.4 − 1	1.0+11	D	12, 25°, 165*
74.327	1	2	9 302.5	1 354 680		1.7 − 1	4.1+10	D	25°, 165*
64.139	$3s^23p^2\ ^1S_0$	$3s^23p4d\ ^1P^o_1$	91 508	1 650 620		3.9 − 1	2.1+11	D	51°, 165*
63.188	$3s^23p^2\ ^1D_2$	$3s^23p4d\ ^1F^o_3$	48 068	1 630 650		1.7	3.9+11	D	25, 51°, 165*
62.963	$3s^23p^2\ ^3P_2$	$3s^23p4d\ ^3D^o_3$	18 561.0	*1 606 800*					25, 51°
62.699	1	2	9 302.5	1 604 220		6.9 − 1	2.3+11	E	25, 51°, 165*
62.353	0	1	0.0	1 603 770		3.5 − 1	2.0+11	D	51°, 165*
62.46	$3s^23p^2\ ^3P_2$	$3s^23p4d\ ^3F^o_3$	18 561.0	1 619 600		4.9 − 1	1.2+11	D	51°, 165*
62.10	$3s^23p^2\ ^3P_1$	$3s^23p4d\ ^3P^o_0$	9 302.5	1 620 000		9.3 − 2	1.6+11	D	51°, 165*

Fe XIV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
5302.86	$3s^23p\ ^2P^o_{1/2}$	$3s^23p\ ^2P^o_{3/2}$	0.0	18 852.5		M1	6.02+1	C	19, 38°, 195*
544.304^{C}	$3s3p^2\ ^2P_{3/2}$	$3p^3\ ^2D^o_{5/2}$	396 512	580 233					58
519.508^{C}	$3s3p^2\ ^2P_{3/2}$	$3p^3\ ^4S^o_{3/2}$	396 512	589 002		1.0 − 2	6.5+7	E	165*
484.60	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^4P_{1/2}$	18 852.5	225 114					52°, 208
467.40	3/2	3/2	18 852.5	232 789					52, 53°, 208
447.36	3/2	5/2	18 852.5	242 387		4.4 − 3	2.5+7	E	52, 53°, 165*, 208
444.25	1/2	1/2	0.0	225 114					52, 53°, 208
406.838^{C}	$3s3p^2\ ^2P_{3/2}$	$3p^3\ ^2P^o_{1/2}$	396 512	642 310		3.5 − 2	7.1+8	E	165*
401.773^{C}	3/2	3/2	396 512	645 409		2.6 − 1	2.7+9	D	58, 165*
394.011^{C}	1/2	1/2	388 510	642 310		1.5 − 1	3.3+9	D	58, 165*
370.696^{C}	$3s^23d\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2F^o_{5/2}$	475 202	744 965		4.3 − 2	3.4+8	E	165*
367.996^{C}	3/2	5/2	473 223	744 965		1.7 − 1	1.4+9	E	165*
351.356^{C}	5/2	7/2	475 202	759 814		3.2 − 1	2.2+9	E	58, 165*
360.827	$3s3p^2\ ^2D_{3/2}$	$3p^3\ ^2D^o_{3/2}$	299 242	576 383					56°, 58
358.681	5/2	5/2	301 469	580 233		3.5 − 1	3.0+9	E	56°, 58, 165*
355.883^{C}	3/2	5/2	299 242	580 233		3.5 − 2	3.1+8	E	58, 165*
360.208^{C}	$3s3p^2\ ^2S_{1/2}$	$3p^3\ ^2P^o_{1/2}$	364 693	642 310		5.0 − 3	1.3+8	E	165*
356.232^{C}	1/2	3/2	364 693	645 409		1.4 − 1	1.9+9	D	58, 165*
359.342	$3s3p(^3P^o)3d\ ^4D^o_{3/2}$	$3p^2(^3P)3d\ ^4F_{5/2}$	692 662	970 948					59
356.505	7/2	9/2	703 393	983 894					59
356.60	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2D_{3/2}$	18 852.5	299 242		5.6 − 3	7.5+7	E	32°, 33, 165*
353.829	3/2	5/2	18 852.5	301 469		2.2 − 1	1.9+9	D	20, 32, 33, 47, 56°, 165*
334.171	1/2	3/2	0.0	299 242		1.5 − 1	2.3+9	D	20, 32, 33, 56°, 165*, 178
348.547	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	$3p^2(^3P)3d\ ^4F_{7/2}$	690 304	977 283					59
345.113^{C}	$3s3p^2\ ^2D_{3/2}$	$3p^3\ ^4S^o_{3/2}$	299 242	589 002		8.0 − 3	1.1+8	E	165*
308.998	$3s3p(^3P^o)3d\ ^4F^o_{9/2}$	$3p^2(^3P)3d\ ^4F_{9/2}$	660 263	983 894					59
307.73	5/2	5/2	645 988	970 948					59
307.403	7/2	7/2	651 946	977 283					59
303.573	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	$3p^2(^1D)3d\ ^2D_{5/2}$	703 393	1 032 802					59
301.286^{C}	$3s^23d\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	475 202	807 113		2.2 − 2	4.1+8	E	165*
299.500^{C}	3/2	3/2	473 223	807 113		3.0 − 2	5.7+8	E	165*
295.993^{C}	$3s3p^2\ ^4P_{5/2}$	$3p^3\ ^2D^o_{5/2}$	242 387	580 233		6.6 − 3	8.5+7	E	165*
293.321	$3s3p(^3P^o)3d\ ^4D^o_{5/2}$	$3p^2(^3P)3d\ ^4P_{3/2}$	704 114	1 045 029					59
285.698	1/2	1/2	694 168	1 044 188					59
283.795	3/2	3/2	692 662	1 045 029					59
292.036	$3s^23d\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	475 202	817 593		2.5	2.4+10	E	56°, 58, 165*
289.520^{C}	5/2	5/2	475 202	820 601		7.2 − 2	9.5+8	E	165*
287.859	3/2	5/2	473 223	820 601		1.9	2.5+10	E	56°, 58, 165*
291.652	$3s3p(^3P^o)3d\ ^4F^o_{9/2}$	$3p^2(^3P)3d\ ^4D_{7/2}$	660 263	1 003 137					59
285.877	5/2	3/2	645 988	995 789					59
285.477	5/2	5/2	645 988	996 279					59
291.492	$3s3p^2\ ^2D_{3/2}$	$3p^3\ ^2P^o_{1/2}$	299 242	642 310		3.2 − 1	1.3+10	D	56°, 165*
290.747	5/2	3/2	301 469	645 409		4.9 − 1	9.7+9	D	56°, 58, 165*
288.878^{C}	3/2	3/2	299 242	645 409		6.4 − 2	1.3+9	D	165*
289.977	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	$3p^2(^3P)3d\ ^2D_{5/2}$	807 113	1 151 968					59
289.697	$3s3p(^3P^o)3d\ ^2F^o_{7/2}$	$3p^2(^3P)3d\ ^2F_{7/2}$	759 814	1 105 002					59
281.635	5/2	5/2	744 965	1 099 985					59
289.123	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2S_{1/2}$	18 852.5	364 693		3.0 − 2	1.2+9	E	12, 20, 32, 33, 56°, 165*, 178
274.203	1/2	1/2	0.0	364 693		4.0 − 1	1.8+10	D	11, 12, 20, 33, 54, 56°, 165*

Fe XIV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
288.512	$3s3p^2\ ^4P_{5/2}$	$3p^3\ ^4S^o_{3/2}$	242 387	589 002		8.4 − 1	1.6+10	D	47, 55°, 56, 165*
280.739	3/2	3/2	232 789	589 002		5.6 − 1	1.2+10	D	47, 55°, 56, 165*
274.797	1/2	3/2	225 114	589 002		2.8 − 1	6.2+9	D	55°, 56, 165*
284.627	$3s3p(^3P^o)3d\ ^2F^o_{5/2}$	$3p^2(^1S)3d\ ^2D_{5/2}$	744 965	1 096 302					59
282.230	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	$3p^2(^3P)3d\ ^4P_{5/2}$	690 304	1 044 631					59
273.538	$3s^23d\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2D^o_{3/2}$	475 202	840 775		6.0 − 1	1.4+10	E	56°, 58, 165*
272.1	3/2	3/2	473 223	840 775		3.6 − 1	8.0+9	E	58°, 165*
270.765	5/2	5/2	475 202	844 477		1.3	2.0+10	E	56°, 58, 165*
269.357^C	3/2	5/2	473 223	844 477		2.2 − 2	3.5+8	E	165*
273.000	$3s^23d\ ^2D_{3/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	473 223	839 492		6.8 − 1	3.1+10	D	56°, 58, 165*
271.404^C	5/2	3/2	475 202	843 656		7.2 − 1	1.6+10	D	165*
269.926	3/2	3/2	473 223	843 656		6.0 − 1	1.4+10	D	56°, 58, 165*
270.511	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2P_{1/2}$	18 852.5	388 510		4.8 − 1	2.1+10	D	11, 12, 20, 47, 54, 56°, 165*, 178, 192
264.785	3/2	3/2	18 852.5	396 512		1.42	3.38+10	C−	11, 12, 20, 54, 56°, 165*, 178, 192
257.377	1/2	1/2	0.0	388 510		2.8 − 1	1.4+10	D	11, 12, 20, 54, 56°, 165*, 178, 192
252.188	1/2	3/2	0.0	396 512		2.90 − 1	7.6+9	C−	11, 12, 20, 54, 56°, 165*, 178, 192
263.70	$3s3p(^1P^o)3d\ ^2F^o_{5/2}$	$3s3d^2\ ^2G_{7/2}$	820 601	1 199 820					59
261.450	7/2	9/2	817 593	1 200 075					59
261.274	$3s3p(^3P^o)3d\ ^2D^o_{3/2}$	$3p^2(^3P)3d\ ^2F_{5/2}$	717 195	1 099 985					59
258.227	5/2	7/2	717 861	1 105 002					59
257.178^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	301 469	690 304		5.3 − 2	8.9+8	E	165*
249.627	$3s3p(^1P^o)3d\ ^2D^o_{5/2}$	$3s3d^2\ ^2F_{7/2}$	844 477	1 245 075					59
248.117	3/2	5/2	840 775	1 243 811					59
248.803^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	301 469	703 393		2.5 − 2	3.3+8	E	165*
248.125^C	$3s3p^2\ ^4P_{5/2}$	$3p^3\ ^2P^o_{3/2}$	242 387	645 409		7.2 − 3	2.0+8	E	165*
242.354^C	3/2	3/2	232 789	645 409		1.6 − 2	4.6+8	E	165*
237.928^C	1/2	3/2	225 114	645 409		6.8 − 3	2.0+8	E	165*
243.545^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	396 512	807 113		3.8 − 1	1.1+10	D	58, 165*
238.890^C	1/2	3/2	388 510	807 113		1.4 − 2	4.1+8	E	165*
240.159	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2D^o_{5/2}$	301 469	717 861					56°, 58
239.231	3/2	3/2	299 242	717 195					56°, 58
235.800^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2F^o_{5/2}$	396 512	820 601		1.6 − 2	3.1+8	E	165*
229.341	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	$3s3d^2\ ^4F_{7/2}$	690 304	1 126 336					59
226.040	$3s3p^2\ ^2S_{1/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	364 693	807 113		1.2	3.9+10	D	56°, 58, 165*
225.744^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	396 512	839 492		1.36 − 1	8.89+9	C−	58, 165*
223.618	3/2	3/2	396 512	843 656		9.2 − 1	3.0+10	D	56°, 58, 165*
221.738^C	1/2	1/2	388 510	839 492		8.6 − 1	5.8+10	D	58, 165*
219.710^C	1/2	3/2	388 510	843 656					58
225.481^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2F^o_{5/2}$	301 469	744 965		1.2 − 1	2.6+9	E	165*
224.354	3/2	5/2	299 242	744 965		6.0 − 1	1.3+10	E	56°, 58, 165*
218.169	5/2	7/2	301 469	759 814		9.0 − 1	1.6+10	E	56°, 58, 165*
225.327	$3p^3\ ^4S^o_{3/2}$	$3p^2(^1D)3d\ ^2D_{5/2}$	589 002	1 032 802					59
225.092^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2D^o_{3/2}$	396 512	840 775		6.8 − 2	2.3+9	E	165*
223.222	3/2	5/2	396 512	844 477		2.6	5.8+10	E	56°, 58, 165*
221.124	1/2	3/2	388 510	840 775		1.4	4.7+10	E	56°, 58, 165*

Fe XIV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
223.256^{C}	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	242 387	690 304		1.4 – 1	3.0+9	E	165*
218.578	3/2	5/2	232 789	690 304		1.0	2.5+10	E	56°, 165*
212.345	3/2	1/2	232 789	703 750					57
212.145	3/2	3/2	232 789	704 209					57
220.902	$3p^3\ ^2D^o_{5/2}$	$3p^2(^1D)3d\ ^2D_{5/2}$	580 233	1 032 802					59
217.110	3/2	3/2	576 383	1 036 979					59
220.076	$3s^23p\ ^2P^o_{3/2}$	$3s^23d\ ^2D_{3/2}$	18 852.5	473 223		2.4 – 1	8.1+9	D	11, 12, 20, 23, 49, 56°, 165*, 192
219.136	3/2	5/2	18 852.5	475 202		1.7	3.9+10	D	11, 12, 20, 39, 49, 56°, 58, 165*, 192
211.331	1/2	3/2	0.0	473 223		9.6 – 1	3.6+10	D	11, 12, 20, 23, 39, 49, 56°, 165*, 192
219.690	$3p^3\ ^4S^o_{3/2}$	$3p^2(^3P)3d\ ^4P_{1/2}$	589 002	1 044 188					59
219.474	3/2	5/2	589 002	1 044 631					59
219.289	3/2	3/2	589 002	1 045 029					59
216.928	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	242 387	703 393		2.28	4.04+10	C–	32, 56°, 165*
216.742^{C}	3/2	1/2	232 789	694 168		6.4 – 3	4.5+8	E	165*
216.576	5/2	5/2	242 387	704 114		1.1	2.7+10	D	56°, 165*
213.906	1/2	3/2	225 114	692 662					56
213.176	1/2	1/2	225 114	694 168		5.6 – 1	4.1+10	D	56°, 165*
212.154	3/2	5/2	232 789	704 114		4.4 – 1	1.1+10	D	56°, 165*
210.797	$3s3p(^3P^o)3d\ ^4F^o_{7/2}$	$3s3d^2\ ^4F_{7/2}$	651 946	1 126 336					59
210.615^{C}	$3s3p^2\ ^2S_{1/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	364 693	839 492		2.6 – 1	1.9+10	D	58, 165*
208.784^{C}	1/2	3/2	364 693	843 656		1.7 – 1	6.7+9	D	58, 165*
210.048^{C}	$3s3p^2\ ^2S_{1/2}$	$3s3p(^1P^o)3d\ ^2D^o_{3/2}$	364 693	840 775					58
193.752^{C}	$3s3p^2\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	301 469	817 593		1.2	2.7+10	E	58, 165*
192.629^{C}	5/2	5/2	301 469	820 601		4.7 – 2	1.4+9	E	165*
191.806^{C}	3/2	5/2	299 242	820 601		8.4 – 1	2.6+10	E	58, 165*
193.264^{C}	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)3d\ ^2F^o_{7/2}$	242 387	759 814		1.9 – 2	4.2+8	E	165*
185.423^{C}	$3s3p^2\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2D^o_{3/2}$	301 469	840 775		4.0 – 3	1.9+8	E	165*
184.661^{C}	3/2	3/2	299 242	840 775		1.8 – 3	8.8+7	E	165*
185.099^{C}	$3s3p^2\ ^2D_{3/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	299 242	839 492		1.5 – 3	1.4+8	E	165*
184.438^{C}	5/2	3/2	301 469	843 656		5.6 – 3	2.7+8	E	165*
183.684^{C}	3/2	3/2	299 242	843 656		6.0 – 3	3.0+8	E	165*
173.851^{C}	$3s3p^2\ ^4P_{5/2}$	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	242 387	817 593		1.2 – 2	3.3+8	E	165*
171.822^{C}	$3s3p^2\ ^4P_{1/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	225 114	807 113		5.4 – 3	3.1+8	E	165*
91.273	$3s^23d\ ^2D_{3/2}$	$3s^24p\ ^2P^o_{1/2}$	473 223	1 568 840		1.4 – 1	5.6+10	D	25°, 165*
91.009	5/2	3/2	475 202	1 574 010		2.5 – 1	5.1+10	D	25°, 165*
76.152	$3s^23d\ ^2D_{5/2}$	$3s^24f\ ^2F^o_{7/2}$	475 202	1 788 380		4.9	7.0+11	C	25°, 165*
76.022	3/2	5/2	473 223	1 788 640		3.4	6.6+11	C	25°, 165*
73.08	$3s3p(^3P^o)3d\ ^4F^o_{7/2}$	$3s3p(^3P^o)4f\ ^4G_{9/2}$	651 946	2 020 000					25
72.95	5/2	7/2	645 988	2 017 000					25
72.80	9/2	11/2	660 263	2 034 000		8.4	8.8+11	D	25°, 165*
71.377	$3s3p^2\ ^2D_{5/2}$	$3s3p(^1P^o)4s\ ^2P^o_{3/2}$	301 469	1 702 500					25
70.613	$3s^23p\ ^2P^o_{3/2}$	$3s^24s\ ^2S_{1/2}$	18 852.5	1 435 020		2.5 – 1	1.7+11	D	23, 25°, 50, 165*
69.66	1/2	1/2	0.0	1 435 020		1.3 – 1	8.9+10	D	23, 25°, 50, 165*
70.251	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)4s\ ^4P^o_{3/2}$	242 387	1 666 100		2.4 – 1	8.1+10	D	25°, 165*
69.667	5/2	5/2	242 387	1 678 100		5.5 – 1	1.3+11	D	25°, 165*
69.386	1/2	3/2	225 114	1 666 100		2.2 – 1	7.6+10	D	25°, 165*
69.176	3/2	5/2	232 789	1 678 100		2.4 – 1	5.6+10	D	25°, 165*
59.579	$3s^23p\ ^2P^o_{3/2}$	$3s^24d\ ^2D_{5/2}$	18 852.5	1 697 290		1.0	3.1+11	C	23, 50, 60°, 165*, 184
58.963	1/2	3/2	0.0	1 695 980		5.6 – 1	2.7+11	C	12, 23, 50, 60°, 165*, 184

Fe XV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
7058.6	$2p^63s3p\ ^3P^o_1$	$2p^63s3p\ ^3P^o_2$	239 660	253 820		M1	3.74+1	C	19°, 195*
536.418	$2p^63s3d\ ^1D_2$	$2p^63p3d\ ^1D^o_2$	762 093	948 513	330	1.6 − 1	7.4+8	D	61°, 165*
493.552^C	$2p^63s3p\ ^1P^o_1$	$2p^63p^2\ ^3P_0$	351 911	554 524		2.3 − 3	6.4+7	E	165*
470.166^C	1	1	351 911	564 602		8.4 − 4	8.4+6	E	165*
434.98	1	2	351 911	581 803	2	6.6 − 2	4.7+8	E	62°, 165*
481.493	$2p^63s3p\ ^1P^o_1$	$2p^63p^2\ ^1D_2$	351 911	559 600	260	2.7 − 1	1.6+9	E	47, 61°, 64, 165*, 182, 186
417.258	$2p^63s^2\ ^1S_0$	$2p^63s3p\ ^3P^o_1$	0	239 660		3.2 − 3	4.1+7	E	20°, 61, 64, 68, 69, 165*, 182, 192
405.145^C	$2p^63s3d\ ^3D_3$	$2p^63p3d\ ^3F^o_2$	681 416	928 241		1.4 − 3	1.1+7	E	165*
402.48	2	2	679 785	928 241	1	1.1 − 1	9.1+8	D	62°, 165*
400.851	1	2	678 772	928 241	190	3.9 − 1	3.2+9	D	47, 61°, 165*
389.54	3	3	681 416	938 126	1	1.6 − 1	1.0+9	C	62°, 165*
387.086	2	3	679 785	938 126	280	6.5 − 1	4.1+9	C	47, 61°, 165*
372.798	3	4	681 416	949 658	440	1.12	6.0+9	C	47, 61°, 165*
332.854	$2p^63s3d\ ^1D_2$	$2p^63p3d\ ^1F^o_3$	762 093	1 062 515	370	2.1	1.8+10	D	61°, 165*
331.083	$2p^63s3d\ ^3D_3$	$2p^63p3d\ ^3P^o_2$	681 416	983 514	170				61
315.998^C	2	1	679 785	996 243		1.3 − 1	2.9+9	E	165*
315.341^C	1	0	678 772	995 889		1.6 − 1	1.1+10	C	165*
314.99	1	1	678 772	996 243	3	3.6 − 1	7.9+9	E	62°, 165*
329.94	$2p^63s3d\ ^3D_2$	$2p^63p3d\ ^3D^o_1$	679 785	982 868	4	3.3 − 1	6.6+9	E	62°, 165*
328.844^C	1	1	678 772	982 868		9.9 − 2	2.0+9	E	165*
319.047	3	3	681 416	994 852	180	8.4 − 1	7.7+9	C	61°, 165*
317.393^C	2	3	679 785	994 852		2.0 − 1	1.9+9	C	165*
315.559	2	2	679 785	996 623	120				61
327.024	$2p^63s3p\ ^3P^o_2$	$2p^63p^2\ ^1D_2$	253 820	559 600	200	1.6 − 1	2.0+9	E	61°, 64, 165*
312.556	1	2	239 660	559 600	70	8.1 − 2	1.1+9	E	61°, 64, 165*
324.975	$2p^63s3p\ ^1P^o_1$	$2p^63p^2\ ^1S_0$	351 911	659 627	180	3.09 − 1	1.97+10	C	61°, 64, 165*
321.771	$2p^63s3p\ ^3P^o_2$	$2p^63p^2\ ^3P_1$	253 820	564 602	310	3.3 − 1	7.1+9	C	54, 61°, 64, 165*, 178
317.597	1	0	239 660	554 524	220	2.7 − 1	1.77+10	C	32, 54, 61°, 165*
307.730	1	1	239 660	564 602	220	2.1 − 1	4.91+9	C	32, 61°, 64, 165*
304.894	2	2	253 820	581 803	400	9.0 − 1	1.3+10	D	32, 54, 61°, 165*
302.334	0	1	233 842	564 602	140	2.85 − 1	6.9+9	C	32, 61°, 165*
292.275	1	2	239 660	581 803	220	2.9 − 1	4.5+9	D	32, 61°, 165*
319.70	$2p^63s3d\ ^1D_2$	$2p^63p3d\ ^1P^o_1$	762 093	1 074 887	4	6.0 − 1	1.3+10	D	62°, 165*
305.940^C	$2p^63s3p\ ^1P^o_1$	$2p^63s3d\ ^3D_1$	351 911	678 772		1.1 − 3	2.6+7	E	165*
304.995^C	1	2	351 911	679 785		2.1 − 3	3.0+7	E	165*
305.15	$2p^63p3d\ ^1P^o_1$	$2p^63d^2\ ^1D_2$	1 074 887	1 402 592	1				67
290.239	$2p^63p3d\ ^1F^o_3$	$2p^63d^2\ ^1G_4$	1 062 515	1 407 058	4				65°, 66, 67
284.164	$2p^63s^2\ ^1S_0$	$2p^63s3p\ ^1P^o_1$	0	351 911	1000	8.27 − 1	2.28+10	B	11, 12, 49, 61°, 63, 64, 68, 69, 165*, 178, 192
272.70	$2p^63p^2\ ^3P_2$	$2p^63p3d\ ^1D^o_2$	581 803	948 513	1				62
271.27	$2p^63p^2\ ^1D_2$	$2p^63p3d\ ^3F^o_2$	559 600	928 241	2				62
267.303	$2p^63p3d\ ^3P^o_1$	$2p^63d^2\ ^3F_2$	996 243	1 370 331	1				65
257.384	2	3	983 514	1 372 035					65°, 66, 67
266.377	$2p^63p3d\ ^3D^o_2$	$2p^63d^2\ ^3F_3$	996 623	1 372 035	2				65°, 66, 67
263.685	3	4	994 852	1 374 056	5				65°, 66, 67
258.088	1	2	982 868	1 370 331					65°, 66, 67
257.127	$2p^63p^2\ ^1D_2$	$2p^63p3d\ ^1D^o_2$	559 600	948 513	210	7.0 − 1	1.4+10	E	61°, 165*
249.336^C	$2p^63p^2\ ^3P_2$	$2p^63p3d\ ^3D^o_1$	581 803	982 868		8.0 − 3	2.9+8	E	165*
242.100	2	3	581 803	994 852	200	1.4	2.3+10	D	61°, 165*
241.066	2	2	581 803	996 623	100				61
239.082^C	1	1	564 602	982 868		1.1 − 1	4.3+9	E	165*
233.46	0	1	554 524	982 868	2	6.3 − 1	2.5+10	E	62°, 165*
231.47	1	2	564 602	996 623	2				62

Fe XV – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
243.794	$2p^63s3p\ ^1P^o_1$	$2p^63s3d\ ^1D_2$	351 911	762 093	390	1.9	4.2+10	D	61°, 63, 64, 165*, 186
243.235	$2p^63p3d\ ^3D^o_2$	$2p^63d^2\ ^3P_2$	996 623	1 407 773	3				67
242.620	$2p^63p3d\ ^1P^o_1$	$2p^63d^2\ ^1S_0$	1 074 887	1 487 054	1				67
241.289[C]	$2p^63p^2\ ^3P_2$	$2p^63p3d\ ^3P^o_1$	581 803	996 243		1.7 − 1	6.5+9	E	165*
238.708	1	2	564 602	983 514	140				61
231.87	1	0	564 602	995 889	2	1.7 − 1	2.1+10	E	62°, 165*
231.68	1	1	564 602	996 243	2	3.6 − 1	1.5+10	E	61, 62°, 165*
240.81	$2p^63p^2\ ^1S_0$	$2p^63p3d\ ^1P^o_1$	659 627	1 074 887	3	6.4 − 1	2.4+10	C	62°, 165*
238.114[C]	$2p^63s3p\ ^3P^o_1$	$2p^63p^2\ ^1S_0$	239 660	659 627		2.7 − 3	3.2+8	E	165*
235.638	$2p^63p3d\ ^3F^o_4$	$2p^63d^2\ ^3F_4$	949 658	1 374 056	4				65°, 66, 67
230.463	3	3	938 126	1 372 035	1				65°, 66, 67
226.220	2	2	928 241	1 370 331	1				65°, 67
235.32[C]	$2p^63s3p\ ^3P^o_2$	$2p^63s3d\ ^3D_1$	253 820	678 772		1.6 − 2	6.2+8	D	165*
234.782	2	2	253 820	679 785	60	2.27 − 1	5.5+9	C	61°, *64*, 165*
233.865	2	3	253 820	681 416	290	1.3	2.2+10	C	11, 12, 23, 49, 61°, 63, 64, 165*, 178, 192
227.734	1	1	239 660	678 772	140	2.3 − 1	9.8+9	C	49, 61°, 63, 165*
227.206	1	2	239 660	679 785	220	6.9 − 1	1.8+10	C	11, 49, 61°, 63, 64, 165*, 178
224.754	0	1	233 842	678 772	90	3.14 − 1	1.38+10	C	11, 49, 61°, 63, 64, 165*
229.744	$2p^63p^2\ ^1D_2$	$2p^63p3d\ ^3D^o_3$	559 600	994 852	60				61
220.22	$2p^63p3d\ ^1D^o_2$	$2p^63d^2\ ^1D_2$	948 513	1 402 592	1				67
208.034	$2p^63p^2\ ^3P_2$	$2p^63p3d\ ^1F^o_3$	581 803	1 062 515	60				61
198.867	$2p^63p^2\ ^1D_2$	$2p^63p3d\ ^1F^o_3$	559 600	1 062 515					61
196.74[C]	$2p^63s3p\ ^3P^o_2$	$2p^63s3d\ ^1D_2$	253 820	762 093		4.7 − 4	1.6+7	E	165*
191.41[C]	1	2	239 660	762 093		9.6 − 3	3.5+8	E	165*
194.067[C]	$2p^63p^2\ ^1D_2$	$2p^63p3d\ ^1P^o_1$	559 600	1 074 887		6.5 − 3	3.8+8	E	165*
73.473	$2p^63s3d\ ^1D_2$	$2p^63s4f\ ^1F^o_3$	762 093	2 123 150		3.5	6.2+11	C	12, 25, 64°, 165*
73.471	$2p^63p3d\ ^1P^o_1$	$2p^63p4f\ ^1D_2$	1 074 887	2 436 000					51
73.199	$2p^63p3d\ ^1F^o_3$	$2p^63p4f\ ^1G_4$	1 062 515	2 428 700		6.4	8.8+11	C−	51°, 165*
71.267	$2p^63p3d\ ^3P^o_2$	$2p^63p4f\ ^1F_3$	983 514	2 386 700					51
71.062	$2p^63p3d\ ^3D^o_3$	$2p^63p4f\ ^3F_4$	994 852	2 402 100					25, 51°
71.062	1	2	982 868	2 390 100					25, 51°
70.601	$2p^63p3d\ ^3D^o_2$	$2p^63p4f\ ^3D_3$	996 623	2 413 000					25, 51°
70.519	$2p^63p3d\ ^3P^o_1$	$2p^63p4f\ ^3D_2$	996 243	2 414 300					25, 51°
70.224	0	1	995 889	2 420 100		9.2 − 1	4.13+11	C	25, 51°, 165*
70.224	1	1	996 243	2 420 100					25, 51°
70.054	$2p^63s3d\ ^3D_3$	$2p^63s4f\ ^3F^o_4$	681 416	2 108 880	4	5.8	8.8+11	C	12, 25, 51, 60°, 64, 71, 165*
69.987	2	3	679 785	2 108 620	3	4.1	7.9+11	C−	25, 51, 60°, 64, 165*
69.945	1	2	678 772	2 108 520	2	2.7	7.4+11	C	51, 60°, 64, 165*
69.66	$2p^63s3p\ ^1P^o_1$	$2p^63s4s\ ^1S_0$	351 911	1 787 000		1.4 − 1	1.9+11	C	64°, 165*
69.534	$2p^63p3d\ ^1D^o_2$	$2p^63p4f\ ^1F_3$	948 513	2 386 700					25, 51°
69.036	$2p^63p3d\ ^3F^o_3$	$2p^63p4f\ ^3G_4$	938 126	2 386 700					25°, 51
68.883	2	3	928 241	2 380 160					25°, 51
68.849	4	5	949 658	2 402 100		7.2	9.2+11	C	25°, 51, 165*
66.238	$2p^63s3p\ ^3P^o_2$	$2p^63s4s\ ^3S_1$	253 820	1 763 700	1	3.1 − 1	1.6+11	C	70°, 165*
65.612	1	1	239 660	1 763 700	1	1.9 − 1	9.8+10	C	70°, 71, 165*
65.370	0	1	233 842	1 763 700		6.2 − 2	3.2+10	C	64, 70°, 71, 165*
63.96	$2p^63p^2\ ^1D_2$	$2p^63s4f\ ^1F^o_3$	559 600	2 123 150		7.0 − 1	1.6+11	E	64°, 165*, 186
59.404	$2p^63s3p\ ^1P^o_1$	$2p^63s4d\ ^1D_2$	351 911	2 035 280		9.0 − 1	3.4+11	C−	25°, 64, 165*

Fe XV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
56.236	$2p^63s3p\ ^3P^o_2$	$2p^63s4d\ ^3D_2$	253 820	2 032 020					60
56.200	2	3	253 820	2 033 180	3				60°, 71
55.815	1	1	239 660	2 031 310					60
55.793	1	2	239 660	2 032 020	2				60°, 71
55.635	0	1	233 842	2 031 310	1				60°, 71
52.911	$2p^63s^2\ ^1S_0$	$2p^63s4p\ ^1P^o_1$	0	1 889 970	3	3.70 − 1	2.94+11	C	12, 50, 60°, 64, 71, 165*
50.120	$2p^63s3d\ ^3D_3$	$2p^63s5f\ ^3F^o_4$	681 416	2 676 600	1				60°, 71
50.085	2	3	679 785	2 676 400					60
50.062	1	2	678 772	2 676 400					60
49.49	$2p^63s3d\ ^1D_2$	$2p^63s5f\ ^1F^o_3$	762 093	2 782 700					71
43.65	$2p^63s3p\ ^3P^o_2$	$2p^63s5s\ ^3S_1$	253 820	2 544 800					71
43.39	$2p^63s3d\ ^3D_3$	$2p^63s6f\ ^3F^o_4$	681 416	2 986 100					71
42.93	$2p^63s3d\ ^1D_2$	$2p^63s6f\ ^1F^o_3$	762 093	3 091 500					71
41.903	$2p^63s3p\ ^3P^o_2$	$2p^63s5d\ ^3D_3$	253 820	2 640 300	4				70
41.663	1	2	239 660	2 639 900	3				70
41.559	0	1	233 842	2 640 100	1				70
38.95	$2p^63s^2\ ^1S_0$	$2p^63s5p\ ^1P^o_1$	0	2 567 000		1.15 − 1	1.69+11	C	71°, 165*
17.917	$2p^63s3p\ ^1P^o_1$	$2p^53s^23p\ ^1P_1$	351 911	5 933 200?	7				72
17.880	$2p^63s3p\ ^1P^o_1$	$2p^53s^23p\ ^3P_2$	351 911	5 947 500?	11				72
17.620	$2p^63s3p\ ^3P^o_2$	$2p^53s^23p\ ^3D_3$	253 820	5 929 200?	19				72
17.593	$2p^63s3p\ ^1P^o_1$	$2p^53s^23p\ ^3D_2$	351 911	6 036 000?	19				72
17.555	$2p^63s3p\ ^3P^o_2$	$2p^53s^23p\ ^3P_2$	253 820	5 947 500?	7				72
17.300	2	1	253 820	6 034 200?	5				72

Fe XVI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
909.84^{C}	$2p^64s\ ^2S_{1/2}$	$2p^64p\ ^2P^o_{1/2}$	1 867 740	1 977 650		3.62 − 1	1.46+9	B	165*
848.10^{C}	1/2	3/2	1 867 740	1 985 650		7.82 − 1	1.83+9	B	165*
719.06^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^64d\ ^2D_{3/2}$	1 985 650	2 124 720		1.76 − 1	5.65+8	B	165*
712.71^{C}	3/2	5/2	1 985 650	2 125 960		1.60	3.48+9	B	165*
679.95^{C}	1/2	3/2	1 977 650	2 124 720		9.30 − 1	3.33+9	B	165*
360.758^{S}	$2p^63s\ ^2S_{1/2}$	$2p^63p\ ^2P^o_{1/2}$	0	277 194		2.50 − 1	6.38+9	B	11, 20, 63, 69, 70$^{\Delta}$, 73°, 165*
335.409^{S}	1/2	3/2	0	298 143		5.40 − 1	8.01+9	B	11, 20, 63, 69, 70$^{\Delta}$, 73°, 165*
314.12^{C}	$2p^65d\ ^2D_{3/2}$	$2p^66p\ ^2P^o_{1/2}$	2 788 050	3 106 400		4.72 − 1	1.59+10	C	165*
312.22^{C}	5/2	3/2	2 788 610	3 108 900		8.4 − 1	1.5+10	C	165*
311.67^{C}	3/2	3/2	2 788 050	3 108 900		9.6 − 2	1.6+9	D	165*
305.37^{C}	$2p^65f\ ^2F^o_{5/2}$	$2p^66d\ ^2D_{3/2}$	2 818 600	3 146 070		2.6 − 1	4.6+9	C	165*
305.09^{C}	7/2	5/2	2 818 900	3 146 670		3.8 − 1	4.5+9	C	165*
304.81^{C}	5/2	5/2	2 818 600	3 146 670		1.9 − 2	2.3+8	D	165*
281.82^{C}	$2p^65p\ ^2P^o_{3/2}$	$2p^66s\ ^2S_{1/2}$	2 721 160	3 076 000		6.0 − 1	2.5+10	C	165*
278.68^{C}	1/2	1/2	2 717 170	3 076 000		3.0 − 1	1.3+10	C	165*
267.01^{C}	$2p^65d\ ^2D_{5/2}$	$2p^66f\ ^2F^o_{5/2}$	2 788 610	3 163 130		1.8 − 1	2.8+9	D	165*
266.97^{C}	5/2	7/2	2 788 610	3 163 190		3.7	4.3+10	C	165*
266.61^{C}	3/2	5/2	2 788 050	3 163 130		2.5	3.9+10	C	165*
265.003^{S}	$2p^63p\ ^2P^o_{3/2}$	$2p^63d\ ^2D_{3/2}$	298 143	675 501		1.12 − 1	2.65+9	B	63, 70, 73°, 165*
262.976^{S}	3/2	5/2	298 143	678 406		1.01	1.63+10	B	11, 12, 20, 23, 63, 70, 73°, 165*
251.061^{S}	1/2	3/2	277 194	675 501		5.88 − 1	1.56+10	B	11, 12, 20, 49, 63, 70, 73°, 165*
248.36^{L}	$2p^53s3p\ ^4D_{7/2}$	$2p^53s3d\ ^4F^o_{9/2}$							76
235.34^{C}	$2p^65p\ ^2P^o_{3/2}$	$2p^66d\ ^2D_{3/2}$	2 721 160	3 146 070		1.0 − 1	3.1+9	D	165*
235.01^{C}	3/2	5/2	2 721 160	3 146 670		9.2 − 1	1.8+10	C	165*
233.15^{C}	1/2	3/2	2 717 170	3 146 070		5.12 − 1	1.57+10	C	165*
184.54^{C}	$2p^65f\ ^2F^o_{7/2}$	$2p^67d\ ^2D_{5/2}$	2 818 900	3 360 800		6.7 − 2	2.2+9	D	165*
184.54^{C}	5/2	3/2	2 818 600	3 360 500		4.6 − 2	2.3+9	D	165*
184.43^{C}	5/2	5/2	2 818 600	3 360 800		3.3 − 2	1.1+9	E	165*
171.69^{C}	$2p^65d\ ^2D_{5/2}$	$2p^67f\ ^2F^o_{7/2}$	2 788 610	3 371 070		1.0	2.9+10	C	165*
171.64^{C}	5/2	5/2	2 788 610	3 371 210		5.0 − 2	1.9+9	D	165*
171.48^{C}	3/2	5/2	2 788 050	3 371 210		7.2 − 1	2.7+10	C	165*
168.79^{C}	$2p^64d\ ^2D_{3/2}$	$2p^65p\ ^2P^o_{1/2}$	2 124 720	2 717 170		2.9 − 1	3.4+10	C	165*
168.01^{C}	5/2	3/2	2 125 960	2 721 160		5.2 − 1	3.1+10	C	165*
167.66^{C}	3/2	3/2	2 124 720	2 721 160		6.0 − 2	3.6+9	D	165*
166.16^{C}	$2p^65p\ ^2P^o_{3/2}$	$2p^67s\ ^2S_{1/2}$	2 721 160	3 323 000		1.2 − 1	1.4+10	C	165*
165.06^{C}	1/2	1/2	2 717 170	3 323 000		6.2 − 2	7.6+9	C	165*
165.81^{C}	$2p^64f\ ^2F^o_{5/2}$	$2p^65d\ ^2D_{3/2}$	2 184 960	2 788 050		1.1 − 1	6.6+9	C	165*
165.78^{C}	7/2	5/2	2 185 410	2 788 610		1.5 − 1	6.2+9	C	165*
165.66^{C}	5/2	5/2	2 184 960	2 788 610		7.8 − 3	3.1+8	D	165*
156.88	$2p^64f\ ^2F^o_{7/2}$	$2p^65g\ ^2G_{9/2}$	2 185 410	2 822 800	bl				75°, 198
156.80	5/2	7/2	2 184 960	2 822 700	bl				75°, 198
156.41^{C}	$2p^65p\ ^2P^o_{3/2}$	$2p^67d\ ^2D_{3/2}$	2 721 160	3 360 500		3.5 − 2	2.4+9	D	165*
156.34^{C}	3/2	5/2	2 721 160	3 360 800		3.1 − 1	1.4+10	C	165*
155.44^{C}	1/2	3/2	2 717 170	3 360 500		1.8 − 1	1.2+10	C	165*
147.9^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^65s\ ^2S_{1/2}$	1 985 650	2 662 000		4.24 − 1	6.50+10	C	165*
146.1^{C}	1/2	1/2	1 977 650	2 662 000		2.16 − 1	3.39+10	C	165*
147.04^{C}	$2p^65f\ ^2F^o_{7/2}$	$2p^68d\ ^2D_{5/2}$	2 818 900	3 499 000		2.2 − 2	1.2+9	D	165*
147.02^{C}	5/2	3/2	2 818 600	3 498 800		1.7 − 2	1.3+9	D	165*
146.97^{C}	5/2	5/2	2 818 600	3 499 000		1.2 − 3	6.1+7	E	165*

Fe XVI – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
144.4^{C}	$2p^6 4d\ ^2D_{5/2}$	$2p^6 5f\ ^2F^o_{5/2}$	2 125 960	2 818 600		2.0 − 1	1.1+10	D	165*
144.25	5/2	7/2	2 125 960	2 818 900	bl	4.0	1.6+11	C	75°, 165*
144.06	3/2	5/2	2 124 720	2 818 600		3.0	1.6+11	C	75°, 165*
139.45^{C}	$2p^6 5d\ ^2D_{5/2}$	$2p^6 8f\ ^2F^o_{5/2}$	2 788 610	3 505 700		2.2 − 2	1.2+9	D	165*
139.43^{C}	5/2	7/2	2 788 610	3 505 800		4.4 − 1	1.9+10	C	165*
139.34^{C}	3/2	5/2	2 788 050	3 505 700		3.0 − 1	1.7+10	C	165*
128.59^{C}	$2p^6 5p\ ^2P^o_{3/2}$	$2p^6 8d\ ^2D_{3/2}$	2 721 160	3 498 800		1.7 − 2	1.7+9	D	165*
128.56^{C}	3/2	5/2	2 721 160	3 499 000		1.5 − 1	1.0+10	C	165*
127.94^{C}	1/2	3/2	2 717 170	3 498 800		8.62 − 1	8.78+10	C	165*
124.63^{C}	$2p^6 4p\ ^2P^o_{3/2}$	$2p^6 5d\ ^2D_{3/2}$	1 985 650	2 788 050		1.1 − 1	1.2+10	D	165*
124.54^{C}	3/2	5/2	1 985 650	2 788 610		9.6 − 1	7.0+10	C	165*
123.40^{C}	1/2	3/2	1 977 650	2 788 050		5.4 − 1	5.9+10	C	165*
117.73^{C}	$2p^6 4s\ ^2S_{1/2}$	$2p^6 5p\ ^2P^o_{1/2}$	1 867 740	2 717 170		1.6 − 1	3.9+10	C	165*
117.18^{C}	1/2	3/2	1 867 740	2 721 160		3.24 − 1	3.93+10	C	165*
101.87^{C}	$2p^6 4d\ ^2D_{3/2}$	$2p^6 6p\ ^2P^o_{1/2}$	2 124 720	3 106 400		5.2 − 2	1.6+10	C	165*
101.74^{C}	5/2	3/2	2 125 960	3 108 900		9.0 − 2	1.5+10	C	165*
101.61^{C}	3/2	3/2	2 124 720	3 108 900		1.0 − 2	1.6+9	D	165*
96.416^{C}	$2p^6 4d\ ^2D_{5/2}$	$2p^6 6f\ ^2F^o_{5/2}$	2 125 960	3 163 130		5.0 − 2	6.0+9	D	165*
96.411^{C}	5/2	7/2	2 125 960	3 163 190		1.0	9.3+10	C	165*
96.301^{C}	3/2	5/2	2 124 720	3 163 130		7.2 − 1	8.7+10	C	165*
91.714^{C}	$2p^6 4p\ ^2P^o_{3/2}$	$2p^6 6s\ ^2S_{1/2}$	1 985 650	3 076 000		8.44 − 2	3.34+10	C	165*
91.046^{C}	1/2	1/2	1 977 650	3 076 000		4.24 − 2	1.70+10	C	165*
86.176^{C}	$2p^6 4p\ ^2P^o_{3/2}$	$2p^6 6d\ ^2D_{3/2}$	1 985 650	3 146 070		3.5 − 2	7.9+9	D	165*
86.131^{C}	3/2	5/2	1 985 650	3 146 670		3.2 − 1	4.8+10	C	165*
85.586^{C}	1/2	3/2	1 977 650	3 146 070		1.8 − 1	4.0+10	C	165*
85.078^{C}	$2p^6 4f\ ^2F^o_{7/2}$	$2p^6 7d\ ^2D_{5/2}$	2 185 410	3 360 800		8.8 − 3	1.4+9	D	165*
85.067^{C}	5/2	3/2	2 184 960	3 360 500		6.0 − 3	1.4+9	D	165*
85.046^{C}	5/2	5/2	2 184 960	3 360 800		4.3 − 4	6.6+7	E	165*
80.732^{C}	$2p^6 4s\ ^2S_{1/2}$	$2p^6 6p\ ^2P^o_{1/2}$	1 867 740	3 106 400		4.8 − 2	2.5+10	C	165*
80.570^{C}	1/2	3/2	1 867 740	3 108 900		1.0 − 1	2.6+10	C	165*
80.314^{C}	$2p^6 4d\ ^2D_{5/2}$	$2p^6 7f\ ^2F^o_{7/2}$	2 125 960	3 371 070		4.1 − 1	5.4+10	C	165*
80.305^{C}	5/2	5/2	2 125 960	3 371 210		2.2 − 2	3.7+9	D	165*
80.225^{C}	3/2	5/2	2 124 720	3 371 210		3.0 − 1	5.2+10	C	165*
76.796	$2p^6 3d\ ^2D_{3/2}$	$2p^6 4p\ ^2P^o_{1/2}$	675 501	1 977 650		1.36 − 1	7.72+10	B	25°, 165*
76.502	5/2	3/2	678 406	1 985 650		2.35 − 1	6.70+10	B	25°, 165*
76.327^{C}	3/2	3/2	675 501	1 985 650		2.6 − 2	7.4+9	D	165*
76.127^{C}	$2p^6 4f\ ^2F^o_{7/2}$	$2p^6 8d\ ^2D_{5/2}$	2 185 410	3 499 000		4.4 − 3	8.4+8	E	165*
76.113^{C}	5/2	3/2	2 184 960	3 498 800		3.1 − 3	8.7+8	E	165*
76.101^{C}	5/2	5/2	2 184 960	3 499 000		2.2 − 4	4.1+7	E	165*
74.775^{C}	$2p^6 4p\ ^2P^o_{3/2}$	$2p^6 7s\ ^2S_{1/2}$	1 985 650	3 323 000		3.2 − 2	1.9+10	D	165*
74.330^{C}	1/2	1/2	1 977 650	3 323 000		1.6 − 2	9.9+9	D	165*
72.735^{C}	$2p^6 4p\ ^2P^o_{3/2}$	$2p^6 7d\ ^2D_{3/2}$	1 985 650	3 360 500		1.7 − 2	5.4+9	D	165*
72.719^{C}	3/2	5/2	1 985 650	3 360 800		1.6 − 1	3.2+10	C	165*
72.314^{C}	1/2	3/2	1 977 650	3 360 500		8.8 − 2	2.8+10	C	165*
72.477^{C}	$2p^6 4d\ ^2D_{5/2}$	$2p^6 8f\ ^2F^o_{5/2}$	2 125 960	3 505 700		1.1 − 2	2.4+9	D	165*
72.472^{C}	5/2	7/2	2 125 960	3 505 800		2.2 − 1	3.5+10	C	165*
72.412^{C}	3/2	5/2	2 124 720	3 505 700		1.6 − 1	3.3+10	C	165*
66.377^{C}	$2p^6 3d\ ^2D_{5/2}$	$2p^6 4f\ ^2F^o_{5/2}$	678 406	2 184 960		2.65 − 1	6.69+10	B	165*
66.356^{S}	5/2	7/2	678 406	2 185 410		5.31	1.00+12	B	11, 12, 25, 50, 73°, 74, 165*, 167
66.249^{S}	3/2	5/2	675 501	2 184 960		3.71	9.39+11	B	11, 12, 25, 73°, 74, 165*, 167

Fe XVI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
66.087^C	$2p^64p\ ^2P^o_{3/2}$	$2p^68d\ ^2D_{3/2}$	1 985 650	3 498 800		9.6 − 3	3.7+9	D	165*
66.079^C	$_{3/2}$	$_{5/2}$	1 985 650	3 499 000		8.76 − 2	2.23+10	C	165*
65.740^C	$_{1/2}$	$_{3/2}$	1 977 650	3 498 800		4.90 − 2	1.89+10	C	165*
63.711	$2p^63p\ ^2P^o_{3/2}$	$2p^64s\ ^2S_{1/2}$	298 143	1 867 740		2.65 − 1	2.18+11	B	11, 12, 25°, 50, 71, 74, 165*
62.871	$_{1/2}$	$_{1/2}$	277 194	1 867 740		1.25 − 1	1.05+11	B	11, 12, 25°, 50, 71, 74, 165*
54.747	$2p^63p\ ^2P^o_{3/2}$	$2p^64d\ ^2D_{3/2}$	298 143	2 124 720		1.25 − 1	6.97+10	B	25°, 74, 165*
54.710	$_{3/2}$	$_{5/2}$	298 143	2 125 960		1.12	4.16+11	B	25°, 50, 74, 165*
54.127	$_{1/2}$	$_{3/2}$	277 194	2 124 720		6.00 − 1	3.41+11	B	12, 25°, 50, 74, 165*
50.565	$2p^63s\ ^2S_{1/2}$	$2p^64p\ ^2P^o_{1/2}$	0	1 977 650		1.51 − 1	1.98+11	B	25°, 71, 74, 165*, 184
50.359	$_{1/2}$	$_{3/2}$	0	1 985 650		2.82 − 1	1.86+11	B	25°, 71, 74, 165*, 178,184
48.980^C	$2p^63d\ ^2D_{3/2}$	$2p^65p\ ^2P^o_{1/2}$	675 501	2 717 170		2.0 − 2	2.8+10	D	165*
48.97	$_{5/2}$	$_{3/2}$	678 406	2 721 160		3.7 − 2	2.6+10	D	71°, 165*
48.884^C	$_{3/2}$	$_{3/2}$	675 501	2 721 160		4.0 − 3	2.9+9	E	165*
46.725^C	$2p^63d\ ^2D_{5/2}$	$2p^65f\ ^2F^o_{5/2}$	678 406	2 818 600		4.9 − 2	2.5+10	D	165*
46.718	$_{5/2}$	$_{7/2}$	678 406	2 818 900		9.66 − 1	3.70+11	C	71, 74°, 165*
46.661	$_{3/2}$	$_{5/2}$	675 501	2 818 600		6.76 − 1	3.46+11	C	71, 74°, 165*
42.30	$2p^63p\ ^2P^o_{3/2}$	$2p^65s\ ^2S_{1/2}$	298 143	2 662 000		4.8 − 2	9.2+10	C	71°, 165*
41.91	$_{1/2}$	$_{1/2}$	277 194	2 662 000		2.48 − 2	4.72+10	C	71°, 165*
41.17	$2p^63d\ ^2D_{5/2}$	$2p^66p\ ^2P^o_{3/2}$	678 406	3 108 900		1.4 − 2	1.4+10	D	71°, 165*
41.137^C	$_{3/2}$	$_{1/2}$	675 501	3 106 400		7.2 − 3	1.5+10	D	165*
41.095^C	$_{3/2}$	$_{3/2}$	675 501	3 108 900		1.6 − 3	1.5+9	E	165*
40.246^C	$2p^63d\ ^2D_{5/2}$	$2p^66f\ ^2F^o_{5/2}$	678 406	3 163 130		1.8 − 2	1.2+10	D	165*
40.245	$_{5/2}$	$_{7/2}$	678 406	3 163 190		3.5 − 1	1.8+11	C	70°, 71, 165*
40.199	$_{3/2}$	$_{5/2}$	675 501	3 163 130		2.5 − 1	1.7+11	C	70°, 165*
40.162^C	$2p^63p\ ^2P^o_{3/2}$	$2p^65d\ ^2D_{3/2}$	298 143	2 788 050		3.9 − 2	4.1+10	D	165*
40.153	$_{3/2}$	$_{5/2}$	298 143	2 788 610		3.6 − 1	2.5+11	C	71, 74°, 165*
39.827	$_{1/2}$	$_{3/2}$	277 194	2 788 050		2.0 − 1	2.1+11	C	71, 74°, 165*
37.138	$2p^63d\ ^2D_{5/2}$	$2p^67f\ ^2F^o_{7/2}$	678 406	3 371 070		1.76 − 1	1.07+11	C	70°, 71, 165*
37.136^C	$_{5/2}$	$_{5/2}$	678 406	3 371 210		9.0 − 3	7.3+9	D	165*
37.096	$_{3/2}$	$_{5/2}$	675 501	3 371 210		1.24 − 1	1.00+11	C	70°, 165*
36.803	$2p^63s\ ^2S_{1/2}$	$2p^65p\ ^2P^o_{1/2}$	0	2 717 170		4.8 − 2	1.2+11	D	70°, 165*
36.749	$_{1/2}$	$_{3/2}$	0	2 721 160		9.0 − 2	1.1+11	C	70°, 71, 165*
36.01	$2p^63p\ ^2P^o_{3/2}$	$2p^66s\ ^2S_{1/2}$	298 143	3 076 000		2.0 − 2	5.0+10	D	71°, 165*
35.71	$_{1/2}$	$_{1/2}$	277 194	3 076 000		9.4 − 3	2.4+10	D	71°, 165*
35.370^C	$2p^63d\ ^2D_{5/2}$	$2p^68f\ ^2F^o_{5/2}$	678 406	3 505 700		5.0 − 3	4.5+9	E	165*
35.368	$_{5/2}$	$_{7/2}$	678 406	3 505 800		1.01 − 1	6.8+10	C	70°, 71, 165*
35.333	$_{3/2}$	$_{5/2}$	675 501	3 505 700		7.2 − 2	6.4+10	C	70°, 165*
35.113^C	$2p^63p\ ^2P^o_{3/2}$	$2p^66d\ ^2D_{3/2}$	298 143	3 146 070		1.8 − 2	2.5+10	D	165*
35.106	$_{3/2}$	$_{5/2}$	298 143	3 146 670		1.60 − 1	1.44+11	C	70°, 71, 165*
34.857	$_{1/2}$	$_{3/2}$	277 194	3 146 070		8.98 − 2	1.23+11	C	70°, 71, 165*
34.21	$2p^63d\ ^2D_{5/2}$	$2p^69f\ ^2F^o_{7/2}$	678 406	3 600 000					71
33.04	$2p^63p\ ^2P^o_{3/2}$	$2p^67s\ ^2S_{1/2}$	298 143	3 323 000		1.0 − 2	3.1+10	D	71°, 165*
32.84	$_{1/2}$	$_{1/2}$	277 194	3 323 000		5.0 − 3	1.5+10	D	71°, 165*
32.655^C	$2p^63p\ ^2P^o_{3/2}$	$2p^67d\ ^2D_{3/2}$	298 143	3 360 500		9.2 − 3	1.5+10	D	165*
32.652	$_{3/2}$	$_{5/2}$	298 143	3 360 800		8.8 − 2	9.1+10	C	70°, 71, 165*
32.433	$_{1/2}$	$_{3/2}$	277 194	3 360 500		4.8 − 2	7.7+10	C	70°, 71, 165*
32.192	$2p^63s\ ^2S_{1/2}$	$2p^66p\ ^2P^o_{1/2}$	0	3 106 400		2.0 − 2	6.7+10	C	70°, 165*
32.166	$_{1/2}$	$_{3/2}$	0	3 108 900		4.2 − 2	6.8+10	C	70°, 71, 165*
31.244^C	$2p^63p\ ^2P^o_{3/2}$	$2p^68d\ ^2D_{3/2}$	298 143	3 498 800		6.0 − 3	1.0+10	D	165*
31.242	$_{3/2}$	$_{5/2}$	298 143	3 499 000		5.2 − 2	6.1+10	C	70°, 71, 165*
31.041	$_{1/2}$	$_{3/2}$	277 194	3 498 800		3.0 − 2	5.2+10	C	70°, 71, 165*

Fe XVI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
30.33	$2p^63p\ ^2P^o_{3/2}$	$2p^69d\ ^2D_{5/2}$	298 143	3 595 000					71
30.10	1/2	3/2	277 194	3 599 000					71
29.93	$2p^63s\ ^2S_{1/2}$	$2p^67p\ ^2P^o_{3/2}$	0	3 341 000					71
28.67	$2p^63s\ ^2S_{1/2}$	$2p^68p\ ^2P^o_{3/2}$	0	3 488 000					71
27.88	$2p^63s\ ^2S_{1/2}$	$2p^69p\ ^2P^o_{3/2}$	0	3 587 000					71
17.593	$2p^63p\ ^2P^o_{3/2}$	$2p^5(^2P^o_{3/2})3s3p(^3P^o_1)\ (\frac{3}{2},1)_{5/2}$	298 143	5 982 000	19				72
17.467	1/2	1/2	277 194	6 001 000	13				72
17.498	$2p^63p\ ^2P^o_{3/2}$	$2p^5(^2P^o_{3/2})3s3p(^3P^o_2)\ (\frac{3}{2},2)_{5/2}$	298 143	6 013 000	40				72
17.498	3/2	3/2	298 143	6 013 000	40				72
17.413	3/2	1/2	298 143	6 042 000	14				72
17.498	$2p^63d\ ^2D_{5/2}$	$2p^5(^2P^o_{3/2})3s3d(^3D_3)\ (\frac{3}{2},3)^o_{5/2}$	678 406	6 393 000	40				72
17.413	5/2	7/2	678 406	6 422 000	14				72
17.366	5/2	3/2	678 406	6 436 000	16				72
17.449	$2p^63d\ ^2D_{3/2}$	$2p^5(^2P^o_{3/2})3s3d(^3D_1)\ (\frac{3}{2},1)^o_{5/2}$	675 501	6 406 000	16				72
17.413	3/2	3/2	675 501	6 419 000	14				72
17.399	$2p^63d\ ^2D_{3/2}$	$2p^5(^2P^o_{3/2})3s3d(^3D_2)\ (\frac{3}{2},2)^o_{1/2}$	675 501	6 423 000	18				72
17.399	3/2	5/2	675 501	6 425 000	18				72
17.399	5/2	5/2	678 406	6 425 000	18				72
17.337	$2p^63d\ ^2D_{5/2}$	$2p^5(^2P^o_{3/2})3s3d(^1D_2)\ (\frac{3}{2},2)^o_{7/2}$	678 406	6 445 000	8				72
17.285	5/2	5/2	678 406	6 464 000	3				72
17.249	3/2	3/2	675 501	6 473 000	10				72
17.323	$2p^63s\ ^2S_{1/2}$	$2p^5(^2P^o)3s^2\ ^2P^o_{3/2}$	0	5 773 000	2				72°, 188
17.025	1/2	1/2	0	5 873 000	9				72°, 188
17.249	$2p^63p\ ^2P^o_{3/2}$	$2p^5(^2P^o_{1/2})3s3p(^3P^o_2)\ (\frac{1}{2},2)_{3/2}$	298 143	6 096 000	10				72
17.249	$2p^63p\ ^2P^o_{1/2}$	$2p^5(^2P^o_{1/2})3s3p(^3P^o_0)\ (\frac{1}{2},0)_{1/2}$	277 194	6 075 000	10				72
17.206	$2p^63p\ ^2P^o_{1/2}$	$2p^5(^2P^o_{1/2})3s3p(^3P^o_1)\ (\frac{1}{2},1)_{3/2}$	277 194	6 089 000	17				72
17.206	$2p^63p\ ^2P^o_{3/2}$	$2p^5(^2P^o_{3/2})3s3p(^1P^o_1)\ (\frac{3}{2},1)_{5/2}$	298 143	6 110 000	17				72
17.206	1/2	1/2	277 194	6 089 000	17				72
17.161	3/2	3/2	298 143	6 129 000	16				72
17.087	1/2	3/2	277 194	6 129 000	15				72
17.161	$2p^63d\ ^2D_{3/2}$	$2p^5(^2P^o_{1/2})3s3d(^3D_3)\ (\frac{1}{2},3)^o_{5/2}$	675 501	6 502 000	16				72
17.124	5/2	7/2	678 406	6 517 000	25				72
17.161	$2p^63d\ ^2D_{3/2}$	$2p^5(^2P^o_{1/2})3s3d(^3D_1)\ (\frac{1}{2},1)^o_{3/2}$	675 501	6 502 000	16				72
16.952	3/2	1/2	675 501	6 574 000	2				72
17.124	$2p^63d\ ^2D_{3/2}$	$2p^5(^2P^o_{1/2})3s3d(^3D_2)\ (\frac{1}{2},2)^o_{5/2}$	675 501	6 516 000	25				72
17.124	5/2	5/2	678 406	6 516 000	25				72
17.087	5/2	3/2	678 406	6 530 000	15				72
17.025	$2p^63d\ ^2D_{5/2}$	$2p^5(^2P^o_{1/2})3s3d(^1D_2)\ (\frac{1}{2},2)^o_{5/2}$	678 406	6 556 000	9				72
16.993	3/2	5/2	675 501	6 556 000	7				72
16.890	3/2	3/2	675 501	6 595 000	13				72
16.890	$2p^63p\ ^2P^o_{3/2}$	$2p^5(^2P^o_{1/2})3s3p(^1P^o_1)\ (\frac{1}{2},1)_{3/2}$	298 143	6 217 000	13				72
16.839	1/2	3/2	277 194	6 217 000	7				72
16.696	1/2	1/2	277 194	6 267 000					72

Fe XVII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	A (s^{-1})	Acc.	References
1153.20	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_0$	5 864 770	5 951 210		M1			79°
703.04[C]	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_0$	$2s^22p^53p\ ^3S_1$	5 951 210	6 093 450		2.5 − 3	1.1+7	E	165*
437.30	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^53p\ ^3S_1$	5 864 770	6 093 450	2				80°, 174
409.91	2	1	5 849 490	6 093 450	10	2.5 − 1	3.3+9	D	53, 78, 79, 80°, 165*, 174
414.30	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s^22p^53p\ ^3P_0$	5 960 870	6 202 250					80
351.69	1	1	5 960 870	6 245 210	8				79, 80°, 174
347.96	1	2	5 960 870	6 248 260	35				53, 78, 79, 80°, 174
340.12	0	1	5 951 210	6 245 210					79°
389.25	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^53p\ ^3D_2$	5 864 770	6 121 690	20				53, 78, 79, 80°, 174
367.37	2	2	5 849 490	6 121 690	25				53, 78, 79, 80°, 174
358.32	1	1	5 864 770	6 143 850	20				53, 78, 79, 80°, 174
350.58	2	3	5 849 490	6 134 730	100	8.0 − 1	6.4+9	D	78, 79, 80°, 81, 114, 165*, 174
387.36	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s^22p^53p\ ^1P_1$	5 960 870	6 219 030	10				79, 80°, 174
373.41	0	1	5 951 210	6 219 030	25				79°, 174
370.989[C]	$2s^22p^53p\ ^3P_0$	$2s^22p^53d\ ^3P^o_1$	6 202 250	6 471 800		9.9 − 3	1.6+8	E	165*
340.47	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^53p\ ^1D_2$	5 864 770	6 158 470	45				53, 78, 79, 80°, 174
323.65	2	2	5 849 490	6 158 470	35				53, 78, 79, 80°, 174
304.93	$2s^22p^53p\ ^1D_2$	$2s^22p^53d\ ^3P^o_2$	6 158 470	6 486 400	30				79, 80°, 174
296.3	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^53p\ ^3P_0$	5 864 770	6 202 250					53, 78, 79, 80°, 174
288.94	$2s^22p^53p\ ^3P_2$	$2s^22p^53d\ ^1D^o_2$	6 248 260	6 594 360					80
285.755[C]	$2s^22p^53p\ ^3P_0$	$2s^22p^53d\ ^3D^o_1$	6 202 250	6 552 200		1.7 − 1	4.6+9	D	165*
281.11	1	2	6 245 210	6 600 950	25				53, 78, 79, 80°, 174
280.20	2	3	6 248 260	6 605 150					53, 78, 79, 80°, 174
284.357[C]	$2s^22p^53p\ ^3D_3$	$2s^22p^53d\ ^3P^o_2$	6 134 730	6 486 400		2.8 − 2	4.6+8	E	165*
284.01	$2s^22p^53p\ ^3D_3$	$2s^22p^53d\ ^3F^o_4$	6 134 730	6 486 830	100	1.2	1.1+10	D	53, 78, 79, 80°, 81, 165*, 174
279.1	3	3	6 134 730	6 493 030					80
275.6	1	2	6 143 850	6 506 700	25				79, 80°, 174
269.41	2	3	6 121 690	6 493 030					53°, 78, 79, 80, 174
259.6	2	2	6 121 690	6 506 700					80
280.20	$2s^22p^53p\ ^1D_2$	$2s^22p^53d\ ^1F^o_3$	6 158 470	6 515 350	85				53, 78, 79, 80°, 174
269.88	$2s^22p^53p\ ^3S_1$	$2s^22p^53d\ ^3P^o_0$	6 093 450	6 463 980		1.2 − 1	1.1+10	D	53°, 78, 79, 80, 165*
264.306[C]	1	1	6 093 450	6 471 800		3.0 − 1	9.6+9	D	165*
254.48	1	2	6 093 450	6 486 400	25	2.6 − 1	5.4+9	E	53, 78, 79, 80°, 165*, 174
266.43	$2s^22p^53p\ ^1P_1$	$2s^22p^53d\ ^1D^o_2$	6 219 030	6 594 360	25				53, 78, 79, 80°, 174
254.75	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s^22p^53p\ ^1S_0$	5 960 870	6 353 410	25				53, 78, 79, 80°, 174
204.6	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^53p\ ^1S_0$	5 864 770	6 353 410	2				53, 78, 79, 80°, 174
95.29	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s2p^63s\ ^1S_0$	5 960 870	7 010 000		5.7 − 2	4.2+10	D	81°, 123, 165*

Fe XVII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
90.461^C	$2s^22p^53p\ ^3S_1$	$2s2p^63p\ ^3P^o_1$	6 093 450	7 198 900		5.1 − 2	1.4+10	E	165*
87.30	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s2p^63s\ ^1S_0$	5 864 770	7 010 000		7.8 − 2	6.7+10	D	81°, 123, 165*
59.59	$2s^22p^53d\ ^1F^o_3$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_4$	6 515 350	8 193 000					83
59.26	$2s^22p^53d\ ^3F^o_3$	$2s^22p^5(^2P^o_{1/2})4f\ ^2[\frac{7}{2}]_4$	6 493 030	8 180 000					83
58.91	2	3	6 506 700	8 204 000					83
59.26	$2s^22p^53d\ ^3D^o_2$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_3$	6 600 950	8 289 000					83
58.98	$2s^22p^53d\ ^1D^o_2$	$2s^22p^5(^2P^o_{1/2})4f\ ^2[\frac{5}{2}]_3$	6 594 360	8 289 000					83
58.98	$2s^22p^53d\ ^1F^o_3$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{9}{2}]_4$	6 515 350	8 210 000					83
58.76	$2s^22p^53d\ ^3P^o_2$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{3}{2}]_2$	6 486 400	8 188 000					83
58.76	$2s^22p^53d\ ^3F^o_4$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{9}{2}]_5$	6 486 830	8 188 000		7.0	1.2+12	D	83°, 165*
58.62	$2s^22p^53d\ ^3P^o_2$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{5}{2}]_3$	6 486 400	8 192 000					83
58.62	$2s^22p^53d\ ^3F^o_4$	$2s^22p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_4$	6 486 830	8 193 000					83
57.32	$2s^22p^53p\ ^3D_3$	$2s^22p^5(^2P^o_{3/2})4s\ (\frac{3}{2},\frac{1}{2})^o_2$	6 134 730	7 879 000		4.2 − 1	1.7+11	D	83°, 165*
56.005^C	$2s^22p^53p\ ^3S_1$	$2s^22p^5(^2P^o_{3/2})4s\ (\frac{3}{2},\frac{1}{2})^o_2$	6 093 450	7 879 000		1.6 − 1	6.7+10	D	165*
55.54^C	$2s^22p^53p\ ^1S_0$	$2s^22p^54d\ ^3D^o_1$	6 353 410	8 154 000		1.1 − 1	7.9+10	E	165*
52.75^C	$2s^22p^53p\ ^1S_0$	$2s^22p^54d\ ^1P^o_1$	6 353 410	8 249 000		3.3 − 1	2.7+11	D	165*
51.24^C	$2s^22p^53p\ ^3P_0$	$2s^22p^54d\ ^3D^o_1$	6 202 250	8 154 000		2.8 − 1	2.4+11	D	165*
50.262	$2s^22p^53p\ ^3D_3$	$2s^22p^54d\ ^3F^o_4$	6 134 730	8 123 600		2.0	6.0+11	D	82°, 83, 165*
49.880	$2s^22p^53p\ ^3D_2$	$2s^22p^54d\ ^3D^o_3$	6 121 690	8 125 800					82°, 83
49.787	$2s^22p^53p\ ^3D_1$	$2s^22p^54d\ ^1D^o_2$	6 143 850	8 151 700					82°, 83
49.44^C	$2s^22p^53p\ ^3S_1$	$2s^22p^54d\ ^3P^o_1$	6 093 450	8 116 000		4.5 − 1	4.0+11	D	165*
48.876^C	$2s2p^63s\ ^1S_0$	$2s2p^64p\ ^3P^o_1$	7 010 000	9 056 000		4.3 − 2	4.0+10	E	165*
48.497^C	$2s2p^63s\ ^1S_0$	$2s2p^64p\ ^1P^o_1$	7 010 000	9 072 000		2.6 − 1	2.4+11	D	165*
41.37	$2s^22p^53d\ ^3F^o_4$	$2s^22p^5(^2P^o_{3/2})5f\ ^2[\frac{9}{2}]_5$	6 486 830	8 903 000		1.4	4.8+11	D	83°, 165*
17.097	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_2$	0	5 849 490		M2	2.0+5	D+	86°, 165*, 196, 199,201,203,204
17.054	0	1	0	5 864 770		1.22 − 1	9.33+11	C+	84°, 85, 86, 110, 120, 165*, 177, 196,199,201, 203,204
16.777	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	5 960 870		1.05 − 1	8.29+11	C+	84°, 85, 86, 110, 120, 165*, 177, 196,199,201, 203,204
15.450	$2s^22p^6\ ^1S_0$	$2s^22p^53d\ ^3P^o_1$	0	6 471 800		9.7 − 3	9.0+10	E	84°, 85, 86, 96, 110, 120, 165*, 177,199,201, 203,204
15.262	$2s^22p^6\ ^1S_0$	$2s^22p^53d\ ^3D^o_1$	0	6 552 200		6.3 − 1	6.0+12	D	84°, 85, 86, 96, 110, 120, 165*, 177,196,199, 203,204
15.015	$2s^22p^6\ ^1S_0$	$2s^22p^53d\ ^1P^o_1$	0	6 660 000		2.31	2.28+13	C+	84°, 85, 86, 96, 110, 120, 165*, 177,196,199, 203,204

Fe XVII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
13.891	$2s^22p^6\ ^1S_0$	$2s2p^63p\ ^3P^o_1$	0	7 198 900		3.0 – 2	3.4+11	E	84°, 85, 86, 96, 109, 120, 165*, 177, 199, 203, 204
13.823	$2s^22p^6\ ^1S_0$	$2s2p^63p\ ^1P^o_1$	0	7 234 300		2.8 – 1	3.3+12	D	84°, 85, 86, 96, 109, 110, 120, 165*, 177, 199, 203, 204
12.681	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})4s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	7 885 800		2.5 – 2	3.5+11	D	84°, 86, 96, 109, 110, 120, 165*, 204
12.526	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})4s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	7 983 000		2.1 – 2	3.0+11	D	84°, 86, 96, 109, 110, 120, 165*, 177, 204
12.322	$2s^22p^6\ ^1S_0$	$2s^22p^54d\ ^3P^o_1$	0	8 116 000		3.6 – 3	5.3+10	E	84°, 96, 109, 110, 120, 165*, 177, 204
12.264	$2s^22p^6\ ^1S_0$	$2s^22p^54d\ ^3D^o_1$	0	8 154 000		4.0 – 1	5.9+12	D	84°, 85, 86, 96, 110, 120, 165*, 177, 204
12.123	$2s^22p^6\ ^1S_0$	$2s^22p^54d\ ^1P^o_1$	0	8 249 000		5.3 – 1	8.0+12	D	84°, 85, 86, 96, 110, 120, 165*, 177, 204
11.420	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})5s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	8 757 000	3				87
11.287	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})5s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	8 860 000	2				84°, 87△, 120, 177
11.253	$2s^22p^6\ ^1S_0$	$2s^22p^55d\ ^3D^o_1$	0	8 887 000	7				84°, 87△, 96, 109, 110, 120, 203, 206
11.133	$2s^22p^6\ ^1S_0$	$2s^22p^55d\ ^1P^o_1$	0	8 982 000	8				84°, 87△, 96, 109, 110, 120, 177, 204, 206
11.043	$2s^22p^6\ ^1S_0$	$2s2p^64p\ ^3P^o_1$	0	9 056 000		1.6 – 2	2.9+11	E	84°, 86, 120, 165*, 206
11.023	$2s^22p^6\ ^1S_0$	$2s2p^64p\ ^1P^o_1$	0	9 072 000		1.1 – 1	2.1+12	D	84°, 86, 165*
10.851	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})6s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	9 216 000	1				87
10.770	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})6d\ ^2[\frac{3}{2}]^o_1$	0	9 285 000	6				84°, 87△, 96, 109, 110, 120, 204
10.658	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})6d\ ^2[\frac{3}{2}]^o_1$	0	9 383 000	3				84°, 87△, 96, 109, 110, 120, 204
10.550	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})7s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	9 479 000	2				87
10.500	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})7d\ ^2[\frac{3}{2}]^o_1$	0	9 524 000	3				87°, 96
10.386	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})7d\ ^2[\frac{3}{2}]^o_1$	0	9 628 000	1				87°, 96
10.320	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})8d\ ^2[\frac{3}{2}]^o_1$	0	9 690 000	2				87
10.221	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})8d\ ^2[\frac{3}{2}]^o_1$	0	9 784 000	1				87
10.123	$2s^22p^6\ ^1S_0$	$2s2p^65p\ ^1P^o_1$	0	9 878 000	2				87
10.123	$2s^22p^6\ ^1S_0$	$2s2p^65p\ ^3P^o_1$	0	9 878 000	2				87

Fe XVIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
974.86	$1s^22s^22p^5\ ^2P^o_{3/2}$	$1s^22s^22p^5\ ^2P^o_{1/2}$	0	102 579		M1	1.93+4	C	14, 69°, 88, 89, 90, 91, 92, 195*
103.939	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s2p^6\ ^2S_{1/2}$	102 579	1 064 702	10	1.07 − 1	3.31+10	C+	12, 69, 75△, 93°, 103, 104, 123, 165*, 169, 178, 189
93.926	3/2	1/2	0	1 064 702	10	2.42 − 1	9.13+10	C+	12, 69, 75△, 93°, 103, 104, 123, 165*, 169, 178, 189
16.337	$1s^22s2p^6\ ^2S_{1/2}$	$1s^22s2p^5(^3P^o)3s\ ^4P^o_{5/2}$	1 064 702	7 185 800		M2			94
16.305	1/2	3/2	1 064 702	7 197 800	65				94
16.234	1/2	1/2	1 064 702	7 224 600	55				94
16.272	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^3P)3s\ ^2P_{3/2}$	102 579	6 248 100	7				84°, 94, 95, 96, 108, 112, 120△, 201, 205
16.026	1/2	1/2	102 579	6 342 600	45	1.2 − 1	1.5+12	D	84°, 94, 95, 96, 108, 120△, 165*
16.005	3/2	3/2	0	6 248 100	70				49, 84°, 94, 95, 108, 109, 112, 120△, 176
15.766	3/2	1/2	0	6 342 600	35	1.0 − 1	1.4+12	D	84°, 94, 95, 96, 108, 112, 120△, 165*, 171, 172, 201, 205
16.165	$1s^22s2p^6\ ^2S_{1/2}$	$1s^22s2p^5(^3P^o)3s\ ^2P^o_{3/2}$	1 064 702	7 250 900	150				94°, 96, 108, 176, 201
16.109	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^3P)3s\ ^4P_{1/2}$	102 579	6 310 200					94, 95°, 96, 108, 112, 201, 205
16.087	1/2	3/2	102 579	6 317 900					95°, 205
16.072	3/2	5/2	0	6 222 000	20	2.1 − 2	9.1+10	E	84°, 94, 95, 96, 108, 109, 110, 112, 120△, 165*, 176, 201, 204, 205
15.847^C	3/2	1/2	0	6 310 200		1.5 − 2	2.0+11	E	165*
15.828	3/2	3/2	0	6 317 900	50				49, 84°, 94, 95, 96, 108, 109, 110, 112, 120△, 176, 201, 205
15.870	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^1D)3s\ ^2D_{3/2}$	102 579	6 403 800	60	2.0 − 1	1.3+12	D	84°, 94, 95, 96, 108, 109, 112, 120△, 165*, 171, 172, 201, 205
15.625	3/2	5/2	0	6 400 000	70	2.5 − 1	1.1+12	D	49, 84°, 94, 95, 96, 108, 109, 110, 112, 120△, 165*, 171, 172, 176, 201
15.450	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^1S)3s\ ^2S_{1/2}$	102 579	6 575 100	30	7.8 − 2	1.1+12	D	84°, 94, 95, 96, 108, 109, 112, 120△, 165*, 201
15.209^C	3/2	1/2	0	6 575 100		1.9 − 2	2.8+11	E	165*
14.772	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^3P)3d\ ^4P_{3/2}$	102 579	6 872 400					94, 95°, 96, 108, 112, 172, 205
14.581	3/2	1/2	0	6 858 200	60				84°, 94, 95, 96, 108, 109, 120△, 171, 172, 205
14.551	3/2	3/2	0	6 872 400	60				84°, 94, 95, 96, 108, 112, 120△, 205
14.67^C	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^3P)3d\ (2)_{3/2}$	102 579	6 919 000					96, 108
14.453	3/2	3/2	0	6 919 000	35				84°, 94, 109, 120△, 176
14.610	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^3P)3d\ ^2P_{3/2}$	102 579	6 947 300	35				84°, 94, 120△, 171, 172, 176
14.534	$1s^22s^22p^5\ ^2P^o_{3/2}$	$1s^22s^22p^4(^3P)3d\ (1)_{5/2}$	0	6 880 400	70				84°, 95, 96, 108, 109, 120△, 205
14.486	$1s^22s^22p^5\ ^2P^o_{3/2}$	$1s^22s^22p^4(^3P)3d\ ^4D_{1/2}$	0	6 903 200	40				84°, 120△

Fe XVIII – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
14.469	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^1D)3d\ ^2S_{1/2}$	102 579	7 014 300	35	1.7 − 1	2.7+12	D	84°, 94, 95, 96, 108, 112, 120△, 165*, 171, 172,176,204,205
14.256	3/2	1/2	0	7 014 300	30	9.6 − 1	1.6+13	D	84°, 94, 95, 96, 108, 109, 120△, 165*, 171,172,205
14.418	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^1D)3d\ ^2P_{3/2}$	102 579	7 038 400	70	4.0 − 1	3.2+12	E	84°, 94, 95, 96, 108, 109, 112, 120△, 165*, 171,172,205
14.344	1/2	1/2	102 579	7 074 200	50				84°, 94, 120△, 171, 172
14.203	3/2	3/2	0	7 038 400		2.4	1.9+13	E	84°, 109, 165*, 171, 172,176,204
14.373	$1s^22s^22p^5\ ^2P^o_{3/2}$	$1s^22s^22p^4(^3P)3d\ ^2D_{5/2}$	0	6 957 500	70				49, 84, 94, 95°, 96, 108, 109, 112, 120△, 171,172,176,204
14.361	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^1D)3d\ ^2D_{3/2}$	102 579	7 066 100	60	1.8	1.5+13	E	84, 94, 95°, 96, 108, 120△, 165*, 171, 172,205
14.203	3/2	5/2	0	7 040 800	60				49, 84°, 94, 95, 96, 109, 112, 120△, 170,172,176,205
14.152	3/2	3/2	0	7 066 100	60	5.2 − 1	4.3+12	E	84°, 94, 95, 96, 108, 109, 120△, 165*, 171,172,205
14.121	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^1S)3d\ ^2D_{3/2}$	102 579	7 184 300	75	1.8	1.5+13	D	84°, 94, 95, 96, 108, 109, 112, 120△, 165*, 171,172,176,205
13.954	3/2	5/2	0	7 166 400	55	2.0 − 1	1.1+12	D	94, 95°, 96, 108, 109, 110, 112, 120△, 165*, 172,176,205
13.919[C]	3/2	3/2	0	7 184 300		1.1 − 2	9.6+10	E	165*
13.464	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s2p^5(^3P^o)3p\ ^4P_{3/2}$	102 579	7 529 900	60				84°, 120△
13.319	3/2	5/2	0	7 508 100	50				84°, 112, 120△
13.397	$1s^22s^22p^5\ ^2P^o_{3/2}$	$1s^22s2p^5(^3P^o)3p\ (1)_{3/2}$	0	7 464 400	55				84°, 120△
13.397	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s2p^5(^3P^o)3p\ ^2D_{3/2}$	102 579	7 567 000	55				84°, 120△
13.374	3/2	5/2	0	7 477 200	50				84°, 94, 112, 120△
13.355	$1s^22s^22p^5\ ^2P^o_{3/2}$	$1s^22s2p^5(^3P^o)3p\ ^2P_{3/2}$	0	7 487 800	50				84°, 120△
13.319	3/2	1/2	0	7 508 100	50				84°, 112, 120△
13.355	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s2p^5(^3P^o)3p\ ^2S_{1/2}$	102 579	7 599 400	50				84°, 120△
13.159	3/2	1/2	0	7 599 400					84°, 94, 112, 120
13.049	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s2p^5(^1P^o)3p\ ^2D_{3/2}$	102 579	7 763 400					84°, 94, 112, 120
12.847	3/2	5/2	0	7 783 900					84°, 120
13.015	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s2p^5(^1P^o)3p\ ^2P_{1/2}$	102 579	7 786 000					84°, 94, 112, 120
13.001	1/2	3/2	102 579	7 794 400					84°, 112, 120
11.865	$1s^22s^22p^5\ ^2P^o_{3/2}$	$1s^22s^22p^4(^3P_2)4s\ (2,\frac{1}{2})_{3/2}$	0	8 428 200	20				84°, 94, 120△
11.778	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^1D_2)4s\ (2,\frac{1}{2})_{3/2}$	102 579	8 593 000	10				84°, 94, 120△
11.640	3/2	5/2	0	8 591 100	15				84°, 120△, 206
11.741	$1s^22s^22p^5\ ^2P^o_{3/2}$	$1s^22s^22p^4(^3P_1)4s\ (1,\frac{1}{2})_{3/2}$	0	8 517 200	10				84°, 120△
11.551	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^3P_1)4d\ (1,\frac{5}{2})_{3/2}$	102 579	8 759 900	50				84°, 94, 96, 109, 120△
11.442	3/2	3/2	0	8 759 900					96°, 108, 109
11.420	3/2	5/2	0	8 756 600					84°, 94
11.526	$1s^22s^22p^5\ ^2P^o_{3/2}$	$1s^22s^22p^4(^3P_2)4d\ (2,\frac{5}{2})_{5/2}$	0	8 676 000	50				84°, 94, 96, 109, 112, 120△, 173
11.526	3/2	3/2	0	8 676 000	50				84°, 94, 112, 120△

Fe XVIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
11.458	$1s^22s^22p^5\ ^2P^o_{3/2}$	$1s^22s^22p^4(^3P_0)4d\ (0,\frac{3}{2})_{3/2}$	0	8 727 500	30				84°, 94, 120△
11.458	$1s^22s^22p^5\ ^2P^o_{3/2}$	$1s^22s^22p^4(^3P_0)4d\ (0,\frac{5}{2})_{5/2}$	0	8 727 500	30				84°, 94, 120△
11.440	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^1D_2)4d\ (2,\frac{3}{2})_{3/2}$	102 579	8 843 900	50				84°, 94, 112, 120△
11.326	3/2	1/2	0	8 829 200	55				84°, 94, 112, 120△, 206
11.326	3/2	5/2	0	8 829 200	55				84°, 94, 112, 120△, 206
11.440	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^1D_2)4d\ (2,\frac{5}{2})_{1/2}$	102 579	8 843 900	50				84°, 94, 112, 120△, 173
11.326	3/2	5/2	0	8 829 200	55				84°, 94, 96, 109, 120△
11.326	3/2	3/2	0	8 829 200	55				84°, 94, 112, 120△, 173,206
11.253	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^1S_0)4d\ (0,\frac{3}{2})_{3/2}$	102 579	8 989 200	45				84°, 94, 112, 120△, 173,206
10.51	$1s^22s^22p^5\ ^2P^o_{3/2}$	$1s^22s^22p^4(^3P)5d\ ^2D_{5/2}$	0	9 510 000					97
10.48	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^3P)5d\ ^2P_{3/2}$	102 579	9 640 000					97
10.44	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^1D)5d\ ^2D_{3/2}$	102 579	9 680 000					97
10.44	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^1D)5d\ ^2P_{1/2}$	102 579	9 680 000					97
10.33	3/2	3/2	0	9 680 000					97
10.41	$1s^22s^22p^5\ ^2P^o_{3/2}$	$1s^22s^22p^4(^3P)5d\ ^2F_{5/2}$	0	9 610 000					97
10.33	$1s^22s^22p^5\ ^2P^o_{3/2}$	$1s^22s^22p^4(^1D)5d\ ^2F_{5/2}$	0	9 680 000					97
10.03	$1s^22s^22p^5\ ^2P^o_{3/2}$	$1s^22s^22p^4(^3P)6d\ ^2D_{5/2}$	0	9 970 000					97
9.98	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^1D)6d\ ^2D_{3/2}$	102 579	10 120 000					97
9.98	$1s^22s^22p^5\ ^2P^o_{1/2}$	$1s^22s^22p^4(^1D)6d\ ^2P_{1/2}$	102 579	10 120 000					97
1.92164	$1s^22s^22p^5\ ^2P^o_{3/2}$	$1s2s^22p^6\ ^2S_{1/2}$	0	52 039 000					98°, 190

Fe XIX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
1118.060	$1s^22s^22p^4\ ^3P_2$	$1s^22s^22p^4\ ^3P_1$	0	89 441		M1	1.45+4	C	14, 69°, 88, 89, 90, 91, 92, 195*
592.234	$1s^22s^22p^4\ ^3P_2$	$1s^22s^22p^4\ ^1D_2$	0	168 852		M1	1.73+4	C	69°, 91, 92, 101, 195*
424.26	$1s^22s^22p^4\ ^3P_1$	$1s^22s^22p^4\ ^1S_0$	89 441	325 140		M1	1.50+5	C	101°, 195*
151.61[C]	$1s^22s^22p^4\ ^1S_0$	$1s^22s2p^5\ ^3P^o_1$	325 140	984 740		8.2 − 3	7.9+8	E	165*
132.63	$1s^22s^22p^4\ ^1D_2$	$1s^22s2p^5\ ^3P^o_2$	168 852	922 890	4bl	3.0 − 2	2.2+9	E	75°, 165*
119.983	$1s^22s^22p^4\ ^3P_1$	$1s^22s2p^5\ ^3P^o_2$	89 441	922 890	8bl	1.12 − 1	1.04+10	C	75△, 93°, 103, 104, 123, 128, 165*, 178, 189,197
111.695	1	1	89 441	984 740	5	7.05 − 2	1.26+10	C	75△, 93°, 103, 104, 123, 128, 165*, 178, 189,197
109.952	0	1	75 250	984 740	6	8.7 − 2	1.6+10	C	75△, 93°, 103, 123, 128, 165*, 178, 189,197
108.355	2	2	0	922 890	10	3.4 − 1	3.9+10	C	69, 75△, 93°, 103, 104, 123, 128, 165*, 178,189,197
106.318	1	0	89 441	1 030 020	6	1.03 − 1	6.05+10	C	75△, 93°, 103, 123, 165*, 178, 189, 197
101.550	2	1	0	984 740	8	1.47 − 1	3.17+10	C	69, 75△, 93°, 103, 104, 123, 128, 165*, 178,189,197
115.396	$1s^22s2p^5\ ^1P^o_1$	$1s^22p^6\ ^1S_0$	1 267 600	2 134 180	7bl	3.21 − 1	1.61+11	C	75△, 93°, 165*, 187
106.107	$1s^22s^22p^4\ ^1S_0$	$1s^22s2p^5\ ^1P^o_1$	325 140	1 267 600	4	5.4 − 2	1.1+10	C	75△, 93°, 103, 123, 165*, 178, 189, 197
91.012	$1s^22s^22p^4\ ^1D_2$	$1s^22s2p^5\ ^1P^o_1$	168 852	1 267 600	9	5.55 − 1	1.49+11	C	75△, 93°, 103, 104, 123, 165*, 178, 189, 197
86.999	$1s^22s2p^5\ ^3P^o_1$	$1s^22p^6\ ^1S_0$	984 740	2 134 180	1	1.4 − 2	1.2+10	E	75△, 93°, 165*
84.874	$1s^22s^22p^4\ ^3P_1$	$1s^22s2p^5\ ^1P^o_1$	89 441	1 267 600	1	3.0 − 3	9.3+8	E	75△, 93°, 165*, 197
83.870	0	1	75 250	1 267 600	1	5.0 − 3	1.6+9	E	75△, 93°, 165*, 197
78.888	2	1	0	1 267 600	4	3.6 − 2	1.3+10	E	75△, 93°, 165*, 197, 198
15.172	$1s^22s^22p^4\ ^3P_1$	$1s^22s^22p^3(^4S^o)3s\ ^3S^o_1$	89 441	6 680 000	25	6.9 − 2	6.7+11	C−	84°, 94, 96, 108, 109, 112, 120△, 165*
15.138	0	1	75 250	6 680 000	5	5.3 − 2	5.1+11	C−	84°, 96, 109, 110, 120△, 165*
14.966	2	1	0	6 680 000	35	2.6 − 1	2.5+12	C−	84°, 94, 96, 108, 109, 112, 120△, 165*
15.111	$1s^22s^22p^4\ ^1D_2$	$1s^22s^22p^3(^2D^o)3s\ ^3D^o_2$	168 852	6 787 000	10	2.3 − 2	1.3+11	E	84°, 120△, 165*
15.04[C]	2	3	168 852	6 818 000		2.5 − 2	1.1+11	E	165*
15.015	$1s^22s^22p^4\ ^1S_0$	$1s^22s^22p^3(^2P^o)3s\ ^1P^o_1$	325 140	6 985 000	100	1.4 − 1	1.4+12	D	84°, 120△, 165*
14.995	$1s^22s^22p^4\ ^1D_2$	$1s^22s^22p^3(^2D^o)3s\ ^1D^o_2$	168 852	6 834 000	55	3.7 − 1	2.2+12	D	84°, 120△, 165*
14.929	$1s^22s^22p^4\ ^3P_1$	$1s^22s^22p^3(^2D^o)3s\ ^3D^o_1$	89 441	6 788 000	30	1.2 − 1	1.2+12	D	84°, 94, 112, 120△, 165*
14.929	1	2	89 441	6 787 000	30	4.2 − 2	2.5+11	D	84°, 94, 112, 120△, 64*
14.735	2	2	0	6 787 000	40	1.6 − 1	9.8+11	D	84°, 94, 112, 120△, 165*
14.668	2	3	0	6 818 000	55	2.6 − 1	1.1+12	C	84°, 94, 112, 120△, 165*
14.823	$1s^22s^22p^4\ ^3P_1$	$1s^22s^22p^3(^2D^o)3s\ ^1D^o_2$	89 441	6 834 000	15	4.5 − 3	2.7+10	E	84°, 120△, 165*
14.63[C]	2	2	0	6 834 000		2.2 − 2	1.4+11	E	165*
14.806	$1s^22s^22p^4\ ^1D_2$	$1s^22s^22p^3(^2P^o)3s\ ^3P^o_1$	168 852	6 923 000	20	5.5 − 2	5.6+11	E	84°, 96, 109, 120△, 165*
14.70[C]	2	2	168 852	6 970 000		1.1 − 1	6.8+11	E	165*

Fe XIX – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
14.67^{C}	$1s^22s^22p^4\ ^1D_2$	$1s^22s^22p^3(^2P^o)3s\ ^1P^o_1$	168 852	6 985 000		1.1 – 1	1.1+12	D	165*
14.668	$1s^22s^22p^4\ ^3P_1$	$1s^22s^22p^3(^2P^o)3s\ ^3P^o_0$	89 441	6 907 000	55	3.6 – 2	1.1+12	C	84°, 120△, 165*
14.60^{C}	0	1	75 250	6 923 000		7.3 – 2	7.5+11	D	165*
14.534	1	2	89 441	6 970 000	70	1.1 – 1	6.8+11	D	84°, 120△, 165*
13.84^{C}	$1s^22s^22p^4\ ^1D_2$	$1s^22s^22p^3(^2D^o)3d\ ^3D^o_3$	168 852	7 396 000		7.5 – 2	3.7+11	E	165*
13.795	$1s^22s^22p^4\ ^3P_2$	$1s^22s^22p^3(^4S^o_{3/2})3d\ (\frac{3}{2},\frac{5}{2})^o_3$	0	7 249 000	55	1.4	7.0+12	D	84°, 94, 111, 112, 120△, 165*
13.735	$1s^22s^22p^4\ ^1S_0$	$1s^22s^22p^3(^2P^o_{3/2})3d\ (\frac{3}{2},\frac{5}{2})^o_1$	325 140	7 606 000	45	2.2	2.6+13	D	84°, 120△, 165*
13.735	$1s^22s^22p^4\ ^1D_2$	$1s^22s^22p^3(^2P^o_{1/2})3d\ (\frac{1}{2},\frac{5}{2})^o_3$	168 852	7 450 000	45	4.7 – 1	2.4+12	E	84°, 120△, 165*
13.700	2	2	168 852	7 468 000	45				84°, 111, 120△
13.735	$1s^22s^22p^4\ ^3P_1$	$1s^22s^22p^3(^2D^o_{3/2})3d\ (\frac{3}{2},\frac{5}{2})^o_2$	89 441	7 370 000	45				84°, 94, 111, 120△
13.735	$1s^22s^22p^4\ ^1D_2$	$1s^22s^22p^3(^2D^o_{5/2})3d\ (\frac{5}{2},\frac{5}{2})^o_3$	168 852	7 449 000	45	2.0	1.0+13	D	84°, 120△, 165*
13.520	$1s^22s^22p^4\ ^3P_2$	$1s^22s^22p^3(^2D^o)3d\ ^3D^o_3$	0	7 396 000	75	3.8	2.0+13	D	84°, 94, 112, 120△, 165*
13.520	$1s^22s^22p^4\ ^1D_2$	$1s^22s^22p^3(^2P^o_{3/2})3d\ (\frac{3}{2},\frac{3}{2})^o_3$	168 852	7 565 000	75				84°, 120△
13.504	$1s^22s^22p^4\ ^3P_2$	$1s^22s^22p^3(^2D^o_{5/2})3d\ (\frac{5}{2},\frac{3}{2})^o_2$	0	7 405 000	55				84°, 94, 111, 120△
13.464	$1s^22s^22p^4\ ^3P_1$	$1s^22s^22p^3(^2P^o_{3/2})3d\ (\frac{3}{2},\frac{3}{2})^o_1$	89 441	7 567 000	60				84°, 111, 120△
13.397	1	2	89 441	7 554 000	55				84°, 94, 111, 120△
13.424	$1s^22s^22p^4\ ^3P_2$	$1s^22s^22p^3(^2D^o)3d\ ^1F^o_3$	0	7 449 000	50	9.0 – 1	4.8+12	E	84°, 94, 120△, 165*
10.933	$1s^22s^22p^4\ ^3P_1$	$1s^22s^22p^3(^4S^o_{3/2})4d\ (\frac{3}{2},\frac{5}{2})^o_2$	89 441	9 242 000	25				84°, 94, 120△, 173, 176,206
10.907	0	1	75 250	9 244 000					84°, 173, 175
10.813	2	3	0	9 248 000	55				84°, 94, 112, 120△, 206
10.813	2	2	0	9 242 000	55				84°, 120△
10.813	$1s^22s^22p^4\ ^1D_2$	$1s^22s^22p^3(^2D^o_{5/2})4d\ (\frac{5}{2},\frac{5}{2})^o_2$	168 852	9 417 000	55				84°, 120△, 206
10.813	2	3	168 852	9 417 000	55				84°, 120△, 206
10.813	$1s^22s^22p^4\ ^1S_0$	$1s^22s^22p^3(^2P^o_{3/2})4d\ (\frac{3}{2},\frac{5}{2})^o_1$	325 140	9 573 000	55				84°, 120△, 173, 175, 206
10.770	$1s^22s^22p^4\ ^3P_1$	$1s^22s^22p^3(^2D^o_{3/2})4d\ (\frac{3}{2},\frac{5}{2})^o_2$	89 441	9 374 000	35				84°, 94, 120△, 173, 175,206
10.736	$1s^22s^22p^4\ ^1D_2$	$1s^22s^22p^3(^2P^o_{1/2})4d\ (\frac{1}{2},\frac{5}{2})^o_3$	168 852	9 483 000	20				84°, 120△, 173, 175,206
10.685	$1s^22s^22p^4\ ^3P_2$	$1s^22s^22p^3(^2D^o_{3/2})4d\ (\frac{3}{2},\frac{3}{2})^o_3$	0	9 359 000	25				84°, 94, 120△, 173, 175,206
10.658	$1s^22s^22p^4\ ^3P_2$	$1s^22s^22p^3(^2D^o_{5/2})4d\ (\frac{5}{2},\frac{3}{2})^o_3$	0	9 383 000	35				84°, 94, 120△
10.644	2	2	0	9 395 000	35				84°, 94, 120△
10.635	2	1	0	9 403 000	40				84°, 94, 120△, 173, 175,206
10.658	$1s^22s^22p^4\ ^1D_2$	$1s^22s^22p^3(^2P^o_{3/2})4d\ (\frac{3}{2},\frac{3}{2})^o_3$	168 852	9 552 000	35				84°, 120△, 173, 175
10.635	$1s^22s^22p^4\ ^3P_1$	$1s^22s^22p^3(^2P^o_{1/2})4d\ (\frac{1}{2},\frac{5}{2})^o_2$	89 441	9 492 000	40				84°, 120△
10.617	$1s^22s^22p^4\ ^3P_0$	$1s^22s^22p^3(^2P^o_{1/2})4d\ (\frac{1}{2},\frac{3}{2})^o_1$	75 250	9 494 000	25				84°, 94, 120△, 173,175
10.564	$1s^22s^22p^4\ ^3P_1$	$1s^22s^22p^3(^2P^o_{3/2})4d\ (\frac{3}{2},\frac{3}{2})^o_1$	89 441	9 556 000	35				84°, 94, 120△, 173, 175,206
9.82	$1s^22s^22p^4\ ^1S_0$	$1s^22s^22p^3(^2P^o)5d\ ^1P^o_1$	325 140	10 510 000					97
9.81	$1s^22s^22p^4\ ^3P_2$	$1s^22s^22p^3(^4S^o)5d\ ^3D^o_3$	0	10 190 000					97

Fe XIX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
9.81	$1s^22s^22p^4\ ^1D_2$	$1s^22s^22p^3(^2D^o)5d\ ^1F^o_3$	168 852	10 390 000					97
9.81	$1s^22s^22p^4\ ^1D_2$	$1s^22s^22p^3(^2D^o)5d\ ^1D^o_2$	168 852	10 360 000					97
9.78	$1s^22s^22p^4\ ^3P_1$	$1s^22s^22p^3(^2D^o)5d\ ^3D^o_2$	89 441	10 330 000					97
9.68	2	3	0	10 330 000					97
9.68	2	2	0	10 330 000					97
9.68	$1s^22s^22p^4\ ^1D_2$	$1s^22s^22p^3(^2P^o)5d\ ^1F^o_3$	168 852	10 500 000					97
9.64	$1s^22s^22p^4\ ^3P_0$	$1s^22s^22p^3(^2P^o)5d\ ^3D^o_1$	75 250	10 450 000					97
9.52	2	3	0	10 500 000					97
9.61	$1s^22s^22p^4\ ^3P_1$	$1s^22s^22p^3(^2P^o)5d\ ^3P^o_1$	89 441	10 500 000					97
9.44	$1s^22s^22p^4\ ^3P_1$	$1s^22s^22p^3(^4S^o)6d\ ^5D^o_2$	89 441	10 680 000					97
9.36	$1s^22s^22p^4\ ^3P_0$	$1s^22s^22p^3(^2P^o)6d\ ^3D^o_1$	75 250	10 760 000					97
9.34	$1s^22s^22p^4\ ^3P_2$	$1s^22s^22p^3(^4S^o)6d\ ^3D^o_3$	0	10 710 000					97
9.21	$1s^22s^22p^4\ ^1D_2$	$1s^22s^22p^3(^2D^o)6d\ ^1F^o_3$	168 852	11 030 000					97
1.91765	$1s^22s^22p^4\ ^3P_2$	$1s2s^22p^5\ ^3P^o_2$	0	52 147 200					98°, 121

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Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2665.1	$1s^22s^22p^3\ ^2D^o_{3/2}$	$1s^22s^22p^3\ ^2D^o_{5/2}$	138 620	176 130		M1	2.91+4	C	89, 91, 113°, 195*
679.24^{P}	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s^22s^22p^3\ ^2P^o_{3/2}$	176 130	323 340		M1	1.27+4	C	115°, 195*
541.35	3/2	3/2	138 620	323 340		M1	4.49+4	C	92, 101°, 195*
567.76	$1s^22s^22p^3\ ^4S^o_{3/2}$	$1s^22s^22p^3\ ^2D^o_{5/2}$	0	176 130		M1	1.27+3	C	101°, 115, 116, 195*
309.26	$1s^22s^22p^3\ ^4S^o_{3/2}$	$1s^22s^22p^3\ ^2P^o_{3/2}$	0	323 340		M1	2.91+4	C	114°, 115, 116, 195*
232.89^{C}	$1s^22s^22p^3\ ^2P^o_{3/2}$	$1s^22s2p^4\ ^4P_{5/2}$	323 340	752 730		1.3 − 3	2.7+7	E	165*
201.09^{C}	3/2	3/2	323 340	820 630		4.4 − 3	1.8+8	E	165*
171.76^{C}	1/2	1/2	260 270	842 480		2.2 − 3	2.5+8	E	165*
173.43^{C}	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s^22s2p^4\ ^4P_{5/2}$	176 130	752 730		7.2 − 3	2.7+8	E	165*
162.84^{C}	3/2	5/2	138 620	752 730		1.5 − 2	6.4+8	E	165*
155.16^{C}	5/2	3/2	176 130	820 630		6.6 − 4	4.6+7	E	165*
146.63^{C}	3/2	3/2	138 620	820 630		1.7 − 3	1.3+8	E	165*
142.07^{C}	3/2	1/2	138 620	842 480		2.0 − 3	3.4+8	E	165*
162.79^{C}	$1s^22s2p^4\ ^2P_{1/2}$	$1s^22p^5\ ^2P^o_{3/2}$	1 340 040	1 954 310		2.84 − 2	1.79+9	C	165*
140.44	3/2	3/2	1 242 430	1 954 310		3.7 − 1	3.1+10	C	75°, 118, 165*
138.49	1/2	1/2	1 340 040	2 061 990		1.9 − 1	3.2+10	C	75°, 118, 165*
122.00	3/2	1/2	1 242 430	2 061 990		1.65 − 1	3.7+10	C	75°, 118, 165*
139.04^{C}	$1s^22s^22p^3\ ^2P^o_{3/2}$	$1s^22s2p^4\ ^2D_{3/2}$	323 340	1 042 570		8.0 − 3	6.9+8	D	165*
136.052	3/2	5/2	323 340	1 058 360		1.0 − 1	6.0+9	C	75$^\triangle$, 93°, 118, 165*, 187
127.86	1/2	3/2	260 270	1 042 570		2.92 − 2	2.98+9	C	75°, 165*
132.850	$1s^22s^22p^3\ ^4S^o_{3/2}$	$1s^22s2p^4\ ^4P_{5/2}$	0	752 730		2.1 − 1	1.3+10	C	69°, 75$^\triangle$, 103, 104, 118, 124, 128, 165*, 178, 187
121.858	3/2	3/2	0	820 630		1.65 − 1	1.86+10	C	75$^\triangle$, 103, 104, 118, 119°, 123, 128, 165*, 178, 187
118.697	3/2	1/2	0	842 480		8.84 − 2	2.09+10	C	75$^\triangle$, 103, 104, 118, 119°, 123, 128, 165*, 178
131.70	$1s^22s2p^4\ ^2S_{1/2}$	$1s^22p^5\ ^2P^o_{3/2}$	1 195 260	1 954 310		9.38 − 2	9.0+9	C	75°, 118, 165*
115.38^{C}	1/2	1/2	1 195 260	2 061 990		9.2 − 3	2.3+9	D	165*
115.41^{C}	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s^22s2p^4\ ^2D_{3/2}$	176 130	1 042 570		3.4 − 4	4.3+7	E	165*
113.349	5/2	5/2	176 130	1 058 360		3.8 − 1	3.3+10	C	75$^\triangle$, 93°, 103, 104, 118, 123, 165*, 178, 187
110.626	3/2	3/2	138 620	1 042 570		3.1 − 1	4.3+10	C	75, 93°, 103, 104, 118, 123, 165*, 178, 187
108.73^{C}	3/2	5/2	138 620	1 058 360		2.8 − 4	2.7+7	E	165*
114.72	$1s^22s^22p^3\ ^2P^o_{3/2}$	$1s^22s2p^4\ ^2S_{1/2}$	323 340	1 195 260		1.2 − 2	3.0+9	D	75°, 123, 165*
106.955	1/2	1/2	260 270	1 195 260		1.3 − 1	3.7+10	C	75$^\triangle$, 93°, 117, 118, 123, 165*
111.586	$1s^22s2p^4\ ^2D_{5/2}$	$1s^22p^5\ ^2P^o_{3/2}$	1 058 360	1 954 310		3.2 − 1	4.3+10	C	75$^\triangle$, 93°, 118, 165*, 181
109.657	3/2	3/2	1 042 570	1 954 310		1.27 − 1	1.76+10	C	75, 93°, 118, 165*, 181
98.075	3/2	1/2	1 042 570	2 061 990		1.33 − 1	4.62+10	C	75$^\triangle$, 93°, 118, 165*, 181
108.803	$1s^22s^22p^3\ ^2P^o_{3/2}$	$1s^22s2p^4\ ^2P_{3/2}$	323 340	1 242 430		6.68 − 2	9.40+9	C	75$^\triangle$, 93°, 103, 118, 123, 165*
101.816	1/2	3/2	260 270	1 242 430		5.68 − 2	9.1+9	C	75$^\triangle$, 93°, 103, 104, 118, 123, 165*
98.358	3/2	1/2	323 340	1 340 040		2.8 − 1	9.6+10	C	75$^\triangle$, 93°, 103, 104, 118, 123, 165*, 178
92.63	1/2	1/2	260 270	1 340 040		1.1 − 2	4.4+9	D	75°, 123, 165*
95.95	$1s^22s^22p^3\ ^4S^o_{3/2}$	$1s^22s2p^4\ ^2D_{3/2}$	0	1 042 570		1.0 − 2	1.9+9	E	75°, 165*, 178
94.638	$1s^22s^22p^3\ ^2D^o_{3/2}$	$1s^22s2p^4\ ^2S_{1/2}$	138 620	1 195 260		1.2 − 1	4.5+10	D	75$^\triangle$, 93°, 117, 118, 165*, 178

Fe XX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
93.782	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s^22s2p^4\ ^2P_{3/2}$	176 130	1 242 430		5.3 – 1	1.0+11	C	$75^{\triangle}$, 93°, 103, 104, 118, 123, 165^*, 187
90.595	$_{3/2}$	$_{3/2}$	138 620	1 242 430		7.24 – 2	1.47+10	C	$75^{\triangle}$, 93°, 103, 118, 165^*, 178
83.235	$_{3/2}$	$_{1/2}$	138 620	1 340 040		6.04 – 2	2.91+10	C	$75^{\triangle}$, 93°, 103, 118, 165^*, 178, 187
89.94^C	$1s^22s2p^4\ ^4P_{1/2}$	$1s^22p^5\ ^2P^o_{3/2}$	842 480	1 954 310		2.6 – 3	5.4+8	E	165^*
88.24	$_{3/2}$	$_{3/2}$	820 630	1 954 310		7.6 – 3	1.6+9	E	75°, 165^*
83.23	$_{5/2}$	$_{3/2}$	752 730	1 954 310		1.3 – 2	3.0+9	E	75°, 165^*
82.00^C	$_{1/2}$	$_{1/2}$	842 480	2 061 990		1.9 – 3	9.6+8	E	165^*
80.59	$_{3/2}$	$_{1/2}$	820 630	2 061 990		5.2 – 4	2.7+8	E	75°, 165^*
83.69	$1s^22s^22p^3\ ^4S^o_{3/2}$	$1s^22s2p^4\ ^2S_{1/2}$	0	1 195 260		4.0 – 3	1.9+9	E	75°, 165^*
80.51	$1s^22s^22p^3\ ^4S^o_{3/2}$	$1s^22s2p^4\ ^2P_{3/2}$	0	1 242 430		1.8 – 2	4.6+9	E	75°, 165^*, 178
13.298^C	$1s^22s^22p^3\ ^2P^o_{3/2}$	$1s^22s^22p^2(^3P)3d\ ^2D_{5/2}$	323 340	7 843 000		2.6 – 2	1.6+11	E	107, 109, 110, 165^*
13.27^C	$_{3/2}$	$_{3/2}$	323 340	7 859 000		1.3 – 1	1.2+12	D	165^*
13.159	$_{1/2}$	$_{3/2}$	260 270	7 859 000		9.2 – 1	8.9+12	D	120°, 165^*
13.176^C	$1s^22s^22p^3\ ^2P^o_{3/2}$	$1s^22s^22p^2(^1D)3d\ ^2D_{5/2}$	323 340	7 913 000					107,109
13.17^C	$_{3/2}$	$_{3/2}$	323 340	7 919 000		4.4 – 2	4.2+11	D	165^*
13.06^C	$_{1/2}$	$_{3/2}$	260 270	7 919 000		3.0 – 1	3.0+12	D	165^*
13.11^C	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s^22s^22p^2(^3P)3d\ ^4P_{3/2}$	176 130	7 802 000		8.4 – 2	8.1+11	E	165^*
13.082	$1s^22s^22p^3\ ^2P^o_{3/2}$	$1s^22s^22p^2(^1D)3d\ ^2F_{5/2}$	323 340	7 983 000					106, 108, 120°
13.082	$1s^22s^22p^3\ ^2P^o_{3/2}$	$1s^22s^22p^2(^1D)3d\ ^2P_{3/2}$	323 340	7 967 000		1.4	1.4+13	D	106, 108, 120°, 165^*
12.98^C	$_{1/2}$	$_{3/2}$	260 270	7 967 000		1.7 – 1	1.7+12	D	165^*
13.082	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s^22s^22p^2(^3P)3d\ ^2F_{7/2}$	176 130	7 820 000					106,107,108,109,110, 120°
13.049	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s^22s^22p^2(^3P)3d\ ^2D_{5/2}$	176 130	7 843 000		7.8 – 1	5.1+12	D	107, 109, 120°, 165^*
13.02^C	$_{5/2}$	$_{3/2}$	176 130	7 859 000		1.1 – 1	1.1+12	D	165^*
12.978	$_{3/2}$	$_{5/2}$	138 620	7 843 000		2.5	1.6+13	D	112, 120°, 165^*
12.946	$1s^22s^22p^3\ ^2P^o_{3/2}$	$1s^22s^22p^2(^1S)3d\ ^2D_{5/2}$	323 340	8 047 000		2.2	1.4+13	D	120°, 165^*
12.924	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s^22s^22p^2(^1D)3d\ ^2D_{5/2}$	176 130	7 913 000		1.4	9.6+12	E	110, 120°, 165^*
12.92^C	$_{5/2}$	$_{3/2}$	176 130	7 919 000		2.7 – 1	2.7+12	D	165^*
12.857	$_{3/2}$	$_{3/2}$	138 620	7 919 000		1.1	1.1+13	D	120°, 165^*
12.847	$_{3/2}$	$_{5/2}$	138 620	7 913 000		1.7	1.1+13	E	112, 120°, 165^*
12.888	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s^22s^22p^2(^1D)3d\ ^2F_{7/2}$	176 130	7 935 000					106,107,108,109,110, 120°, 185
12.763	$_{3/2}$	$_{5/2}$	138 620	7 983 000					107, 109, 110, 112, 120°
12.84^C	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s^22s^22p^2(^1D)3d\ ^2P_{3/2}$	176 130	7 967 000		1.6 – 1	1.6+12	D	165^*
12.77^C	$_{3/2}$	$_{3/2}$	138 620	7 967 000		3.2 – 2	3.3+11	E	165^*
12.818	$1s^22s^22p^3\ ^4S^o_{3/2}$	$1s^22s^22p^2(^3P)3d\ ^4P_{3/2}$	0	7 802 000		2.0	2.1+13	D	94,106,108,110,112, 120°, 165^*, 185
12.818	$_{3/2}$	$_{5/2}$	0	7 802 000					94,106,108,110,112, 120°, 185
12.75^C	$1s^22s^22p^3\ ^4S^o_{3/2}$	$1s^22s^22p^2(^3P)3d\ ^2D_{5/2}$	0	7 843 000		1.7 – 1	1.1+12	E	165^*
12.72^C	$_{3/2}$	$_{3/2}$	0	7 859 000		2.0 – 2	2.1+11	E	165^*
12.71^C	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s^22s^22p^2(^1S)3d\ ^2D_{5/2}$	176 130	8 047 000		1.5 – 1	1.0+12	D	165^*
12.64^C	$_{3/2}$	$_{5/2}$	138 620	8 047 000		6.0 – 3	4.2+10	E	165^*
12.63^C	$1s^22s^22p^3\ ^4S^o_{3/2}$	$1s^22s^22p^2(^1D)3d\ ^2D_{3/2}$	0	7 919 000		1.2 – 2	1.3+11	E	165^*
12.55^C	$1s^22s^22p^3\ ^4S^o_{3/2}$	$1s^22s^22p^2(^1D)3d\ ^2P_{3/2}$	0	7 967 000		1.1 – 2	1.2+11	E	165^*
10.222	$1s^22s^22p^3\ ^2P^o_{1/2}$	$1s^22s^22p^2(^3P)4d\ ^2D_{3/2}$	260 270	10 043 000					120
10.177	$1s^22s^22p^3\ ^2P^o_{3/2}$	$1s^22s^22p^2(^1D)4d\ ^2P_{3/2}$	323 340	10 149 000					120

Fe XX – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
10.177	$1s^22s^22p^3\ ^2D^o_{3/2}$	$1s^22s^22p^2(^3P)4d\ ^2F_{5/2}$	138 620	9 964 000					120
10.159	$5/2$	$7/2$	176 130	10 019 000					120
10.177	$1s^22s^22p^3\ ^2P^o_{3/2}$	$1s^22s^22p^2(^1D)4d\ ^2F_{5/2}$	323 340	10 149 000					120
10.159	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s^22s^22p^2(^3P)4d\ ^2D_{5/2}$	176 130	10 019 000					120
10.121	$3/2$	$5/2$	138 620	10 019 000					120
10.121	$1s^22s^22p^3\ ^4S^o_{3/2}$	$1s^22s^22p^2(^3P)4d\ ^4P_{5/2}$	0	9 880 000					120
9.991	$3/2$	$3/2$	0	10 009 000					120
9.991	$3/2$	$1/2$	0	10 009 000					120
10.058	$1s^22s^22p^3\ ^4S^o_{3/2}$	$1s^22s^22p^2(^3P)4d\ ^4F_{5/2}$	0	9 942 000					120
10.034	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s^22s^22p^2(^1D)4d\ ^2D_{5/2}$	176 130	10 142 000					120
10.008	$3/2$	$3/2$	138 620	10 130 000					120
10.034	$1s^22s^22p^3\ ^2P^o_{3/2}$	$1s^22s^22p^2(^1S)4d\ ^2D_{5/2}$	323 340	10 289 000					120
9.991	$1/2$	$3/2$	260 270	10 269 000					120
10.034	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s^22s^22p^2(^1D)4d\ ^2G_{7/2}$	176 130	10 142 000					120
10.008	$1s^22s^22p^3\ ^4S^o_{3/2}$	$1s^22s^22p^2(^3P)4d\ ^4D_{5/2}$	0	9 992 000					120
9.220	$1s^22s^22p^3\ ^2P^o_{3/2}$	$1s^22s^22p^2(^1D)5d\ ^2P_{3/2}$	323 340	11 169 000					96
9.220	$1s^22s^22p^3\ ^2P^o_{3/2}$	$1s^22s^22p^2(^1D)5d\ ^2F_{5/2}$	323 340	11 169 000					96
9.208	$1s^22s^22p^3\ ^2D^o_{3/2}$	$1s^22s^22p^2(^3P)5d\ ^2F_{5/2}$	138 620	10 998 000					96
9.199	$5/2$	$7/2$	176 130	11 047 000					96
9.208	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s^22s^22p^2(^3P)5d\ ^2D_{5/2}$	176 130	11 036 000					96
9.163	$1s^22s^22p^3\ ^4S^o_{3/2}$	$1s^22s^22p^2(^3P)5d\ ^4P_{5/2}$	0	10 913 000					96
9.110	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s^22s^22p^2(^1D)5d\ ^2G_{7/2}$	176 130	11 153 000					96
9.110	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s^22s^22p^2(^1D)5d\ ^2D_{5/2}$	176 130	11 153 000					96
9.073	$3/2$	$3/2$	138 620	11 160 000					96
9.110	$1s^22s^22p^3\ ^4S^o_{3/2}$	$1s^22s^22p^2(^3P)5d\ ^4F_{5/2}$	0	10 977 000					96
9.065	$1s^22s^22p^3\ ^4S^o_{3/2}$	$1s^22s^22p^2(^3P)5d\ ^4D_{5/2}$	0	11 031 000					96
1.90845	$1s^22s^22p^3\ ^4S^o_{3/2}$	$1s2s^22p^4\ ^4P_{5/2}$	0	52 398 500					98
1.90568	$3/2$	$3/2$	0	52 474 700					98°, 121, 122
1.9051	$3/2$	$1/2$	0	52 491 000					122
1.9075	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s2s^22p^4\ ^2D_{5/2}$	176 130	52 601 000					122
1.9075	$3/2$	$3/2$	138 620	52 563 000					122
1.9051	$1s^22s^22p^3\ ^2P^o_{3/2}$	$1s2s^22p^4\ ^2S_{1/2}$	323 340	52 814 000					122
1.9051	$1s^22s^22p^3\ ^2D^o_{5/2}$	$1s2s^22p^4\ ^2P_{3/2}$	176 130	52 667 000					122

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Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2298.0	$1s^22s^22p^2\ ^3P_1$	$1s^22s^22p^2\ ^3P_2$	73 851	117 354		M1	8.46+2	C	90, 91°, 195*
1354.08	0	1	0	73 851		M1	6.49+3	C	14°, 88, 92, 195*
786.1	$1s^22s^22p^2\ ^3P_2$	$1s^22s^22p^2\ ^1D_2$	117 354	244 561		M1	1.51+4	C	91°, 195*
585.8	1	2	73 851	244 561		M1	1.59+4	C	91°, 92, 101, 195*
270.52	$1s^22s^22p^2\ ^3P_2$	$1s^22s2p^3\ ^5S^o_2$	117 354	486 950		1.9 − 3	3.5+7	E	53°, 165*
242.07	1	2	73 851	486 950		1.6 − 3	3.6+7	E	53°, 165*
259.6^C	$1s^22s2p^3\ ^1P^o_1$	$1s^22p^4\ ^3P_2$	1 261 140	1 646 300		5.7 − 3	1.1+8	E	165*
208.6^C	1	1	1 261 140	1 740 500		1.4 − 2	7.4+8	E	165*
247.09^C	$1s^22s^22p^2\ ^1S_0$	$1s^22s2p^3\ ^3D^o_1$	371 980	776 690		1.5 − 3	5.5+7	E	165*
192.66^C	$1s^22s2p^3\ ^1D^o_2$	$1s^22p^4\ ^3P_2$	1 127 240	1 646 300		2.4 − 2	8.5+8	E	165*
163.06^C	2	1	1 127 240	1 740 500		4.3 − 3	3.6+8	E	165*
187.92^C	$1s^22s^22p^2\ ^1D_2$	$1s^22s2p^3\ ^3D^o_1$	244 561	776 690		3.2 − 3	2.0+8	E	165*
187.70^C	2	2	244 561	777 340		1.0 − 3	3.8+7	E	165*
178.898	2	3	244 561	803 540		3.5 − 2	1.0+9	E	119°, 165*
181.57	$1s^22s2p^3\ ^3S^o_1$	$1s^22p^4\ ^3P_2$	1 095 670	1 646 300		1.7 − 1	6.8+9	C	75°, 165*
156.21	1	0	1 095 670	1 735 700		7.05 − 2	1.93+10	C	75°, 165*
155.06	1	1	1 095 670	1 740 500		1.6 − 1	1.4+10	C	75°, 165*
180.85^C	$1s^22s^22p^2\ ^1S_0$	$1s^22s2p^3\ ^3P^o_1$	371 980	924 920		2.4 − 3	1.6+8	E	165*
179.87^C	$1s^22s2p^3\ ^1P^o_1$	$1s^22p^4\ ^1D_2$	1 261 140	1 817 100		1.20 − 1	5.0+9	C	165*
151.67^C	$1s^22s^22p^2\ ^3P_2$	$1s^22s2p^3\ ^3D^o_1$	117 354	776 690		7.5 − 4	7.3+7	E	165*
151.51	2	2	117 354	777 340		2.2 − 4	1.3+7	E	118°, 165*
145.732	2	3	117 354	803 540		1.48 − 1	6.6+9	C	75△, 118, 119°, 165*, 178
142.278	1	1	73 851	776 690		7.2 − 3	7.9+8	D	75△, 119°, 165*
142.148	1	2	73 851	777 340		1.5 − 1	1.0+10	C	75△, 118, 119°, 123, 165*, 178
128.755	0	1	0	776 690		9.3 − 2	1.2+10	C	75△, 118, 119°, 165*, 178
146.98^C	$1s^22s^22p^2\ ^1D_2$	$1s^22s2p^3\ ^3P^o_1$	244 561	924 920		3.0 − 3	3.0+8	E	165*
143.29^C	2	2	244 561	942 430		3.8 − 3	2.4+8	E	165*
144.96^C	$1s^22s2p^3\ ^1D^o_2$	$1s^22p^4\ ^1D_2$	1 127 240	1 817 100		5.60 − 1	3.56+10	C	75, 118, 165*
142.05	$1s^22s2p^3\ ^3P^o_2$	$1s^22p^4\ ^3P_2$	942 430	1 646 300		5.55 − 2	3.67+9	C	75°, 165*
138.61	1	2	924 920	1 646 300		5.52 − 2	3.83+9	C	75°, 165*
125.29	2	1	942 430	1 740 500		1.25 − 1	1.77+10	C	75°, 165*
123.33	1	0	924 920	1 735 700		4.65 − 2	2.04+10	C	75°, 165*
122.61^C	1	1	924 920	1 740 500		1.0 − 3	1.5+8	E	165*
121.36	0	1	916 330	1 740 500		3.41 − 2	5.1+9	C	75°, 165*
138.18^C	$1s^22s^22p^2\ ^1S_0$	$1s^22s2p^3\ ^3S^o_1$	371 980	1 095 670		5.9 − 3	6.9+8	E	165*
127.04	$1s^22s2p^3\ ^1P^o_1$	$1s^22p^4\ ^1S_0$	1 261 140	2 048 200		2.0 − 1	8.4+10	C	75°, 118, 165*
123.834	$1s^22s^22p^2\ ^3P_2$	$1s^22s2p^3\ ^3P^o_1$	117 354	924 920		2.2 − 2	3.2+9	D	75△, 119°, 123, 165*
121.201	2	2	117 354	942 430		2.40 − 1	2.17+10	C	75△, 117, 118, 119°, 123, 165*, 178
118.697	1	0	73 851	916 330		5.10 − 2	2.41+10	C	75△, 118, 119°, 165*, 178
117.501	1	1	73 851	924 920		1.06 − 1	1.71+10	C	75△, 118, 119°, 123, 165*, 178
115.15	1	2	73 851	942 430		3.6 − 3	3.6+8	D	75°, 118, 165*
108.114	0	1	0	924 920		2.25 − 2	4.28+9	C	75△, 118, 119°, 165*, 178
118.71	$1s^22s2p^3\ ^3D^o_3$	$1s^22p^4\ ^3P_2$	803 540	1 646 300		3.27 − 1	3.09+10	C	75°, 165*
115.08	2	2	777 340	1 646 300		1.46 − 1	1.47+10	C	75°, 165*
115.01	1	2	776 690	1 646 300		3.75 − 2	3.78+9	C	75°, 165*
104.29	1	0	776 690	1 735 700		6.09 − 2	3.73+10	C	75°, 165*
103.83	2	1	777 340	1 740 500		1.10 − 1	2.27+10	C	75°, 165*
103.77	1	1	776 690	1 740 500		7.56 − 2	1.56+10	C	75°, 165*
117.49^C	$1s^22s^22p^2\ ^1D_2$	$1s^22s2p^3\ ^3S^o_1$	244 561	1 095 670		1.9 − 3	3.0+8	E	165*
114.30	$1s^22s2p^3\ ^3P^o_2$	$1s^22p^4\ ^1D_2$	942 430	1 817 100		2.5 − 2	2.5+9	E	75°, 165*
112.1^C	1	2	924 920	1 817 100		1.2 − 2	1.3+9	E	165*
113.297	$1s^22s^22p^2\ ^1D_2$	$1s^22s2p^3\ ^1D^o_2$	244 561	1 127 240		4.6 − 1	4.8+10	C	75△, 117, 118, 119°, 165*, 178

Fe XXI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
112.466	$1s^22s^22p^2\ ^1S_0$	$1s^22s2p^3\ ^1P^o_1$	371 980	1 261 140		1.04 − 1	1.83+10	C	75$^\triangle$, 118, 119°, 165*, 178
104.98^C	$1s^22s2p^3\ ^3S^o_1$	$1s^22p^4\ ^1S_0$	1 095 670	2 048 200		9.6 − 3	5.8+9	E	165*
102.216	$1s^22s^22p^2\ ^3P_2$	$1s^22s2p^3\ ^3S^o_1$	117 354	1 095 670		3.0 − 1	6.4+10	C	75$^\triangle$, 117, 118, 119°, 123, 165*, 178
97.863	1	1	73 851	1 095 670		1.14 − 1	2.64+10	C	75$^\triangle$, 117, 118, 119°, 123, 165*, 178
91.269	0	1	0	1 095 670		3.70 − 2	9.9+9	C	75$^\triangle$, 117, 118, 119°, 165*, 178
99.017	$1s^22s^22p^2\ ^3P_2$	$1s^22s2p^3\ ^1D^o_2$	117 354	1 127 240		6.5 − 2	8.8+9	E	75$^\triangle$, 119°, 165*, 178
94.932^C	1	2	73 851	1 127 240		2.9 − 3	4.2+8	E	165*
98.69	$1s^22s2p^3\ ^3D^o_3$	$1s^22p^4\ ^1D_2$	803 540	1 817 100		4.3 − 2	5.9+9	E	75°, 165*
96.176^C	2	2	777 340	1 817 100		5.0 − 3	7.2+8	E	165*
98.369	$1s^22s^22p^2\ ^1D_2$	$1s^22s2p^3\ ^1P^o_1$	244 561	1 261 140		3.1 − 1	7.1+10	C	75$^\triangle$, 117, 118, 119°, 165*, 178
89.025^C	$1s^22s2p^3\ ^3P^o_1$	$1s^22p^4\ ^1S_0$	924 920	2 048 200		5.4 − 3	4.5+9	E	165*
87.429^C	$1s^22s^22p^2\ ^3P_2$	$1s^22s2p^3\ ^1P^o_1$	117 354	1 261 140		8.0 − 4	2.3+8	E	165*
84.26	1	1	73 851	1 261 140		1.7 − 2	5.3+9	E	75°, 165*
86.26	$1s^22s2p^3\ ^5S^o_2$	$1s^22p^4\ ^3P_2$	486 950	1 646 300		8.0 − 3	1.4+9	E	75°, 165*
79.773^C	2	1	486 950	1 740 500		8.0 − 4	2.8+8	E	165*
12.873^C	$1s^22s^22p^2\ ^1S_0$	$1s^22s^22p3d\ ^3D^o_1$	371 980	8 140 000		8.8 − 3	1.2+11	E	165*
12.728^C	$1s^22s^22p^2\ ^1D_2$	$1s^22s^22p3d\ ^3F^o_3$	244 561	8 101 400		4.0 − 2	2.4+11	E	165*
12.623	$1s^22s^22p^2\ ^1S_0$	$1s^22s^22p3d\ ^1P^o_1$	371 980	8 293 900		5.1 − 1	7.2+12	E	96°, 124, 165*
12.578^C	$1s^22s^22p^2\ ^1D_2$	$1s^22s^22p3d\ ^3D^o_3$	244 561	8 195 000		2.1 − 1	1.3+12	E	165*
12.525	$1s^22s^22p^2\ ^3P_2$	$1s^22s^22p3d\ ^3F^o_3$	117 354	8 101 400		9.5 − 1	5.8+12	E	96°, 124, 165*
12.465^C	$1s^22s^22p^2\ ^3P_2$	$1s^22s^22p3d\ ^3D^o_1$	117 354	8 140 000		1.5 − 2	2.1+11	E	165*
12.398	1	1	73 851	8 140 000		2.5 − 1	3.6+12	D	94°, 112, 165*
12.38	2	3	117 354	8 195 000		3.4	2.1+13	D	106°, 165*
12.325	1	2	73 851	8 187 400					96°, 124
12.285	0	1	0	8 140 000		1.4	2.1+13	D	94°, 106, 110, 112, 165*
12.462	$1s^22s^22p^2\ ^3P_1$	$1s^22s^22p3d\ ^1D^o_2$	73 851	8 098 000					96°, 124
12.423^C	$1s^22s^22p^2\ ^1D_2$	$1s^22s^22p3d\ ^1P^o_1$	244 561	8 293 900		4.8 − 2	6.9+11	E	165*
12.393	$1s^22s^22p^2\ ^1D_2$	$1s^22s^22p3d\ ^1F^o_3$	244 561	8 313 600		5.0	3.1+13	D	96°, 106, 107, 109, 124, 165*
12.325	$1s^22s^22p^2\ ^3P_2$	$1s^22s^22p3d\ ^3P^o_2$	117 354	8 230 900					96°, 106, 107, 109, 110, 124
12.230^C	$1s^22s^22p^2\ ^3P_2$	$1s^22s^22p3d\ ^1P^o_1$	117 354	8 293 900		4.3 − 2	6.4+11	E	165*
12.165^C	1	1	73 851	8 293 900		1.2 − 1	1.8+12	E	165*
12.057^C	0	1	0	8 293 900		8.3 − 2	1.3+12	E	165*
12.201^C	$1s^22s^22p^2\ ^3P_2$	$1s^22s^22p3d\ ^1F^o_3$	117 354	8 313 600		3.5 − 1	2.2+12	E	165*
9.822^C	$1s^22s^22p^2\ ^1S_0$	$1s^22s^22p4d\ ^3D^o_1$	371 980	10 553 000		9.4 − 3	2.2+11	E	165*
9.744^C	$1s^22s^22p^2\ ^3P_2$	$1s^22s^22p4s\ ^3P^o_1$	117 354	10 380 000		1.0 − 2	2.3+11	E	165*
9.632	0	1	0	10 380 000		4.9 − 3	1.2+11	E	125°, 165*
9.705^C	$1s^22s^22p^2\ ^1D_2$	$1s^22s^22p4d\ ^3F^o_3$	244 561	10 548 000		4.0 − 2	4.0+11	E	165*
9.694^C	$1s^22s^22p^2\ ^1S_0$	$1s^22s^22p4d\ ^3P^o_1$	371 980	10 688 000		2.1 − 3	5.0+10	E	165*
9.597^C	$1s^22s^22p^2\ ^1D_2$	$1s^22s^22p4d\ ^3D^o_3$	244 561	10 664 000		1.7 − 2	1.7+11	E	165*
9.587^C	$1s^22s^22p^2\ ^1D_2$	$1s^22s^22p4d\ ^1D^o_2$	244 561	10 675 000		7.0 − 2	1.0+12	D	165*
9.587	$1s^22s^22p^2\ ^3P_2$	$1s^22s^22p4d\ ^3F^o_3$	117 354	10 548 000		3.1 − 1	3.2+12	E	96, 120, 125°, 165*
9.581	$1s^22s^22p^2\ ^1D_2$	$1s^22s^22p4d\ ^1F^o_3$	244 561	10 681 000		8.5 − 1	8.9+12	D	96°, 120, 165*
9.575^C	$1s^22s^22p^2\ ^1D_2$	$1s^22s^22p4d\ ^3P^o_1$	244 561	10 688 000		1.6 − 2	3.9+11	E	165*

Fe XXI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
9.548	$1s^22s^22p^2\ ^3P_1$	$1s^22s^22p4d\ ^3D^o_2$	73 851	10 547 000					125
9.542	1	1	73 851	10 553 000		3.3 − 2	8.1+11	D	125°, 165*
9.482	2	3	117 354	10 664 000		4.7 − 1	4.9+12	D	96, 120, 125°, 165*
9.476	0	1	0	10 553 000		2.1 − 1	5.2+12	D	96, 120, 125°, 165*
9.518	$1s^22s^22p^2\ ^3P_1$	$1s^22s^22p4d\ ^3P^o_2$	73 851	10 580 000					96°, 120
9.460[C]	2	1	117 354	10 688 000		6.0 − 2	1.5+12	D	165*
9.421	1	1	73 851	10 688 000		1.3 − 1	3.3+12	D	96°, 120, 165*
9.472[C]	$1s^22s^22p^2\ ^3P_2$	$1s^22s^22p4d\ ^1D^o_2$	117 354	10 675 000		4.1 − 2	6.1+11	E	165*
9.433	1	2	73 851	10 675 000		1.1 − 1	1.7+12	E	96°, 120, 165*
8.855[C]	$1s^22s^22p^2\ ^1S_0$	$1s^22s^22p5d\ ^3D^o_1$	371 980	11 665 000		5.5 − 3	1.6+11	E	165*
8.646[C]	$1s^22s^22p^2\ ^1D_2$	$1s^22s^22p5d\ ^1D^o_2$	244 561	11 810 000		2.5 − 2	4.4+11	E	165*
8.646[C]	$1s^22s^22p^2\ ^1D_2$	$1s^22s^22p5d\ ^3P^o_1$	244 561	11 810 000		5.5 − 3	1.6+11	E	165*
8.643	$1s^22s^22p^2\ ^1D_2$	$1s^22s^22p5d\ ^1F^o_3$	244 561	11 814 000		3.1 − 1	3.9+12	D	96°, 120, 165*
8.627[C]	$1s^22s^22p^2\ ^3P_1$	$1s^22s^22p5d\ ^3D^o_1$	73 851	11 665 000		1.1 − 2	3.2+11	E	165*
8.573	0	1	0	11 665 000		7.0 − 2	2.1+12	D	125°, 165*
8.558	2	3	117 354	11 802 000		1.5 − 1	2.0+12	D	96°, 120, 165*
8.552[C]	$1s^22s^22p^2\ ^3P_2$	$1s^22s^22p5d\ ^1D^o_2$	117 354	11 810 000		1.6 − 2	2.8+11	E	165*
8.521	1	2	73 851	11 810 000		3.3 − 2	6.1+11	E	96°, 120, 165*
8.552[C]	$1s^22s^22p^2\ ^3P_2$	$1s^22s^22p5d\ ^3P^o_1$	117 354	11 810 000		2.2 − 2	6.5+11	E	165*
8.521	1	1	73 851	11 810 000		4.8 − 2	1.5+12	D	96°, 120, 165*
1.89692	$1s^22s^22p^2\ ^3P_1$	$1s2s^22p^3\ ^3D^o_2$	73 851	52 790 000					98°, 122
1.8966	2	3	117 354	52 843 000					122
1.89474	0	1	0	52 777 700					98
1.8942	$1s^22s^22p^2\ ^1D_2$	$1s2s^22p^3\ ^3P^o_2$	244 561	53 037 000					122
1.8942	$1s^22s^22p^2\ ^3P_1$	$1s2s^22p^3\ ^3S^o_1$	73 851	52 870 000					122
1.89359	$1s^22s^22p^2\ ^3P_2$	$1s2s^22p^3\ ^1D^o_2$	117 354	52 927 100					98°, 122
1.8916	$1s^22s^22p^2\ ^1D_2$	$1s2s^22p^3\ ^1P^o_1$	244 561	53 104 000					122

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Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
845.55	$1s^22s^22p\ ^2P^o_{1/2}$	$1s^22s^22p\ ^2P^o_{3/2}$	0	118 266		M1	1.48+4	C	88, 89, 90°, 91, 92, 126, 195*
379.68^C	$1s^22s2p^2\ ^2P_{3/2}$	$1s^22p^3\ ^4S^o_{3/2}$	992 320	1 255 700		2.7 − 3	3.1+7	E	114, 165*
248.73^C	1/2	3/2	853 650	1 255 700		4.4 − 3	1.2+8	E	165*
360.56^C	$1s^22s2p^2\ ^2S_{1/2}$	$1s^22p^3\ ^4S^o_{3/2}$	978 350	1 255 700		9.6 − 4	1.2+7	E	165*
349.3	$1s^22s^22p\ ^2P^o_{3/2}$	$1s^22s2p^2\ ^4P_{1/2}$	118 266	404 550		5.2 − 4	1.4+7	E	114°, 165*
292.46	3/2	3/2	118 266	460 190		4.4 − 4	8.6+6	E	114°, 165*
253.17	3/2	5/2	118 266	513 260		4.0 − 3	7.0+7	E	114°, 165*
247.19	1/2	1/2	0	404 550		1.6 − 3	8.7+7	E	114°, 165*, 178
217.30	1/2	3/2	0	460 190					114
247.65^C	$1s^22s2p^2\ ^2P_{3/2}$	$1s^22p^3\ ^2D^o_{3/2}$	992 320	1 396 110		1.6 − 3	4.4+7	E	165*
230.28^C	3/2	5/2	992 320	1 426 570		1.61 − 1	3.38+9	C	165*
184.35^C	1/2	3/2	853 650	1 396 110		1.3 − 1	6.6+9	C	165*
239.37^C	$1s^22s2p^2\ ^2S_{1/2}$	$1s^22p^3\ ^2D^o_{3/2}$	978 350	1 396 110		2.92 − 2	8.5+8	C	165*
192.53^C	$1s^22s2p^2\ ^2D_{3/2}$	$1s^22p^3\ ^4S^o_{3/2}$	736 310	1 255 700		3.0 − 3	1.3+8	E	165*
173.21	$1s^22s2p^2\ ^2P_{3/2}$	$1s^22p^3\ ^2P^o_{1/2}$	992 320	1 569 630	1	2.0 − 2	2.2+9	D	75°, 165*
157.37	3/2	3/2	992 320	1 627 720	4	3.0 − 1	2.0+10	C	75°, 118, 165*
139.64	1/2	1/2	853 650	1 569 630	1	1.5 − 2	2.6+9	D	75°, 118, 165*
129.17	1/2	3/2	853 650	1 627 720	1	3.74 − 2	3.74+9	C	75°, 165*
169.08	$1s^22s2p^2\ ^2S_{1/2}$	$1s^22p^3\ ^2P^o_{1/2}$	978 350	1 569 630	1	1.0 − 1	1.2+10	C	75°, 165*
153.96	1/2	3/2	978 350	1 627 720	1	2.48 − 2	1.74+9	C	75°, 165*
161.74	$1s^22s^22p\ ^2P^o_{3/2}$	$1s^22s2p^2\ ^2D_{3/2}$	118 266	736 310	1	6.0 − 4	3.8+7	E	75°, 123, 165*
156.019	3/2	5/2	118 266	759 210	4	1.36 − 1	6.2+9	C	$75^{\triangle}$, 118, 119°, 123, 165*, 178
135.812	1/2	3/2	0	736 310	6	1.2 − 1	1.1+10	C	$75^{\triangle}$, 118, 119°, 123, 128, 165*, 178
157.03	$1s^22s2p^2\ ^2D_{5/2}$	$1s^22p^3\ ^2D^o_{3/2}$	759 210	1 396 110	4bl	7.44 − 2	5.0+9	C	75°, 118, 165*
151.54	3/2	3/2	736 310	1 396 110	3	1.04 − 1	7.6+9	C	75°, 165*
149.87	5/2	5/2	759 210	1 426 570	5	2.59 − 1	1.28+10	C	75°, 118, 165*
144.85	3/2	5/2	736 310	1 426 570	6bl	6.68 − 2	3.54+9	C	75°, 118, 165*
136.01	$1s^22s^22p\ ^2P^o_{3/2}$	$1s^22s2p^2\ ^2P_{1/2}$	118 266	853 650	3bl	6.4 − 5	1.2+7	E	75°, 165*
117.144	1/2	1/2	0	853 650	7	1.6 − 1	3.9+10	C	$75^{\triangle}$, 118, 119°, 123, 128, 165*, 178
114.412	3/2	3/2	118 266	992 320	8	3.5 − 1	4.5+10	C	$75^{\triangle}$, 118, 119°, 123, 128, 129, 165*, 178
100.773	1/2	3/2	0	992 320	4	3.78 − 2	6.20+9	C	$75^{\triangle}$, 118, 119°, 123, 129, 165*, 178
134.65	$1s^22s2p^2\ ^4P_{5/2}$	$1s^22p^3\ ^4S^o_{3/2}$	513 260	1 255 700	6	2.14 − 1	1.96+10	C	75°, 118, 165*
125.71	3/2	3/2	460 190	1 255 700	6	1.44 − 1	1.52+10	C	75°, 118, 165*
117.52	1/2	3/2	404 550	1 255 700	6bl	8.56 − 2	1.03+10	C	75°, 118, 165*
120.03	$1s^22s2p^2\ ^2D_{3/2}$	$1s^22p^3\ ^2P^o_{1/2}$	736 310	1 569 630	8bl	1.28 − 1	2.96+10	C	75°, 165*
115.19	5/2	3/2	759 210	1 627 720	4bl	1.13 − 1	1.43+10	C	75°, 165*
112.21	3/2	3/2	736 310	1 627 720	2	3.9 − 2	5.1+9	D	75°, 165*
116.264	$1s^22s^22p\ ^2P^o_{3/2}$	$1s^22s2p^2\ ^2S_{1/2}$	118 266	978 350	6	1.43 − 1	3.53+10	C	$75^{\triangle}$, 118, 119°, 165*
102.216	1/2	1/2	0	978 350	7bl	8.4 − 3	2.7+9	D	$75^{\triangle}$, 118, 119°, 123, 165*, 178
113.27^C	$1s^22s2p^2\ ^4P_{5/2}$	$1s^22p^3\ ^2D^o_{3/2}$	513 260	1 396 110		1.7 − 3	2.2+8	E	165*
109.53	5/2	5/2	513 260	1 426 570	3bl	2.1 − 2	1.9+9	E	75°, 165*
106.85^C	3/2	3/2	460 190	1 396 110		1.6 − 2	2.3+9	E	165*
103.48^C	3/2	5/2	460 190	1 426 570		4.8 − 4	5.0+7	E	165*
100.85^C	1/2	3/2	404 550	1 396 110		2.0 − 4	3.3+7	E	165*
89.730^C	$1s^22s2p^2\ ^4P_{5/2}$	$1s^22p^3\ ^2P^o_{3/2}$	513 260	1 627 720		7.2 − 4	1.5+8	E	165*
85.831^C	1/2	1/2	404 550	1 569 630		5.0 − 4	2.3+8	E	165*
85.651^C	3/2	3/2	460 190	1 627 720		1.3 − 3	2.9+8	E	165*
12.325	$1s^22s2p^2\ ^2P_{1/2}$	$1s^22s2p(^3P^o)3d\ ^2P^o_{1/2}$	853 650	8 967 000		7.0 − 1	1.5+13	D	96°, 130, 165*

Fe XXII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
12.193	$1s^22s2p^2\ ^2S_{1/2}$	$1s^22s2p(^3P^o)3d\ ^2P^o_{3/2}$	978 350	9 180 000		6.4 − 1	7.2+12	D	96°, 130, 165*
12.193	$1s^22s2p^2\ ^2D_{3/2}$	$1s^22s2p(^3P^o)3d\ ^2D^o_{5/2}$	736 310	8 938 000		1.3	9.9+12	D	96°, 130, 165*
12.095	$1s^22s2p^2\ ^2D_{5/2}$	$1s^22s2p(^3P^o)3d\ ^2F^o_{5/2}$	759 210	9 030 000		1.0	7.8+12	D	96°, 108, 130, 165*
12.053	3/2	5/2	736 310	9 030 000		8.0 − 1	6.1+12	D	96°, 107, 108, 109, 130, 165*
12.045	5/2	7/2	759 210	9 062 000		4.3	2.4+13	D	96°, 107, 109, 130, 165*
12.077	$1s^22s2p^2\ ^2P_{1/2}$	$1s^22s2p(^1P^o)3d\ ^2D^o_{3/2}$	853 650	9 134 000		8.8 − 1	1.0+13	D	96°, 130, 165*
12.077	3/2	5/2	992 320	9 272 000		3.1	2.4+13	D	96°, 107, 109, 130, 165*
12.027	$1s^22s2p^2\ ^2P_{1/2}$	$1s^22s2p(^1P^o)3d\ ^2P^o_{3/2}$	853 650	9 168 000		6.0 − 1	6.9+12	D	96°, 130, 165*
11.976	$1s^22s2p^2\ ^4P_{5/2}$	$1s^22s2p(^3P^o)3d\ ^4F^o_{7/2}$	513 260	8 864 000		1.0	5.9+12	D	96°, 130, 165*, 206
11.935	$1s^22s^22p\ ^2P^o_{3/2}$	$1s^22s^23d\ ^2D_{3/2}$	118 266	8 498 000		2.6 − 1	3.0+12	D	94°, 96, 108, 110, 165*
11.921	3/2	5/2	118 266	8 507 000		2.4	1.8+13	D	96°, 97, 106, 108, 109, 112, 130, 165*, 206
11.767	1/2	3/2	0	8 498 000		1.3	1.6+13	D	94, 96°, 97, 106, 108, 109, 110, 112, 130, 165*, 206
11.886	$1s^22s2p^2\ ^4P_{3/2}$	$1s^22s2p(^3P^o)3d\ ^4P^o_{5/2}$	460 190	8 874 000		1.7	1.3+13	D	96°, 130, 165*
11.823	5/2	3/2	513 260	8 972 000		6.6 − 1	7.9+12	D	96°, 130, 165*, 206
11.748	3/2	1/2	460 190	8 973 000		7.6 − 1	1.8+13	D	96°, 130, 165*
11.748	3/2	3/2	460 190	8 972 000		1.0	1.2+13	D	96°, 130, 165*
11.837	$1s^22s2p^2\ ^4P_{5/2}$	$1s^22s2p(^3P^o)3d\ ^4D^o_{7/2}$	513 260	8 962 000		3.9	2.3+13	D	96°, 107, 109, 130, 165*, 206
11.837	5/2	5/2	513 260	8 973 000		2.1	1.7+13	D	96°, 130, 165*, 206
11.797	1/2	3/2	404 550	8 882 000		1.4	1.7+13	D	96°, 130, 165*
11.789	1/2	1/2	404 550	8 888 000		1.1	2.6+13	D	96°, 130, 165*, 206
11.748	3/2	5/2	460 190	8 973 000		6.0 − 1	4.8+12	D	96°, 130, 165*
11.789	$1s^22s2p^2\ ^2D_{5/2}$	$1s^22s2p(^1P^o)3d\ ^2F^o_{7/2}$	759 210	9 242 000		1.9	1.2+13	D	96°, 107, 109, 130, 165*, 206
11.748	3/2	5/2	736 310	9 249 000		2.0	1.6+13	D	96°, 130, 165*
11.669	$1s^22s^22p\ ^2P^o_{3/2}$	$1s^22s2p3p\ ^2P_{3/2}$	118 266	8 688 000					96°, 107, 109, 130, 206
11.650	1/2	1/2	0	8 584 000					96°, 107, 109, 130
11.459	$1s^22s^22p\ ^2P^o_{3/2}$	$1s^22s2p3p\ ^2D_{5/2}$	118 266	8 845 000					96°, 107, 109, 112, 130, 206
11.442	1/2	3/2	0	8 740 000					96°, 107, 109, 112, 130
9.241	$1s^22s2p^2\ ^2D_{3/2}$	$1s^22s2p(^3P^o)4d\ ^2F^o_{5/2}$	736 310	11 558 000		3.9 − 1	5.1+12	D	96°, 130, 165*
8.977	5/2	7/2	759 210	11 900 000		2.4 − 1	2.5+12	D	96°, 130, 165*
9.215	$1s^22s2p^2\ ^2D_{5/2}$	$1s^22s2p(^3P^o)4d\ ^2D^o_{5/2}$	759 210	11 611 000		2.1 − 1	2.7+12	D	96°, 130, 165*
9.183	$1s^22s2p^2\ ^2D_{5/2}$	$1s^22s2p(^1P^o)4d\ ^2F^o_{7/2}$	759 210	11 649 000		8.4 − 1	8.3+12	D	96°, 130, 165*
8.960	3/2	5/2	736 310	11 897 000		2.7 − 1	3.8+12	D	96°, 130, 165*
9.163	$1s^22s2p^2\ ^2P_{3/2}$	$1s^22s2p(^1P^o)4d\ ^2D^o_{5/2}$	992 320	11 906 000		5.2 − 1	6.9+12	D	96°, 130, 165*
9.14	$1s^22s^22p\ ^2P^o_{3/2}$	$1s^22s^24s\ ^2S_{1/2}$	118 266	11 050 000		1.4 − 2	5.5+11	E	97°, 109, 165*, 206
9.06	1/2	1/2	0	11 050 000		4.6 − 3	1.9+11	E	97°, 109, 165*, 206
9.073	$1s^22s^22p\ ^2P^o_{3/2}$	$1s^22s^24d\ ^2D_{5/2}$	118 266	11 140 000		4.0 − 1	5.5+12	D	97, 125°, 130, 165*, 206
9.073	3/2	3/2	118 266	11 140 000		4.8 − 2	9.8+11	D	125°, 165*
8.976	1/2	3/2	0	11 140 000		2.2 − 1	4.6+12	D	97, 110, 125°, 130, 165*, 206
9.065	$1s^22s2p^2\ ^4P_{3/2}$	$1s^22s2p(^3P^o)4d\ ^4F^o_{5/2}$	460 190	11 492 000		2.6 − 1	3.5+12	D	96°, 130, 165*
9.006	$1s^22s2p^2\ ^4P_{5/2}$	$1s^22s2p(^3P^o)4d\ ^4D^o_{7/2}$	513 260	11 618 000		5.6 − 1	5.7+12	D	96°, 130, 165*
9.006	5/2	5/2	513 260	11 618 000		3.9 − 1	5.3+12	D	96°, 130, 165*
8.992	1/2	3/2	404 550	11 526 000		2.4 − 1	4.9+12	D	96°, 130, 165*
8.722	$1s^22s^22p\ ^2P^o_{1/2}$	$1s^22s2p(^3P^o)4p\ ^2P_{1/2}$	0	11 465 000					125
8.715	$1s^22s^22p\ ^2P^o_{1/2}$	$1s^22s2p(^3P^o)4p\ ^2D_{3/2}$	0	11 474 000					125
8.091	$1s^22s^22p\ ^2P^o_{1/2}$	$1s^22s^25d\ ^2D_{3/2}$	0	12 359 000					125
1.8867	$1s^22s^22p\ ^2P^o_{3/2}$	$1s2s^22p^2\ ^2P_{1/2}$	118 266	53 122 000					122
1.8824	3/2	3/2	118 266	53 242 000					122
1.8824	1/2	1/2	0	53 122 000					122

Fe XXII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1.88534	$1s^22s^22p\ ^2P^o_{3/2}$	$1s2s^22p^2\ ^2D_{5/2}$	118 266	53 166 000					98°, 122
1.88259	$_{1/2}$	$_{3/2}$	0	53 124 000					98°, 122
1.8794	$1s^22s^22p\ ^2P^o_{3/2}$	$1s2s^22p^2\ ^2S_{1/2}$	118 266	53 327 000					122

Fe XXIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1079.3	$1s^22s2p\ ^3P^o_1$	$1s^22s2p\ ^3P^o_2$	379 125	471 780		M1	9.98+3	C+	91°, 92, 165*
602.4^{C}	$1s^22s3p\ ^1P^o_1$	$1s^22s3d\ ^1D_2$	9 107 000	9 273 000		1.4 − 1	5.1+8	E	165*
490.9^{C}	$1s^22s2p\ ^1P^o_1$	$1s^22p^2\ ^3P_0$	752 410	956 100		8.4 − 4	2.3+7	E	165*
363.91^{C}	1	1	752 410	1 027 200		4.5 − 4	7.5+6	E	165*
313.19^{C}	1	2	752 410	1 071 700		2.7 − 2	3.7+8	D	165*
263.765	$1s^22s^2\ ^1S_0$	$1s^22s2p\ ^3P^o_1$	0	379 125		1.5 − 3	4.8+7	D	114, 119°, 131, 132, 178, 191*
221.33	$1s^22s2p\ ^1P^o_1$	$1s^22p^2\ ^1D_2$	752 410	1 204 200	5bl	1.69 − 1	4.61+9	B	75°, 165*
180.10	$1s^22s2p\ ^3P^o_2$	$1s^22p^2\ ^3P_1$	471 780	1 027 200	1	6.50 − 2	4.46+9	B	75°, 165*
173.31	1	0	379 125	956 100	2bl	5.55 − 2	1.23+10	B	75°, 165*
166.74	2	2	471 780	1 071 700	4	1.58 − 1	7.58+9	B	75°, 165*
154.27	1	1	379 125	1 027 200	2	4.47 − 2	4.18+9	B	75°, 165*
147.24	0	1	348 180	1 027 200	3	6.43 − 2	6.59+9	B	75°, 165*
144.36	1	2	379 125	1 071 700	4	8.49 − 2	5.43+9	B	75°, 165*
149.22	$1s^22s2p\ ^1P^o_1$	$1s^22p^2\ ^1S_0$	752 410	1 422 600	3	1.09 − 1	3.27+10	B	75°, 165*
136.53	$1s^22s2p\ ^3P^o_2$	$1s^22p^2\ ^1D_2$	471 780	1 204 200	4	6.75 − 2	4.83+9	C	75°, 165*
121.20^{C}	1	2	379 125	1 204 200		4.8 − 3	4.4+8	D	165*
132.906	$1s^22s^2\ ^1S_0$	$1s^22s2p\ ^1P^o_1$	0	752 410	10bl	1.55 − 1	1.95+10	B	75△, 119°, 123, 128, 131, 132, 165*, 178
36.09^{C}	$1s^22s3d\ ^1D_2$	$1s^22s4p\ ^1P^o_1$	9 273 000	12 044 000		7.5 − 2	1.3+11	D	190*
33.43^{C}	$1s^22s3p\ ^1P^o_1$	$1s^22s4d\ ^1D_2$	9 107 000	12 098 000		1.7	2.0+12	C	190*
13.01^{C}	$1s^22p^2\ ^1S_0$	$1s^22s3p\ ^1P^o_1$	1 422 600	9 107 000		1.1 − 2	1.4+11	D	165*
12.65^{C}	$1s^22p^2\ ^1D_2$	$1s^22s3p\ ^1P^o_1$	1 204 200	9 107 000		1.2 − 2	1.7+11	D	165*
12.427	$1s^22p^2\ ^1S_0$	$1s^22p3s\ ^1P^o_1$	1 422 600	9 470 000		5.5 − 2	7.9+11	D	96°, 108, 165*, 170
12.095	$1s^22p^2\ ^1D_2$	$1s^22p3s\ ^1P^o_1$	1 204 200	9 470 000		1.4 − 1	2.1+12	D	96°, 165*, 170
12.095	$1s^22p^2\ ^3P_1$	$1s^22p3s\ ^3P^o_0$	1 027 200	9 295 000		5.1 − 2	2.3+12	D	96°, 165*, 170
11.898	$1s^22p^2\ ^1S_0$	$1s^22p3d\ ^1P^o_1$	1 422 600	9 828 000		1.29	2.03+13	C−	96°, 130, 165*, 170, 206
11.870	$1s^22s2p\ ^3P^o_2$	$1s^22s3s\ ^3S_1$	471 780	8 894 000		1.3 − 1	2.1+12	D	96°, 165*, 170
11.748	1	1	379 125	8 894 000		7.8 − 2	1.3+12	D	96°, 165*, 170
11.702^{C}	0	1	348 180	8 894 000		2.7 − 2	4.4+11	D	165*
11.86^{C}	$1s^22p^2\ ^1D_2$	$1s^22p3d\ ^1D^o_2$	1 204 200	9 638 000		2.4 − 1	2.3+12	D	165*
11.737	$1s^22s2p\ ^1P^o_1$	$1s^22s3d\ ^1D_2$	752 410	9 273 000		1.8	1.8+13	C−	94, 96°, 107, 108, 109, 130, 134, 165*, 170
11.70^{C}	$1s^22p^2\ ^1D_2$	$1s^22p3d\ ^3P^o_2$	1 204 200	9 753 000		7.5 − 1	7.3+12	D	165*
11.692	$1s^22p^2\ ^3P_2$	$1s^22p3d\ ^3F^o_3$	1 071 700	9 625 000		1.1	7.7+12	C−	96°, 130, 134, 165*, 170, 206
11.68^{C}	$1s^22p^2\ ^3P_2$	$1s^22p3d\ ^3D^o_1$	1 071 700	9 637 000		1.3 − 2	2.1+11	D	165*
11.614	1	1	1 027 200	9 637 000		2.7 − 1	4.4+12	C−	96°, 165*, 170
11.525	2	3	1 071 700	9 749 000		3.2	2.3+13	C−	96°, 107, 109, 130, 134, 165*, 170, 206
11.519	0	1	956 100	9 637 000		1.29	2.16+13	C−	96°, 97, 108, 109, 130, 134, 165*, 170, 206
11.67^{C}	$1s^22p^2\ ^3P_2$	$1s^22p3d\ ^1D^o_2$	1 071 700	9 638 000		2.4 − 1	2.3+12	D	165*
11.614	1	2	1 027 200	9 638 000		1.0	1.0+13	D	96°, 130, 134, 165*, 170, 206
11.594	$1s^22p^2\ ^1D_2$	$1s^22p3d\ ^1F^o_3$	1 204 200	9 830 000		5.05	3.58+13	C−	96°, 97, 107, 108, 109, 130, 134, 165*, 170, 206
11.594	$1s^22p^2\ ^1D_2$	$1s^22p3d\ ^1P^o_1$	1 204 200	9 828 000		7.5 − 2	1.2+12	D	96°, 108, 165*, 170
11.519	$1s^22p^2\ ^3P_2$	$1s^22p3d\ ^3P^o_2$	1 071 700	9 753 000		1.15	1.16+13	C−	96°, 97, 130, 134, 165*, 170
11.459	1	2	1 027 200	9 753 000		1.9 − 1	1.9+12	D	96°, 134, 165*, 170
11.493	$1s^22p^2\ ^3P_1$	$1s^22p3d\ (5)^o_2$	1 027 200	9 728 000					96°, 108, 109, 130, 134, 170, 205

Fe XXIII – Continued

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
11.49^C	$1s^22s2p\ ^1P^o_1$	$1s^22p3p\ ^3D_1$	752 410	9 455 000		8.7 – 2	1.5+12	D	165*
11.46^C	$1s^22s2p\ ^3P^o_2$	$1s^22s3d\ ^3D_1$	471 780	9 199 000		3.6 – 2	6.1+11	D	165*
11.45^C	2	2	471 780	9 209 000		5.5 – 1	5.6+12	C–	165*
11.442	2	3	471 780	9 212 000		3.0	2.2+13	C–	96°, 106, 108, 110, 130, 134, 165*, 170
11.34^C	1	1	379 125	9 199 000		5.4 – 1	9.3+12	C–	165*
11.325	1	2	379 125	9 209 000		1.7	1.7+13	C–	96°, 107, 109, 130, 134, 165*, 169, 206
11.298	0	1	348 180	9 199 000		7.4 – 1	1.3+13	C–	96°, 97, 130, 134, 165*, 170, 206
11.398^C	$1s^22s2p\ ^1P^o_1$	$1s^22p3p\ ^1P_1$	752 410	9 526 000		9.9 – 2	1.7+12	D	165*
11.25^C	$1s^22s2p\ ^1P^o_1$	$1s^22p3p\ ^3P_2$	752 410	9 644 000		2.0 – 1	2.1+12	D	165*
11.166	$1s^22s2p\ ^1P^o_1$	$1s^22p3p\ ^1D_2$	752 410	9 709 000		6.3 – 1	6.7+12	C–	96°, 130, 165*, 170, 206
11.05^C	$1s^22s2p\ ^3P^o_2$	$1s^22p3p\ ^3D_2$	471 780	9 524 000		1.7 – 2	1.9+11	D	165*
11.018^C	1	1	379 125	9 455 000		1.5 – 1	2.7+12	D	165*
10.981^C	0	1	348 180	9 455 000		8.4 – 2	1.5+12	D	165*, 206
10.935	1	2	379 125	9 524 000		4.8 – 1	5.4+12	C–	96°, 130, 134, 165*, 170, 206
10.927	2	3	471 780	9 624 000		7.5 – 1	6.0+12	C–	96°, 107, 109, 130, 134, 165*, 170, 206
11.018	$1s^22s^2\ ^1S_0$	$1s^22s3p\ ^3P^o_1$	0	9 076 000		2.7 – 1	4.9+12	C–	96°, 112, 130, 134, 165*, 170
10.980	$1s^22s^2\ ^1S_0$	$1s^22s3p\ ^1P^o_1$	0	9 107 000		4.3 – 1	7.9+12	C–	94, 96°, 106, 108, 110, 112, 130, 134, 165*, 170, 206
10.903	$1s^22s2p\ ^3P^o_2$	$1s^22p3p\ ^3P_2$	471 780	9 644 000		4.7 – 1	5.3+12	C–	96°, 130, 134, 165*, 170, 206
10.79^C	1	2	379 125	9 644 000		1.9 – 2	2.2+11	D	165*
8.906	$1s^22s2p\ ^1P^o_1$	$1s^22s4s\ ^1S_0$	752 410	11 981 000		1.1 – 2	9.3+11	D	125°, 165*
8.815	$1s^22s2p\ ^1P^o_1$	$1s^22s4d\ ^1D_2$	752 410	12 098 000		3.6 – 1	6.2+12	C–	96△, 97, 125°, 130, 134, 165*
8.763	$1s^22p^2\ ^3P_2$	$1s^22p4d\ ^3F^o_3$	1 071 700	12 484 000		3.7 – 1	4.6+12	D	96°, 130, 134, 191*
8.752	$1s^22p^2\ ^1D_2$	$1s^22p4d\ ^1F^o_3$	1 204 200	12 631 000		9.5 – 1	1.2+13	D	96°, 130, 134, 191*
8.731	$1s^22p^2\ ^3P_1$	$1s^22p4d\ (2)^o_2$	1 027 200	12 480 000					96°, 130, 134
8.672	$1s^22p^2\ ^3P_0$	$1s^22p4d\ ^3D^o_1$	956 100	12 488 000		2.3 – 1	6.8+12	D	96°, 130, 191*
8.672	2	3	1 071 700	12 603 000		4.8 – 1	6.1+12	D	96°, 130, 134, 191*
8.664	$1s^22p^2\ ^3P_2$	$1s^22p4d\ ^3P^o_2$	1 071 700	12 614 000					96°, 130
8.630	1	1	1 027 200	12 615 000		1.5 – 1	4.4+12	D	96°, 130, 165*
8.643	$1s^22p^2\ ^3P_1$	$1s^22p4d\ ^1D^o_2$	1 027 200	12 597 000					96°, 97, 130, 134
8.618^C	$1s^22s2p\ ^3P^o_2$	$1s^22s4d\ ^3D_2$	471 780	12 075 000		1.1 – 1	1.9+12	D	165*
8.616	2	3	471 780	12 081 000		6.0 – 1	7.7+12	C–	96△, 97, 125°, 130, 134, 165*
8.551^C	1	1	379 125	12 073 000		1.1 – 1	3.2+12	D	165*
8.550	1	2	379 125	12 075 000		3.3 – 1	6.0+12	C–	96△, 97, 125°, 130, 134, 165*
8.529	0	1	348 180	12 073 000		1.4 – 1	4.3+12	D	96°, 97, 130, 134, 165*
8.554^C	$1s^22s2p\ ^1P^o_1$	$1s^22p4p\ ^3D_2$	752 410	12 443 000		2.6 – 2	4.7+11	D	165*
8.317	$1s^22s^2\ ^1S_0$	$1s^22s4p\ ^3P^o_1$	0	12 024 000		3.9 – 2	1.3+12	D	125°, 134, 165*
8.305	$1s^22s^2\ ^1S_0$	$1s^22s4p\ ^1P^o_1$	0	12 044 000		1.5 – 1	4.8+12	D	96△, 97, 112, 122, 125°, 130, 134, 140, 165*, 180
8.289	$1s^22s2p\ ^3P^o_1$	$1s^22p4p\ ^3D_2$	379 125	12 443 000		1.3 – 1	2.6+12	D	134°, 165*
8.273	2	3	471 780	12 560 000		2.1 – 1	2.9+12	C–	96°, 130, 134, 165*
7.883	$1s^22s2p\ ^1P^o_1$	$1s^22s5d\ ^1D_2$	752 410	13 438 000		1.3 – 1	2.8+12	D	96°, 130, 191*
7.854	$1s^22p^2\ ^3P_2$	$1s^22p5d\ ^3F^o_3$	1 071 700	13 804 000		1.5 – 1	2.3+12	D	96°, 130, 191*
7.849	$1s^22p^2\ ^1D_2$	$1s^22p5d\ ^1F^o_3$	1 204 200	13 945 000		3.2 – 1	4.9+12	D	96°, 130, 191*
7.826	$1s^22p^2\ ^3P_1$	$1s^22p5d\ ^3D^o_2$	1 027 200	13 805 000		1.2 – 1	2.6+12	D	96°, 130, 191*
7.778	2	3	1 071 700	13 929 000		1.6 – 1	2.5+12	D	96°, 130, 191*

Fe XXIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
7.755	$1s^2 2p^2\ ^3P_1$	$1s^2 2p5d\ ^1D^o_2$	1 027 200	13 922 000					96°, 130
7.733	$1s^2 2s2p\ ^3P^o_2$	$1s^2 2s5d\ ^3D_3$	471 780	13 404 000		1.9 – 1	3.0+12	D	96°, 130, 191*
7.680	0	1	348 180	13 369 000		4.7 – 2	1.8+12	D	96°, 130, 191*
7.680	1	2	379 125	13 400 000		1.1 – 1	2.5+12	D	96°, 130, 191*
7.472	$1s^2 2s^2\ ^1S_0$	$1s^2 2s5p\ ^1P^o_1$	0	13 383 000		6.3 – 2	2.5+12	D	96°, 130, 191*
7.445	$1s^2 2s2p\ ^3P^o_2$	$1s^2 2p5p\ ^3D_3$	471 780	13 904 000		9.0 – 2	1.5+12	D	96°, 130, 191*
1.88706	$1s^2 2s2p\ ^3P^o_2$	$1s(^2S)2s2p^2(^4P)\ ^5P_3$	471 780	53 464 000					98
1.87973	$1s^2 2s^2\ ^1S_0$	$1s2s^2 2p\ ^3P^o_1$	0	53 199 100					98
1.87814	$1s^2 2s2p\ ^1P^o_1$	$1s(^2S)2s2p^2(^2D)\ ^1D_2$	752 410	53 996 600					98°, 135
1.87568	$1s^2 2s2p\ ^3P^o_2$	$1s(^2S)2s2p^2(^2D)\ ^3D_3$	471 780	53 786 000					98°, 142
1.8752	2	1	471 780	53 800 000					135
1.87363	1	2	379 125	53 751 000					98°, 142
1.87242	1	1	379 125	53 800 000					98°, 142
1.8752	$1s^2 2s2p\ ^3P^o_1$	$1s(^2S)2s2p^2(^4P)\ ^3P_0$	379 125	53 707 000					135
1.8714	$1s^2 2s2p\ ^1P^o_1$	$1s(^2S)2s2p^2(^2P)\ ^1P_1$	752 410	54 182 000					135
1.8708	$1s^2 2s2p\ ^3P^o_2$	$1s(^2S)2s2p^2(^2S)\ ^3S_1$	471 780	53 925 000					135
1.87051	$1s^2 2s^2\ ^1S_0$	$1s2s^2 2p\ ^1P^o_1$	0	53 464 000					98°, 122, 141, 142
1.8692	$1s^2 2s2p\ ^1P^o_1$	$1s(^2S)2s2p^2(^2S)\ ^1S_0$	752 410	54 252 000					135
1.8588	$1s^2 2s2p\ ^3P^o_1$	$1s(^2S)2s2p^2(^2P)\ ^1P_1$	379 125	54 182 000					135

Fe XXIV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
776.554[C]	$1s^22p\ ^2P^o_{1/2}$	$1s^22p\ ^2P^o_{3/2}$	391 983	520 757		M1	1.91+4	B	165*
255.113	$1s^22s\ ^2S_{1/2}$	$1s^22p\ ^2P^o_{1/2}$	0	391 983		3.54 − 2	1.81+9	B+	114,132,136,137,138, 139°, 165*, 209
192.028	1/2	3/2	0	520 757		9.56 − 2	4.32+9	B+	114,132,136,137,138, 139°, 165*, 209
69.657[C]	$1s^24p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	12 524 900	13 960 500		2.3 − 1	8.0+10	D	165*
69.425[C]	3/2	5/2	12 524 900	13 965 300		2.09	4.83+11	C+	165*
68.890[C]	1/2	3/2	12 508 900	13 960 500		1.18	4.19+11	C+	165*
45.245[C]	$1s^24p\ ^2P^o_{3/2}$	$1s^26d\ ^2D_{3/2}$	12 524 900	14 735 100		5.6 − 2	4.6+10	D	165*
45.155[C]	3/2	5/2	12 524 900	14 739 500		5.08 − 1	2.76+11	C+	165*
44.920[C]	1/2	3/2	12 508 900	14 735 100		2.84 − 1	2.37+11	C+	165*
37.262[C]	$1s^24p\ ^2P^o_{3/2}$	$1s^27d\ ^2D_{5/2}$	12 524 900	15 208 600		2.22 − 1	1.77+11	C+	165*
37.249[C]	3/2	3/2	12 524 900	15 209 500		2.4 − 2	2.9+10	D	165*
37.029[C]	1/2	3/2	12 508 900	15 209 500		1.24 − 1	1.51+11	C+	165*
32.816[C]	$1s^23p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	9 417 100	12 464 400					
32.402[C]	1/2	1/2	9 378 200	12 464 400					
32.478	$1s^23d\ ^2D_{5/2}$	$1s^24f\ ^2F^o_{7/2}$	9 472 600	12 551 600					139
32.377	3/2	5/2	9 459 000	12 547 600					139
32.00	$1s^23p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	9 417 100	12 539 200		2.4 − 1	3.9+11	C+	139°, 165*
31.968	3/2	5/2	9 417 100	12 545 200		2.2	2.4+12	B	139°, 165*
31.637	1/2	3/2	9 378 200	12 539 200		1.3	2.1+12	B	139°, 165*
30.895	$1s^23s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	9 272 500	12 508 900		3.0 − 1	1.0+12	C	139°, 165*
30.743	1/2	3/2	9 272 500	12 524 900		6.0 − 1	1.1+12	C	139°, 165*
22.181[C]	$1s^23p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	9 417 100	[13 925 450]					
21.991[C]	1/2	1/2	9 378 200	[13 925 450]					
22.010[C]	$1s^23p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	9 417 100	13 960 500		5.6 − 2	1.9+11	D	165*
21.987[C]	3/2	5/2	9 417 100	13 965 300		4.96 − 1	1.14+12	C+	165*
21.823[C]	1/2	3/2	9 378 200	13 960 500		2.78 − 1	9.73+11	C+	165*
18.804[C]	$1s^23p\ ^2P^o_{3/2}$	$1s^26d\ ^2D_{3/2}$	9 417 100	14 735 100		2.3 − 2	1.1+11	D	165*
18.789[C]	3/2	5/2	9 417 100	14 739 500		2.00 − 1	6.30+11	C+	165*
18.668[C]	1/2	3/2	9 378 200	14 735 100		1.12 − 1	5.32+11	C+	165*
17.267[C]	$1s^23p\ ^2P^o_{3/2}$	$1s^27d\ ^2D_{5/2}$	9 417 100	15 208 600		1.04 − 1	3.84+11	C+	165*
17.264[C]	3/2	3/2	9 417 100	15 209 500		1.2 − 2	6.4+10	D	165*
17.149[C]	1/2	3/2	9 378 200	15 209 500		5.80 − 2	3.31+11	C+	165*
11.426	$1s^22p\ ^2P^o_{3/2}$	$1s^23s\ ^2S_{1/2}$	520 757	9 272 500		7.04 − 2	1.80+12	C	96, 112, 134, 139°, 165*
11.261	1/2	1/2	391 983	9 272 500		3.0 − 2	7.9+11	D	96, 112, 134, 139°, 165*
11.187	$1s^22p\ ^2P^o_{3/2}$	$1s^23d\ ^2D_{3/2}$	520 757	9 459 000		2.7 − 1	3.6+12	B	96, 134, 139°, 165*, 206
11.171	3/2	5/2	520 757	9 472 600		2.44	2.18+13	B	94,96,97,106,110,112, 134, 139°, 165*, 206
11.030	1/2	3/2	391 983	9 459 000		1.34	1.84+13	B	96,97,106,110,112,134, 139°, 165*, 206
10.663	$1s^22s\ ^2S_{1/2}$	$1s^23p\ ^2P^o_{1/2}$	0	9 378 200		2.56 − 1	7.51+12	B+	96,97,106,110,112,134, 139°, 165*, 206
10.619	1/2	3/2	0	9 417 100		4.92 − 1	7.28+12	B+	96,97,106,110,112,134, 139°, 165*, 206
8.3757	$1s^22p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	520 757	12 464 400		1.4 − 2	6.9+11	D	96, 134, 139°, 140, 165*, 179
8.2854	1/2	1/2	391 983	12 464 400		7.4 − 3	3.6+11	D	96, 97, 139°, 140, 165*, 179
8.3205[C]	$1s^22p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	520 757	12 539 200		4.88 − 2	1.18+12	C	125, 165*
8.3160	3/2	5/2	520 757	12 545 200		4.40 − 1	7.07+12	C+	96,97,110,112,122,125, 134, 139°, 140, 165*, 179
8.232	1/2	3/2	391 983	12 539 200		2.48 − 1	6.10+12	C+	96, 97, 125, 134, 139°, 165*, 179

Fe XXIV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
7.996	$1s^22s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	0	12 508 900		6.6 – 2	3.4+12	C+	96, 110, 125, 134, 139°, 165*
7.986	1/2	3/2	0	12 524 900		1.31 – 1	3.43+12	C+	96, 97, 110, 125, 134, 139°, 165*
7.4601^C	$1s^22p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	520 757	[13 925 450]					144
7.3891^C	1/2	1/2	391 983	[13 925 450]					144
7.438	$1s^22p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	520 757	13 960 500		1.8 – 2	5.4+11	D	96, 139°, 165*
7.438	3/2	5/2	520 757	13 965 300		1.62 – 1	3.26+12	C	96, 97, 110, 139°, 165*
7.370	1/2	3/2	391 983	13 960 500		9.2 – 2	2.8+12	C	96, 97, 110, 139°, 165*
7.169	$1s^22s\ ^2S_{1/2}$	$1s^25p\ ^2P^o_{1/2}$	0	13 943 400					96, 139°
7.169	1/2	3/2	0	13 951 600					96, 139°
7.033	$1s^22p\ ^2P^o_{3/2}$	$1s^26d\ ^2D_{3/2}$	520 757	14 735 100		8.8 – 3	2.9+11	D	139°, 165*
7.033	3/2	5/2	520 757	14 739 500		7.92 – 2	1.78+12	C+	96, 139°, 165*
6.972	1/2	3/2	391 983	14 735 100		4.44 – 2	1.52+12	C+	96, 110, 139°, 165*
6.808	$1s^22p\ ^2P^o_{3/2}$	$1s^27d\ ^2D_{5/2}$	520 757	15 208 600		4.52 – 2	1.08+12	C+	96, 139°, 165*
6.808	3/2	3/2	520 757	15 209 500		4.8 – 3	1.8+11	D	96, 139°, 165*
6.74877^C	1/2	3/2	391 983	15 209 500		2.54 – 2	9.28+11	C+	165*
6.787	$1s^22s\ ^2S_{1/2}$	$1s^26p\ ^2P^o_{1/2}$	0	14 730 900					96, 139°
6.787	1/2	3/2	0	14 735 600					96, 139°
1.89692	$1s^22p\ ^2P^o_{3/2}$	$1s2s^2\ ^2S_{1/2}$	520 757	53 235 800		1.0 – 2	9.8+12	D+	98°, 165*
1.89244	1/2	1/2	391 983	53 235 800		1.0 – 2	9.7+12	D+	98°, 165*
1.8767^C	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^4P_{1/2}$	520 757	[53 805 000]		2.6 – 4	2.5+11	E	135, 144, 165*
1.8743^C	3/2	3/2	520 757	[53 872 000]		1.8 – 2	8.3+12	D	135, 144, 165*
1.8727^C	3/2	5/2	520 757	[53 918 000]		1.0 – 1	3.2+13	D	135, 144, 165*
1.8722^C	1/2	1/2	391 983	[53 805 000]		2.2 – 2	2.0+13	D	135, 144, 165*
1.8699^C	1/2	3/2	391 983	[53 872 000]		2.0 – 4	1.0+11	E	135, 144, 165*
1.87466	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^4P^o_{1/2}$	0	53 343 000		4.4 – 3	4.2+12	D+	142°, 165*
1.8738^C	1/2	3/2	0	[53 367 000]		3.2 – 2	1.5+13	D+	135, 144, 165*
1.86776^C	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1D)\ ^2D_{3/2}$	520 757	54 060 800		7.2 – 2	3.5+13	D	135, 144, 165*
1.86598	3/2	5/2	520 757	54 111 900		6.68 – 1	2.14+14	C	98°, 122, 135, 141, 142, 143, 165*
1.86328	1/2	3/2	391 983	54 060 800		6.58 – 1	3.16+14	C	98°, 122, 135, 142, 143, 165*
1.8672^C	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^2P_{1/2}$	520 757	[54 076 000]		1.70 – 1	1.63+14	C	135, 144, 165*
1.8628^C	1/2	1/2	391 983	[54 076 000]		5.70 – 1	5.47+14	C	144, 165*
1.86224	3/2	3/2	520 757	54 219 500		1.30	6.24+14	C	98°, 135, 142, 143, 165*
1.85779^C	1/2	3/2	391 983	54 219 500		2.4 – 2	1.2+13	D	141, 144, 165*
1.86345	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^2P^o_{1/2}$	0	53 663 900		1.99 – 1	1.91+14	C	122, 135, 141, 142°, 143, 165*
1.86108	1/2	3/2	0	53 732 200		9.2 – 3	4.4+12	D	98°, 122, 135, 141, 142, 143, 165*
1.8580	$1s^23d\ ^2D_{3/2}$	$1s2p(^3P^o)3d(^2D)\ ^4D^o_{3/2}$	9 459 000	63 281 000					135
1.85704	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^1P^o)\ ^2P^o_{1/2}$	0	53 849 100		3.16 – 1	3.06+14	C	98°, 122, 135, 141, 142, 143, 165*
1.8563^C	1/2	3/2	0	[53 871 000]		9.94 – 1	4.82+14	C	135, 144, 165*
1.85691	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1S)\ ^2S_{1/2}$	520 757	54 373 600		2.56 – 1	2.43+14	C	135, 142°, 165*
1.85248^C	1/2	1/2	391 983	54 373 600		1.0 – 2	1.0+13	D	135, 141, 144, 165*
1.85592	$1s^23d\ ^2D_{5/2}$	$1s2p3d\ ^2F^o_{7/2}$	9 472 600	63 350 600					135, 142°
1.8540	$1s^23s\ ^2S_{1/2}$	$1s2p3s\ ^2P^o_{3/2}$	9 272 500	63 209 000					135
1.85349	$1s^23p\ ^2P^o_{3/2}$	$1s2p3p\ ^2D_{5/2}$	9 417 100	63 368 100					135, 142°, 168
1.85273	1/2	3/2	9 378 200	63 352 000					142
1.8464	$1s^23p\ ^2P^o_{3/2}$	$1s2p3p\ ^2S_{1/2}$	9 417 100	63 572 000					135
1.8453	1/2	1/2	9 378 200	63 572 000					135

Fe XXV

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
6900^C	$1s4p\ ^3P^o_2$	$1s4d\ ^3D_2$	[66 890 900]	[66 905 400]					
4950^C	2	3	[66 890 900]	[66 911 100]					
3390^C	1	2	[66 875 900]	[66 905 400]					
3350^C	1	1	[66 875 900]	[66 905 700]					
3140^C	0	1	[66 873 900]	[66 905 700]					
6800^C	$1s5s\ ^3S_1$	$1s5p\ ^3P^o_1$	[68 423 800]	[68 438 600]		8.7 − 2	4.2+6	E	165*
4440^C	1	2	[68 423 800]	[68 446 300]					
6000^C	$1s5s\ ^1S_0$	$1s5p\ ^1P^o_1$	[68 438 100]	[68 454 800]		9.9 − 2	6.1+6	E	165*
3450^C	$1s4s\ ^3S_1$	$1s4p\ ^3P^o_1$	[66 846 900]	[66 875 900]		6.9 − 2	1.3+7	E	165*
2270^C	1	2	[66 846 900]	[66 890 900]					
3070^C	$1s4s\ ^1S_0$	$1s4p\ ^1P^o_1$	[66 875 000]	[66 907 600]		7.8 − 2	1.9+7	D	165*
1450^C	$1s3s\ ^3S_1$	$1s3p\ ^3P^o_1$	[63 421 700]	[63 490 700]		4.8 − 2	5.1+7	C	165*
1300^C	$1s3s\ ^1S_0$	$1s3p\ ^1P^o_1$	[63 489 000]	[63 565 800]		5.6 − 2	7.4+7	C	165*
428.23^C	$1s2s\ ^3S_1$	$1s2p\ ^3P^o_0$	[53 527 760]	[53 761 280]		1.04 − 2	3.82+8	B	165*
400.30^C	1	1	[53 527 760]	[53 777 570]		3.09 − 2	4.31+8	B	165*
271.12^C	1	2	[53 527 760]	[53 896 600]		8.19 − 2	1.47+9	B	156, 165*
382.76^C	$1s2s\ ^1S_0$	$1s2p\ ^1P^o_1$	[53 781 230]	[54 042 490]		3.29 − 2	4.96+8	B	165*
194.28^C	$1s2s\ ^3S_1$	$1s2p\ ^1P^o_1$	[53 527 760]	[54 042 490]		5.91 − 3	3.46+8	B	165*
65.34^C	$1s4p\ ^1P^o_1$	$1s5s\ ^1S_0$	[66 907 600]	[68 438 100]		1.7 − 1	2.6+11	B	165*
65.24^C	$1s4p\ ^3P^o_2$	$1s5s\ ^3S_1$	[66 890 900]	[68 423 800]					
64.60^C	1	1	[66 875 900]	[68 423 800]		1.6 − 1	8.5+10	B	165*
63.30^C	$1s4s\ ^1S_0$	$1s5p\ ^1P^o_1$	[66 875 000]	[68 454 800]		4.46 − 1	2.48+11	B	165*
62.83^C	$1s4s\ ^3S_1$	$1s5p\ ^3P^o_1$	[66 846 900]	[68 438 600]		4.50 − 1	2.53+11	B	165*
30.219^C	$1s3p\ ^1P^o_1$	$1s4s\ ^1S_0$	[63 565 800]	[66 875 000]		1.0 − 1	7.4+11	B	165*
30.188^C	$1s3d\ ^3D_1$	$1s4p\ ^3P^o_0$	[63 561 300]	[66 873 900]					
30.170^C	1	1	[63 561 300]	[66 875 900]					
30.164^C	2	1	[63 560 700]	[66 875 900]					
30.150^C	3	2	[63 574 200]	[66 890 900]					
30.028^C	2	2	[63 560 700]	[66 890 900]					
30.115^C	$1s3p\ ^3P^o_2$	$1s4s\ ^3S_1$	[63 526 300]	[66 846 900]					
29.796^C	1	1	[63 490 700]	[66 846 900]		9.9 − 2	2.5+11	B	165*
30.020^C	$1s3d\ ^1D_2$	$1s4p\ ^1P^o_1$	[63 576 500]	[66 907 600]		5.5 − 2	1.4+11	C	165*
29.884^C	$1s3p\ ^1P^o_1$	$1s4d\ ^1D_2$	[63 565 800]	[66 912 100]		1.9	2.8+12	C	165*
29.594^C	$1s3p\ ^3P^o_2$	$1s4d\ ^3D_2$	[63 526 300]	[66 905 400]					
29.544^C	2	3	[63 526 300]	[66 911 100]					
29.285^C	1	2	[63 490 700]	[66 905 400]					
29.283^C	1	1	[63 490 700]	[66 905 700]					
29.243^C	0	1	[63 486 100]	[66 905 700]					
29.252^C	$1s3s\ ^1S_0$	$1s4p\ ^1P^o_1$	[63 489 000]	[66 907 600]		4.00 − 1	1.04+12	B	165*
28.950^C	$1s3s\ ^3S_1$	$1s4p\ ^3P^o_1$	[63 421 700]	[66 875 900]		4.05 − 1	1.07+12	B	165*
28.825^C	1	2	[63 421 700]	[66 890 900]					
20.524^C	$1s3p\ ^1P^o_1$	$1s5s\ ^1S_0$	[63 565 800]	[68 438 100]		2.3 − 2	3.7+11	C	165*
20.419^C	$1s3p\ ^3P^o_2$	$1s5s\ ^3S_1$	[63 526 300]	[68 423 800]					
20.271^C	1	1	[63 490 700]	[68 423 800]		2.2 − 2	1.2+11	C	165*
20.138^C	$1s3s\ ^1S_0$	$1s5p\ ^1P^o_1$	[63 489 000]	[68 454 800]		1.03 − 1	5.65+11	B	165*
19.933^C	$1s3s\ ^3S_1$	$1s5p\ ^3P^o_1$	[63 421 700]	[68 438 600]		1.0 − 1	5.7+11	B	165*
19.902^C	1	2	[63 421 700]	[68 446 300]					
10.586^C	$1s2p\ ^1P^o_1$	$1s3s\ ^1S_0$	[54 042 490]	[63 489 000]		4.2 − 2	2.5+12	B	165*

Fe XXV – Continued

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
10.499^{C}	$1s2p\ ^3P^o_2$	$1s3s\ ^3S_1$	[53 896 600]	[63 421 700]					
10.369^{C}	1	1	[53 777 570]	[63 421 700]		4.2 – 2	8.7+11	B	165*
10.489^{C}	$1s2p\ ^1P^o_1$	$1s3d\ ^1D_2$	[54 042 490]	[63 576 500]		2.1	2.5+13	C+	97, 165*
10.348^{C}	$1s2p\ ^3P^o_2$	$1s3d\ ^3D_2$	[53 896 600]	[63 560 700]					
10.333^{C}	2	3	[53 896 600]	[63 574 200]					
10.222^{C}	1	2	[53 777 570]	[63 560 700]					
10.221^{C}	1	1	[53 777 570]	[63 561 300]					
10.204^{C}	0	1	[53 761 280]	[63 561 300]					
10.220^{C}	$1s2s\ ^1S_0$	$1s3p\ ^1P^o_1$	[53 781 230]	[63 565 800]		3.64 – 1	7.75+12	B	165*
10.037^{C}	$1s2s\ ^3S_1$	$1s3p\ ^3P^o_1$	[53 527 760]	[63 490 700]		3.66 – 1	8.08+12	B	165*
7.7927^{C}	$1s2p\ ^1P^o_1$	$1s4s\ ^1S_0$	[54 042 490]	[66 875 000]		9.3 – 3	1.0+12	C	165*
7.7702^{C}	$1s2p\ ^1P^o_1$	$1s4d\ ^1D_2$	[54 042 490]	[66 912 100]		3.6 – 1	8.0+12	C	97, 165*
7.7218^{C}	$1s2p\ ^3P^o_2$	$1s4s\ ^3S_1$	[53 896 600]	[66 846 900]					
7.6515^{C}	1	1	[53 777 570]	[66 846 900]		9.3 – 3	3.5+11	C	165*
7.6871^{C}	$1s2p\ ^3P^o_2$	$1s4d\ ^3D_2$	[53 896 600]	[66 905 400]					
7.6837^{C}	2	3	[53 896 600]	[66 911 100]					
7.6174^{C}	1	2	[53 777 570]	[66 905 400]					
7.6172^{C}	1	1	[53 777 570]	[66 905 700]					
7.6078^{C}	0	1	[53 761 280]	[66 905 700]					
7.6183^{C}	$1s2s\ ^1S_0$	$1s4p\ ^1P^o_1$	[53 781 230]	[66 907 600]		8.8 – 2	3.4+12	B	165*
7.4917^{C}	$1s2s\ ^3S_1$	$1s4p\ ^3P^o_1$	[53 527 760]	[66 875 900]		9.0 – 2	3.6+12	B	165*
7.4833^{C}	1	2	[53 527 760]	[66 890 900]					
6.9466^{C}	$1s2p\ ^1P^o_1$	$1s5s\ ^1S_0$	[54 042 490]	[68 438 100]		3.6 – 3	5.0+11	C	165*
6.8836^{C}	$1s2p\ ^3P^o_2$	$1s5s\ ^3S_1$	[53 896 600]	[68 423 800]					
6.8277^{C}	1	1	[53 777 570]	[68 423 800]		3.6 – 3	1.7+11	C	165*
6.8150^{C}	$1s2s\ ^1S_0$	$1s5p\ ^1P^o_1$	[53 781 230]	[68 454 800]		3.6 – 2	1.7+12	B	165*
6.7065^{C}	$1s2s\ ^3S_1$	$1s5p\ ^3P^o_1$	[53 527 760]	[68 438 600]		3.6 – 2	1.8+12	B	165*
6.7031^{C}	1	2	[53 527 760]	[68 446 300]					
1.868190^{C}	$1s^2\ ^1S_0$	$1s2s\ ^3S_1$	0	[53 527 760]		M1	2.12+8	B	98,122,141,142,147, 154, 165*, 202, 207
1.859511^{C}	$1s^2\ ^1S_0$	$1s2p\ ^3P^o_1$	0	[53 777 570]		6.87 – 2	4.42+13	B	98,121,122,135,141, 142,147,153,154, 165*, 202, 207
1.855405^{C}	0	2	0	[53 896 600]		M2	6.64+9	B	98,122,141,142, 147, 154, 165*, 207
1.850396^{C}	$1s^2\ ^1S_0$	$1s2p\ ^1P^o_1$	0	[54 042 490]		7.03 – 1	4.57+14	B	98,121,122,135, 141,142,147,149, 150,152,153,154, 165*, 202, 207
1.8110^{C}	$1s2p\ ^1P^o_1$	$2s^2\ ^1S_0$	[54 042 490]	[109 258 000]		2.9 – 2	5.9+13	D	144, 165*
1.8025^{C}	$1s2p\ ^3P^o_1$	$2s^2\ ^1S_0$	[53 777 570]	[109 258 000]		2.0 – 2	4.1+13	D	144, 165*
1.8015^{C}	$1s2p\ ^1P^o_1$	$2p^2\ ^3P_0$	[54 042 490]	[109 551 000]					144
1.7989^{C}	1	1	[54 042 490]	[109 631 000]		1.4 – 2	1.0+13	D	144, 165*
1.7972^{C}	1	2	[54 042 490]	[109 683 000]		2.1 – 1	8.8+13	D	144, 165*
1.8002^{C}	$1s2s\ ^1S_0$	$2s2p\ ^3P^o_1$	[53 781 230]	[109 329 000]		1.3 – 2	8.6+12	D	144, 165*
1.7942^{C}	$1s2p\ ^3P^o_2$	$2p^2\ ^3P_1$	[53 896 600]	[109 631 000]		3.2 – 1	2.22+14	C	144, 165*
1.7930^{C}	1	0	[53 777 570]	[109 551 000]		2.4 – 1	4.92+14	C	144, 165*
1.7925^{C}	2	2	[53 896 600]	[109 683 000]		6.75 – 1	2.81+14	C	144, 165*
1.7904^{C}	1	1	[53 777 570]	[109 631 000]		1.8 – 1	1.23+14	C	144, 165*
1.7899^{C}	0	1	[53 761 280]	[109 631 000]		2.56 – 1	1.78+14	C	144, 165*
1.7888^{C}	1	2	[53 777 570]	[109 683 000]		3.90 – 1	1.63+14	C	144, 165*

Fe XXV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1.7933[C]	$1s2s\ ^3S_1$	$2s2p\ ^3P^o_0$	[53 527 760]	[109 291 000]		1.29 – 1	2.67+14	C	144, 165*
1.7921[C]	1	1	[53 527 760]	[109 329 000]		3.75 – 1	2.59+14	C	144, 165*
1.7881[C]	1	2	[53 527 760]	[109 453 000]		6.42 – 1	2.68+14	C	144, 155, 165*
1.7920[C]	$1s2p\ ^1P^o_1$	$2p^2\ ^1D_2$	[54 042 490]	[109 846 000]		9.87 – 1	4.10+14	C	144, 155, 165*
1.7873[C]	$1s2p\ ^3P^o_2$	$2p^2\ ^1D_2$	[53 896 600]	[109 846 000]		2.9 – 1	1.19+14	C	144, 165*
1.7836[C]	1	2	[53 777 570]	[109 846 000]					144
1.7871[C]	$1s2s\ ^1S_0$	$2s2p\ ^1P^o_1$	[53 781 230]	[109 737 000]		3.69 – 1	2.57+14	C	144, 155, 165*
1.7830[C]	$1s2p\ ^1P^o_1$	$2p^2\ ^1S_0$	[54 042 490]	[110 126 000]		2.2 – 1	4.69+14	C	144, 165*
1.7791[C]	$1s2s\ ^3S_1$	$2s2p\ ^1P^o_1$	[53 527 760]	[109 737 000]		1.2 – 2	8.7+12	D	144, 165*
1.7747[C]	$1s2p\ ^3P^o_1$	$2p^2\ ^1S_0$	[53 777 570]	[110 126 000]					144
1.57503[C]	$1s^2\ ^1S_0$	$1s3p\ ^3P^o_1$	0	[63 490 700]		1.7 – 2	1.5+13	E	145, 151, 153, 165*
1.57317[C]	$1s^2\ ^1S_0$	$1s3p\ ^1P^o_1$	0	[63 565 800]		1.38 – 1	1.24+14	B	145,151,152,153, 165*, 202
1.49531[C]	$1s^2\ ^1S_0$	$1s4p\ ^3P^o_1$	0	[66 875 900]		6.0 – 3	6.0+12	E	151, 153, 165*
1.49460[C]	$1s^2\ ^1S_0$	$1s4p\ ^1P^o_1$	0	[66 907 600]		5.07 – 2	5.05+13	B	151, 152, 153, 165*, 202
1.46116[C]	$1s^2\ ^1S_0$	$1s5p\ ^3P^o_1$	0	[68 438 600]		3.0 – 3	3.1+12	E	153, 165*
1.46082[C]	$1s^2\ ^1S_0$	$1s5p\ ^1P^o_1$	0	[68 454 800]		2.44 – 2	2.54+13	B	150, 152, 153, 165*

Fe XXVI

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2027^{C}	$3s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[66 513 060]	[66 562 370]		4.80 − 2	1.94+7	A	164*
1975.1^{C}	$3p\ ^2P^o_{1/2}$	$3d\ ^2D_{3/2}$	[66 511 640]	[66 562 270]		3.08 − 2	1.31+7	A	164*
600.42^{C}	$2s\ ^2S_{1/2}$	$2p\ ^2P^o_{3/2}$	[56 075 900]	[56 242 450]		2.70 − 2	1.25+8	A	164*
27.6879^{C}	$3d\ ^2D_{5/2}$	$4f\ ^2F^o_{7/2}$	[66 578 900]	[70 190 590]		5.82	6.33+12	A	164*
27.5883^{C}	$3p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[66 562 370]	[70 187 100]		2.24	3.27+12	A	164*
27.2698^{C}	$3s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[66 513 060]	[70 180 120]		6.58 − 1	1.47+12	A	164*
18.9349^{C}	$3d\ ^2D_{5/2}$	$5f\ ^2F^o_{7/2}$	[66 578 900]	[71 860 150]		8.96 − 1	2.08+12	A	164*
18.8822^{C}	$3p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[66 562 370]	[71 858 360]		5.04 − 1	1.57+12	A	164*
18.7205^{C}	$3s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[66 513 060]	[71 854 790]		1.63 − 1	7.77+11	A	164*
9.674501^{C}	$2p\ ^2P^o_{3/2}$	$3d\ ^2D_{5/2}$	[56 242 450]	[66 578 900]		2.51	2.98+13	A	164*
9.536097^{C}	$2s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[56 075 900]	[66 562 370]		5.90 − 1	1.08+13	A	164*
7.171209^{C}	$2p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[56 242 450]	[70 187 100]		4.40 − 1	9.50+12	A	164*
7.090077^{C}	$2s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[56 075 900]	[70 180 120]		1.39 − 1	4.61+12	A	164*
6.403725^{C}	$2p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[56 242 450]	[71 858 360]		1.60 − 1	4.34+12	A	164*
6.337581^{C}	$2s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[56 075 900]	[71 854 790]		5.66 − 2	2.35+12	A	164*
1.783442^{C}	$1s\ ^2S_{1/2}$	$2p\ ^2P^o_{1/2}$	0	[56 071 350]		2.80 − 1	2.93+14	A	149, 152, 154, 155, 164*
1.778016^{C}	1/2	3/2	0	[56 242 450]		5.62 − 1	2.96+14	A	149, 152, 154, 155, 164*
1.503496^{C}	$1s\ ^2S_{1/2}$	$3p\ ^2P^o_{1/2}$	0	[66 511 640]		5.32 − 2	7.83+13	A	164*
1.502350^{C}	1/2	3/2	0	[66 562 370]		1.06 − 1	7.86+13	A	164*
1.424905^{C}	$1s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	0	[70 180 120]		3.90 − 2	3.20+13	A	164*
1.391696^{C}	$1s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	0	[71 854 790]		1.87 − 2	1.61+13	A	164*

2.6.3. References for Comments and Tables for Fe Ions

[1] W. M. Cady, Phys. Rev. **43**, 322 (1933).
[2] I. S. Bowen, Astrophys. J. **132**, 1 (1960).
[3] J. O. Ekberg, Phys. Scr. **23**, 7 (1981).
[4] A. H. Gabriel, B. C. Fawcett, and C. Jordan, Nature **209**, 390 (1965).
[5] R. D. Cowan and N. J. Peacock, Astrophys. J. **142**, 390 (1965).
[6] A. A. Ramonas and A. N. Ryabtsev, Opt. Spectrosc. **48**, 348 (1980).
[7] R. D. Cowan, Astrophys. J. **147**, 377 (1967).
[8] U. Feldman and B. S. Fraenkel, Astrophys. J. **145**, 959 (1966).
[9] P. G. Kruger and S. G. Weissberg, Phys. Rev. **52**, 314 (1937).
[10] E. Alexander, U. Feldman, and B. S. Fraenkel, J. Opt. Soc. Am. **55**, 650 (1965).
[11] W. E. Behring, L. Cohen, and U. Feldman, Astrophys. J. **175**, 493 (1972).
[12] M. Malinovsky and L. Heroux, Astrophys. J. **181**, 1009 (1973).
[13] J. Sugar and C. Corliss, J. Phys. Chem. Ref. Data **14**, Suppl. 2 (1985).
[14] G. D. Sandlin, G. E. Brueckner, and R. Tousey, Astrophys. J. **214**, 898 (1977).
[15] U. Feldman and G. A. Doschek, J. Opt. Soc. Am. **67**, 726 (1977).
[16] L. A. Svensson, J. O. Ekberg, and B. Edlén, Solar Phys. **34**, 173 (1974).
[17] B. Edlén and R. Smitt, Solar Phys. **57**, 329 (1978).
[18] J. T. Jefferies, Mem. Soc. Roy. Sci. Liege **17**, 213 (1969).
[19] J. T. Jefferies, F. Q. Orrall, and J. B. Zirker, Solar Phys. **16**, 103 (1971).
[20] W. E. Behring, L. Cohen, U. Feldman, and G. A. Doschek, Astrophys. J. **203**, 521 (1976).
[21] R. Smitt and L. A. Svensson, Phys. Scr. **27**, 364 (1983).
[22] P. G. Kruger, S. G. Weissberg, and L. W. Phillips, Phys. Rev. **51**, 1090 (1937).
[23] H. Zirin, Astrophys. J. **140**, 1332 (1964).
[24] U. Feldman, B. S. Fraenkel, and S. Hoory, Astrophys. J. **142**, 719 (1965).
[25] B. C. Fawcett, R. D. Cowan, E. Y. Kononov, and R. W. Hayes, J. Phys. B **5**, 1255 (1972).
[26] W. J. Wagner and L. L. House, Astrophys. J. **166**, 683 (1971).
[27] M. Swartz, S. O. Kastner, L. Goldsmith, and W. M. Neupert, J. Opt. Soc. Am. **66**, 240 (1976).
[28] S. O. Kastner, A. M. Crooker, W. E. Behring, and L. Cohen, Phys. Rev. A **16**, 577 (1977).
[29] W. Grotrian, Naturwiss. **27**, 214 (1939).
[30] R. Smitt, Solar Phys. **51**, 113 (1977).
[31] F. Magnant-Crifo, Solar Phys. **31**, 91 (1973).
[32] B. C. Fawcett, J. Phys. B **4**, 1577 (1971).
[33] K. G. Widing, G. D. Sandlin, and R. D. Cowan, Astrophys. J. **169**, 405 (1971).
[34] R. Smitt, L. A. Svensson, and M. Outred, Phys. Scr. **13**, 293 (1976).
[35] B. C. Fawcett and A. H. Gabriel, Proc. Phys. Soc. **88**, 262 (1966).
[36] G. E. Bromage, R. D. Cowan, and B. C. Fawcett, Phys. Scr. **15**, 177 (1977).
[37] B. Edlén, Z. Phys. **104**, 407 (1937).
[38] B. Edlén, Z. Astrophys. **22**, 30 (1942).
[39] A. H. Gabriel, B. C. Fawcett, and C. Jordan, Proc. Phys. Soc. **87**, 825 (1966).
[40] B. Edlén, Z. Phys. **104**, 188 (1937).
[41] W. Lotz, J. Opt. Soc. Am **57**, 873 (1967).
[42] W. M. Burton, A. Ridgeley, and R. Wilson, Mon. Not. Roy. Astron. Soc. **135**, 207 (1967).
[43] W. M. Burton and A. Ridgeley, Solar Phys. **14**, 3 (1970).
[44] G. A. Doschek, U. Feldman, M. E. VanHoosier, and J. D. F. Bartoe, Astrophys. J. Suppl. **31**, 417 (1976).
[45] A. H. Gabriel, W. R. S. Garton, L. Goldberg, T. J. L. Jones, C. Jordan, F. J. Morgan, R. W. Nicholls, W. J. Parkinson, H. J. B. Paxton, E. M. Reeves, C. B. Shenton, R. J. Speer, and R. Wilson, Astrophys. J. **169**, 595 (1971).
[46] L. A. Svensson, Solar Phys. **18**, 232 (1971).
[47] B. C. Fawcett, J. Phys. B **3**, 1732 (1970).
[48] G. E. Bromage, R. D. Cowan, and B. C. Fawcett, Mon. Not. Roy. Astron. Soc. **183**, 19 (1978).
[49] B. C. Fawcett, A. H. Gabriel, and P. A. H. Saunders, Proc. Phys. Soc. **90**, 863 (1967).
[50] K. G. Widing and G. D. Sandlin, Astrophys. J. **152**, 545 (1968).
[51] S. O. Kastner, M. Swartz, A. K. Bhatia, and J. Lapides, J. Opt. Soc. Am. **68**, 1558 (1978).
[52] E. Träbert, P. H. Heckmann, R. Hutton, and I. Martinson, J. Opt. Soc. Am. B **5**, 2173 (1988).
[53] K. P. Dere, Astrophys. J. **221**, 1062 (1978).
[54] B. C. Fawcett and N. J. Peacock, Proc. Phys. Soc. **91**, 973 (1967).
[55] U. Litzén and A. Redfors, Phys. Lett. A **127**, 88 (1988).
[56] A. Redfors and U. Litzén, J. Opt. Soc. Am. B **6**, 1447 (1989).
[57] V. E. Levashov, A. N. Ryabtsev, and S. S. Churilov, Opt. Spectrosc. **69**, 20 (1990).
[58] E. H. Pinnington, W. Ansbacher, A. Tauheed, E. Träbert, P. H. Heckmann, G. Möller, and J. H. Blanke, Z. Phys. D **17**, 5 (1990).
[59] S. S. Churilov and V. E. Levashov, Phys. Scr. **48**, 425 (1993).
[60] B. Edlén, Z. Phys. **103**, 536 (1936).
[61] S. S. Churilov, E. Ya. Kononov, A. N. Ryabtsev, and Yu. F. Zayikin, Phys. Scr. **32**, 501 (1985).
[62] U. Litzén and A. Redfors, Phys. Scr. **36**, 895 (1987).
[63] N. J. Peacock, R. D. Cowan, and G. A. Sawyer, *Proc. 7th Int. Conf. on Ionization Phenomena in Gases, Belgrade 1965* (1967).
[64] R. D. Cowan and K. G. Widing, Astrophys. J. **180**, 285 (1973).
[65] A. Redfors, Phys. Scr. **38**, 702 (1988).
[66] V. E. Levashov and S. S. Churilov, Opt. Spectrosc. **65**, 143 (1988).
[67] S. S. Churilov, V. E. Levashov, and J. F. Wyart, Phys. Scr. **40**, 625 (1989).
[68] M. Finkenthal, R. E. Bell, H. W. Moos, and TFR Group, Phys. Lett. **88A**, 165 (1982).
[69] N. J. Peacock, M. F. Stamp, and J. D. Silver, Phys. Scr. **T8**, 10 (1984).
[70] U. Feldman, L. Katz, W. Behring, and L. Cohen, J. Opt. Soc. Am. **61**, 91 (1971).
[71] B. C. Fawcett, A. H. Gabriel, F. E. Irons, N. J. Peacock, and P. A. H. Saunders, Proc. Phys. Soc. **88**, 1051 (1966).
[72] P. G. Burkhalter, L. Cohen, R. D. Cowan, and U. Feldman, J. Opt. Soc. Am. **69**, 1133 (1979).
[73] J. Reader, V. Kaufman, J. Sugar, J. O. Ekberg, U. Feldman, C. M. Brown, J. F. Seely, and W. L. Rowan, J. Opt. Soc. Am. B **4**, 1821 (1987).
[74] B. Edlén, Z. Phys. **100**, 621 (1936).
[75] K. D. Lawson and N. J. Peacock, J. Phys. B **13**, 3313 (1980).
[76] C. Jupén, L. Engström, R. Hutton, and E. Träbert, J. Phys. B **21**, L347 (1988).
[77] B. Edlén, Phys. Scr. **17**, 565 (1978).
[78] C. Jupén, Mon. Not. Roy. Astron. Soc. **208**, short communication 1 (1984).
[79] U. Feldman, G. A. Doschek, and J. F. Seely, Mon. Not. Roy. Astron. Soc. **212**, 41 (1985).
[80] J. P. Buchet, M. C. Buchet-Polizac, A. Denis, J. Desesquelles, M. Druetta, S. Martin, and J. F. Wyart, J. Phys. B **20**, 1709 (1987).
[81] M. Finkenthal, P. Mandelbaum, A. Bar-Shalom, M. Klapisch, J. L. Schwob, C. Breton, C. De Michelis, and M. Mattioli, J. Phys. B **18**, L331 (1985).

[82] S. O. Kastner, W. E. Behring, and L. Cohen, Astrophys. J. **199**, 777 (1975).
[83] B. C. Fawcett, G. E. Bromage, and R. W. Hayes, Mon. Not. Roy. Astron. Soc. **186**, 113 (1979).
[84] H. Gordon, M. G. Hobby, and N. J. Peacock, J. Phys. B **13**, 1985 (1980).
[85] F. Tyrén, Z. Phys. **111**, 314 (1938).
[86] R. J. Hutcheon, J. P. Pye, and K. D. Evans, Mon. Not. Roy. Astron. Soc. **175**, 489 (1976).
[87] R. J. Hutcheon, J. P. Pye, and K. D. Evans, Astron. Astrophys. **51**, 451 (1976).
[88] G. A. Doschek, U. Feldman, K. P. Dere, G. D. Sandlin, M. E. VanHoosier, G. E. Brueckner, J. D. Purcell, and R. Tousey, Astrophys. J. **196**, L83 (1975).
[89] S. Suckewer and E. Hinnov, Phys. Rev. A **20**, 578 (1979).
[90] E. Hinnov and S. Suckewer, Phys. Lett. **79A**, 298 (1980).
[91] E. Hinnov, S. Suckewer, S. Cohen, and K. Sato, Phys. Rev. A **25**, 2293 (1982).
[92] M. Finkenthal, R. E. Bell, H. W. Moos, and TFR Group, J. Appl. Phys. **56**, 2012 (1984).
[93] V. I. Kovalev, E. Ya. Kononov, and S. S. Churilov, *Autoionizing Effects in Atoms and Ions*, Dept. of Phys. and Astron., Sci. Committee on Spectrosc., Acad. Nauk Moscow, USSR, p. 210 (1983).
[94] K. J. Phillips, J. W. Leibacher, C. J. Wolfson, J. H. Parkinson, B. C. Fawcett, B. J. Kent, H. E. Mason, L. W. Acton, J. L. Culhane, and A. H. Gabriel, Astrophys. J. **256**, 774 (1982).
[95] U. Feldman, G. A. Doschek, R. D. Cowan, and L. Cohen, J. Opt. Soc. Am. **63**, 1445 (1973).
[96] V. A. Boiko, A. Ya. Faenov, and S. A. Pikuz, J. Quant. Spectrosc. Radiat. Transfer **19**, 11 (1978).
[97] P. G. Burkhalter, C. M. Dozier, E. Stallings, and R. D. Cowan, J. Appl. Phys. **49**, 1092 (1978).
[98] J. F. Seely, U. Feldman, and U. I. Safronova, Astrophys. J. **304**, 838 (1986).
[99] K. T. Cheng, unpublished material (1981).
[100] W. C. Martin, unpublished material (1982).
[101] K. G. Widing, Astrophys. J. **222**, 735 (1978).
[102] B. Edlén, Phys. Scr. **22**, 593 (1981).
[103] G. A. Doschek, U. Feldman, R. D. Cowan, and L. Cohen, Astrophys. J. **188**, 417 (1974).
[104] C. Breton, C. De Michelis, M. Finkenthal, and M. Mattioli, J. Opt. Soc. Am. **69**, 1652 (1979).
[105] E. Ya. Kononov, Phys. Scr. **27**, 117 (1983).
[106] B. C. Fawcett, R. D. Cowan, and R. W. Hayes, Astrophys. J. **187**, 377 (1974).
[107] B. C. Fawcett and R. W. Hayes, Mon. Not. Roy. Astron. Soc. **170**, 185 (1975).
[108] L. Cohen and U. Feldman, Astrophys. J. **160**, L105 (1970).
[109] M. Swartz, S. Kastner, E. Rothe, and W. Neupert, J. Phys. B **4**, 1747 (1971).
[110] W. M. Neupert, M. Swartz, and S. O. Kastner, Solar Phys. **31**, 171 (1973).
[111] J. P. Pye, K. D. Evans, and R. J. Hutcheon, Mon. Not. Roy. Astron. Soc. **178**, 611 (1977).
[112] D. L. McKenzie, P. B. Landecker, R. M. Broussard, H. R. Rugge, R. M. Young, U. Feldman, and G. A. Doschek, Astrophys. J. **241**, 409 (1980).
[113] S. Suckewer and E. Hinnov, Phys. Rev. Lett. **41**, 756 (1978).
[114] G. D. Sandlin, G. E. Brueckner, V. E. Scherrer, and R. Tousey, Astrophys. J. **205**, L47 (1976).
[115] K. D. Lawson, N. J. Peacock, and M. F. Stamp, J. Phys. B **14**, 1929 (1981).
[116] B. Edlén, Phys. Scr. **26**, 71 (1982).
[117] U. Feldman, G. A. Doschek, R. D. Cowan, and L. Cohen, Astrophys. J. **196**, 613 (1975).
[118] E. Ya. Kononov, K. N. Koshelev, L. I. Podobedova, S. V. Chekalin, and S. S. Churilov, J. Phys. B **9**, 565 (1976).
[119] J. Sugar and W. L. Rowan, J. Opt. Soc. Am. **12**, 1403 (1995).
[120] G. E. Bromage, R. D. Cowan, B. C. Fawcett, H. Gordon, M. G. Hobby, N. J. Peacock, and A. Ridgeley, *The laser-produced spectrum of Fe* XVII *to Fe* XXI *below 18* Å, UKAEA Report CLM-R170 (1977).
[121] T. N. Lie and R. C. Elton, Phys. Rev. A **3**, 865 (1971).
[122] U. Feldman, G. A. Doschek, and R. W. Kreplin, Astrophys. J. **238**, 365 (1980).
[123] S. O. Kastner, W. M. Neupert, and M. Swartz, Astrophys. J. **191**, 261 (1974).
[124] G. E. Bromage and B. C. Fawcett, Mon. Not. Roy. Astron. Soc. **178**, 605 (1977).
[125] B. C. Fawcett, C. Jordan, J. R. Lemen, and K. J. H. Phillips, Mon. Not. Roy. Astron. Soc. **225**, 1013 (1987).
[126] R. W. Noyes, *High Energy Phenomena on the Sun*, edited by R. Ramaty and R. G. Stone, NASA SP-342 (1973), p. 231.
[127] S. O. Kastner, J. Opt. Soc. Am. **61**, 335 (1971).
[128] B. C. Fawcett and R. D. Cowan, Mon. Not. Roy. Astron. Soc. **171**, 1 (1975).
[129] G. A. Doschek, U. Feldman, and L. Cohen, J. Opt. Soc. Am. **65**, 463 (1975).
[130] G. E. Bromage, R. D. Cowan, B. C. Fawcett, and A. Ridgeley, J. Opt. Soc. Am. **68**, 48 (1978).
[131] K. G. Widing, Astrophys. J. **197**, L33 (1975).
[132] E. Hinnov, Astrophys. J. **230**, L197 (1979).
[133] B. Edlén, Phys. Scr. **32**, 86 (1985).
[134] B. C. Fawcett, A. Ridgeley, and T. P. Hughes, Mon. Not. Roy. Astron. Soc. **188**, 365 (1979).
[135] E. Ya. Kononov, K. N. Koshelev, and Yu. V. Sidel'nikov, Sov. J. Plasma Phys. **3**, 375 (1977).
[136] K. G. Widing and J. D. Purcell, Astrophys. J. **204**, L151 (1976).
[137] E. Hinnov, the TFTR Operating Team, B. Denne, and the JET Operating Team, Phys. Rev. A **40**, 4357 (1989).
[138] R. J. Knize, Phys. Rev. A **43**, 1637 (1991).
[139] J. Reader, J. Sugar, N. Acquista, and R. Bahr, J. Opt. Soc. Am. B **11**, 1930 (1994).
[140] J. F. Seely and U. Feldman, Phys. Scr. **33**, 110 (1986).
[141] Yu. I. Grineva, V. I. Karev, V. V. Korneev, V. V. Krutov, S. L. Mandelstam, L. A. Vainstein, B. N. Vasilyev, and I. A. Zhitnik, Solar Phys. **29**, 441 (1973).
[142] J. F. Seely and U. Feldman, J. Phys. B **18**, L797 (1985).
[143] M. Bitter, K. W. Hill, N. Sauthoff, P. C. Efthimion, E. Meservey, W. Roney, S. von Goeler, R. Horton, M. Goldman, and W. Stodiek, Phys. Rev. Lett. **43**, 129 (1979).
[144] L. A. Vainshtein and U. I. Safronova, Reprint No. 2, Acad. Nauk USSR, Inst. Spectrosc. Moscow (1985).
[145] M. Klapisch, J. L. Schwob, B. S. Fraenkel, and J. Oreg, J. Opt. Soc. Am. **67**, 148 (1977).
[146] B. Edlén, Phys. Scr. **19**, 255 (1979).
[147] P. Beiersdorfer, M. Bitter, S. von Goeler, S. Cohen, K. W. Hill, J. Timberlake, R. S. Walling, M. H. Chen, P. L. Hagelstein, and J. H. Scofield, Phys. Rev. A **34**, 1297 (1986).
[148] L. A. Vainshtein and U. I. Safronova, Phys. Scr. **31**, 519 (1985).
[149] E. V. Aglitsky, P. S. Antsiferov, S. L. Mandelstam, A. M. Panin, U. I. Safronova, S. A. Ulitin, and L. A. Vainshtein, Phys. Scr. **38**, 136 (1988).
[150] P. Beiersdorfer, M. Bitter, S. von Goeler, and K. W. Hill, Phys. Rev. A **40**, 150 (1989).
[151] P. Indelicato, O. Gorceix, M. Tavernier, J. P. Briand, J. P. Desclaux, R. Marrus, and M. Prior, Z. Phys. D **2**, 149 (1986).
[152] S. Morita and J. Fujita, J. Phys. Soc. Jpn. **52**, 1957 (1983).
[153] E. V. Aglitskii and A. M. Panin, Opt. Spectrosc. **58**, 453 (1985).
[154] J. J. Turechek and H. J. Kunze, Z. Phys. A **273**, 111 (1975).
[155] V. Decaux, M. Bitter, H. Hsuan, S. von Goeler, K. W. Hill, R. A. Hulse, G. Taylor, H. Park, and C. P. Bhalla, Phys. Rev. A **43**, 228 (1991).
[156] J. P. Buchet, M. C. Buchet-Poulizac, A. Denis, J. Desequelles, M. Druetta, J. P. Grandin, and X. Husson, Phys. Rev. A **23**, 3354 (1981).

[157] G. W. Drake, Can. J. Phys. **66**, 586 (1988).
[158] K. T. Cheng, M. H. Chen, W. R. Johnson, and J. Sapirstein, Phys. Rev. A **50**, 247 (1994).
[159] K. T. Cheng, Private communication (1996).
[160] W. R. Johnson and G. Soff, Atom. Data Nucl. Data Tables **33**, 405 (1985).
[161] G. W. F. Drake, *Calculated transition frequencies for helium-like ions*, unpublished (1985).
[162] P. J. Mohr, Atom. Data Nucl. Data Tables **29**, 453 (1983).
[163] G. W. Erickson, J. Phys. Chem. Ref. Data **6**, 831 (1977).
[164] W. L. Wiese, M. W. Smith, and B. M. Glennon, Natl. Stand. Ref. Data Ser. **4**, Vol. I (1966).
[165] J. R. Fuhr, G. A. Martin, and W. L. Wiese, J. Phys. Chem. Ref. Data **17**, Suppl. 4. (1988).
[166] S. M. Younger and A. W. Weiss, J. Res. Natl. Bur. Stand. **79A**, 629 (1975).
[167] N. Acquista and J. Reader, J. Opt. Soc. Am. B **1**, 649 (1984).
[168] M. Bitter, S. von Goeler, K. W. Hill, R. Horton, D. Johnson, W. Roney, N. Sauthoff, E. Silver, and W. Stodiek, Phys. Rev. Lett. **47**, 921 (1981).
[169] V. A. Boiko, Yu. P. Voinov, V. A. Gribkov, and G. V. Sklizkov, Opt. Spectrosc. **29**, 545 (1970).
[170] V. A. Boiko, S. A. Pikuz, U. I. Safronova, and A. Ya. Faenov, J. Phys. B **10**, 1253 (1977).
[171] V. A. Boiko, S. A. Pikuz, A. S. Safronova, and A. Ya. Faenov, Opt. Spectrosc. **44**, 498 (1978).
[172] V. A. Boiko, S. A. Pikuz, A. S. Safronova, A. Ya. Faenov, P. O. Bogdanovich, G. V. Merkelis, Z. B. Rudzikas, and S. D. Sadziuviene, J. Phys. B **12**, 1927 (1979).
[173] G. E. Bromage, B. C. Fawcett, and R. D. Cowan, Mon. Not. Roy. Astron. Soc. **178**, 599 (1977).
[174] J. P. Buchet, M. C. Buchet-Poulizac, A. Denis, J. Desequelles, M. Druetta, S. Martin, J. P. Grandin, X. Husson, and I. Lesteven, Phys. Scr. **31**, 364 (1985).
[175] L. F. Chase, W. C. Jordan, J. D. Perez, and R. R. Johnston, Phys. Rev. A **13**, 1497 (1976).
[176] L. Cohen, U. Feldman, and S. O. Kastner, J. Opt. Soc. Am. **58**, 331 (1968).
[177] J. P. Connerade, N. J. Peacock, and R. J. Speer, Solar Phys. **14**, 159 (1970).
[178] J. H. Dave, U. Feldman, J. F. Seely, A. Wouters, S. Suckewer, E. Hinnov, and J. L. Schwob, J. Opt. Soc. Am. B **4**, 635 (1987).
[179] G. A. Doschek, Space Sci. Rev. **13**, 765 (1972).
[180] G. A. Doschek, J. F. Meekins, and R. D. Cowan, Astrophys. J. **177**, 261 (1972).
[181] G. A. Doschek, U. Feldman, J. Davis, and R. D. Cowan, Phys. Rev. A **12**, 980 (1975).
[182] A. K. Dupree, M. C. E. Huber, R. W. Noyes, W. H. Parkinson, E. M. Reeves, and G. L. Withbroe, Astrophys. J. **182**, 321 (1973).
[183] B. C. Fawcett, A. H. Gabriel, and C. Jordan, Astrophys. J. **152**, L119 (1968).
[184] B. C. Fawcett, N. J. Peacock, and R. D. Cowan, J. Phys. B **1**, 295 (1968).
[185] B. C. Fawcett, J. Phys. B **4**, 981 (1971).
[186] B. C. Fawcett, R. D. Cowan, and R. W. Hayes, J. Phys. B **5**, 2143 (1972).
[187] B. C. Fawcett, M. Galanti, and N. J. Peacock, J. Phys. B **7**, 1149 (1974).
[188] U. Feldman and L. Cohen, J. Opt. Soc. Am. **57**, 1128 (1967).
[189] U. Feldman, G. A. Doschek, D. J. Nagel, W. E. Behring, and L. Cohen, Astrophys. J. **183**, L43 (1973).
[190] B. S. Fraenkel and J. L. Schwob, Phys. Lett. **40A**, 83 (1972).
[191] J. R. Fuhr, G. A. Martin, W. L. Wiese, and S. M. Younger, J. Phys. Chem. Ref. Data **10**, 305 (1981).
[192] C. Jordan, Mon. Not. Roy. Astron. Soc. **132**, 515 (1966).
[193] C. Jordan, Solar Phys. **21**, 381 (1971).
[194] C. Jordan, Space Sci. Rev. **13**, 595 (1972).
[195] V. Kaufman and J. Sugar, J. Phys. Chem. Ref. Data **15**, 321 (1986).
[196] M. Klapisch, A. Bar Shalom, J. L. Schwob, B. S. Fraenkel, C. Breton, C. de Michelis, M. Finkenthal, and M. Mattioli, Phys. Lett. **69A**, 34 (1978).
[197] E. Ya. Kononov, A. N. Ryabtsev, U. I. Safronova, and S. S. Churilov, J. Phys. B **9**, L477 (1976).
[198] E. Ya. Kononov, V. I. Kovalev, A. N. Ryabtsev, and S. S. Churilov, Sov. J. Quantum Electron. **7**, 111 (1977).
[199] M. Loulergue and H. Nussbaumer, Astron. Astrophys. **24**, 209 (1973).
[200] J. E. Manson, Solar Phys. **27**, 107 (1972).
[201] D. L. McKenzie and P. B. Landecker, Astrophys. J. **254**, 309 (1982).
[202] W. M. Neupert, Solar Phys. **18**, 474 (1971).
[203] J. H. Parkinson, Astron. Astrophys. **24**, 215 (1973).
[204] J. H. Parkinson, Solar Phys. **42**, 183 (1975).
[205] H. R. Rugge and A. B. C. Walker, Jr., Astrophys. J. **219**, 1068 (1978).
[206] N. Spector, A. Zigler, H. Zmora, and J. L. Schwob, J. Opt. Soc. Am. **70**, 857 (1980).
[207] S. Suckewer, Phys. Scr. **23**, 72 (1981).
[208] E. Träbert, R. Hutton, and I. Martinson, Z. Phys. D **5**, 125 (1987).
[209] K. G. Widing, Nucl. Instrum. Meth. **110**, 361 (1973).

2.7. Cobalt

2.7.1. Brief Comments on Each Cobalt Ion

Co VIII

Ca I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^2\ \ ^3F_2$

Ionization energy 1 273 000 ± 5000 cm^{-1}
(157.8 ± 0.6 eV)

Alexander *et al.* [1] classified 19 lines of the $3d^2-3d4f$ array in the range of 122.2 – 125.6 Å. An extension of the analysis was carried out by Fawcett *et al.* [2] who classified 135 lines belonging to the $3p^63d^2-3p^53d^3$ and $3d^2-3d4p$, $4f$, $5f$ arrays in the range of 102.0 – 192.7 Å. We have adopted their wavelengths. The uncertainties of the wavelengths are ±0.007 to ±0.015 Å for the former two arrays in the range 153.0 – 192.7 Å and ±0.004 Å for the latter two arrays in the range of 102.0 – 134.0 Å.

The value for the ionization energy was derived by Sugar and Corliss [3] from the nf series.

Co IX

K I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d\ \ ^2D_{3/2}$

Ionization energy 1 501 300 ± 2000 cm^{-1}
(186.13 ± 0.20 eV)

Alexander *et al.* [4] classified the $3d\ ^2D-nf\ ^2F^\circ$ doublets for $n=4-10$ in the range of 70.9 – 108.7 Å.

The $3p^63d-3p^53d^2$ array was observed by Gabriel *et al.* [5] and by Goldsmith [6] who also identified the $3d\ ^2D-4p\ ^2P^\circ$ doublet in the range of 159 – 160 Å. A further extension with improved measurements was made by Ramonas and Ryabtsev [7], who classified 18 lines in the range of 152.7 – 213.6 Å, including new lines due to $3p^63d\ ^2D-3p^53d^2(^1D)\ ^2F^\circ$ and $(^1G)\ ^2F^\circ$, and revised the wavelength of the $3d\ ^2D_{3/2}-4p\ ^2P^\circ_{1/2}$ transition. The uncertainty of their wavelengths is ±0.003 Å.

Hoory *et al.* [8] measured the spectral lines in the wavelength range of 95.8 – 101.5 Å with an uncertainty of ±0.005 Å and identified them as $3p^63d-3p^53d4s$ transitions.

The value for the ionization energy was derived by Alexander *et al.* [4] from their observations of the nf series.

Co X

Ar I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^6\ \ ^1S_0$

Ionization energy 2 221 000 ± 3000 cm^{-1}
(275.4 ±0.4 eV)

Alexander *et al.* [4] classified transitions from the $3p^54s\ ^{3,1}P^\circ_1$ and $3p^54d\ ^{3,1}P^\circ_1$ levels to the ground level at ~90 Å and ~72 Å.

The $3p^6\ ^1S_0-3p^53d\ ^1P^\circ_1$ line measured by Gabriel *et al.* [5] was found to be 158.873±0.005 Å by Goldsmith [6] and 158.88±0.03 Å by Fawcett and Hayes [9]. The wavelength of Ref. [6] is given here.

The $3p^53d-3p^54f$ transitions were classified by Fawcett *et al.* [10], including 11 lines in the range of 94.4 – 98.3 Å. Remeasured wavelengths with uncertainties of ±0.01 Å in the extended range of 94.4 – 111.6 Å were reported by Swartz *et al.* [11]. They also classified the lines at 63.017 Å and 62.332 Å as transitions from the $3p^55s\ ^{3,1}P^\circ_1$ levels to the ground level.

An isoelectronic comparison of measured wavelengths of the $3p^6\ ^1S_0-3p^53d\ ^3D_1$ spin-forbidden transition with relativistic Hartree-Fock calculations was carried out by Sugar *et al.* [12] for Fe^{8+} through Mo^{24+}. They obtained a fitted wavelength value of 200.893±0.005 Å for Co.

The value for the ionization energy was derived from ns terms by Sugar and Corliss [3].

Co XI

Cl I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^5\ \ ^2P^\circ_{3/2}$

Ionization energy 2 460 000 cm^{-1} (305 eV)

The solar coronal line at 5188.5 Å was identified by Price [13] as the magnetic-dipole $^2P^\circ_{3/2}-^2P^\circ_{1/2}$ transition in the configuration $3s^23p^5$. This wavelength value is, however, inconsistent with the present level scheme. We give the wavelength of 5168 Å calculated from energy levels.

The classification of $3p^5-3p^44s$ lines in the wavelength range of 81.5 – 84.1 Å was carried out by Edlén [14]. An additional $3p^5\ ^2P^\circ_{3/2}-3p^44s\ ^4P_{5/2}$ line at 84.67±0.015 Å was measured by Fawcett *et al.* [10] using a laser-produced plasma source. They also classified the $3p^5-3p^44d$ and $3p^43d-3p^44f$ transitions in the ranges of 66.1 – 68.0 Å and 84.7 – 87.3 Å.

Wavelengths of the $3p^5-3p^43d$ transitions in the range of 158.2 – 177.6 Å were reported by Gabriel *et al.* [5], Goldsmith [6], and Fawcett and Hayes [9]. The wavelengths with uncertainties of ±0.005 Å are taken from Ref. [6].

Fawcett and Hayes [9] and Fawcett and Hatter [15] classified the lines at 318.85±0.03 Å and 339.81±0.03 Å, respectively, as transitions from the $3s3p^6\ ^2S_{1/2}$ level to the ground $3s^23p^5\ ^2P^\circ_{3/2,1/2}$ levels.

The value for the ionization energy was determined by Lotz [16] by extrapolation.

Co XII

S I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^4\ \ ^3P_2$

Ionization energy 2 710 000 cm^{-1} (336 eV)

Wavelengths for magnetic-dipole transitions within the ground configuration $3s^23p^4$, except for the $^3P_1 - {}^1D_2$ transition at 3801.2 Å were identified by Price [13] in the solar corona, and have been calculated from energy levels of Smitt *et al.* [17].

Fawcett and Hayes [9] measured wavelengths of 10 lines due to the $3p^4 - 3p^33d$ transitions in the range of 165.8 – 180.5 Å. The wavelength uncertainty is ±0.03 Å. In Ref. [9], a revised classification for the line at 168.34 Å observed by Gabriel *et al.* [5] was given. Improved measurements of the transitions $3s^23p^4\ \ ^3P - 3s3p^5\ ^3P^\circ$ and $^1D_2 - {}^1P^\circ_1$ previously classified by Fawcett and Hayes [9] in the wavelength range of 286.6 – 344.0 Å were carried out by Fawcett and Hatter [15], whose wavelengths with uncertainties of ±0.02 Å are given here.

Fawcett *et al.* [10] measured the $3p^4 - 3p^34d$ and $3p^33d - 3p^34f$ arrays in the ranges of ~63 Å and ~80 Å, respectively, with an uncertainty of ±0.015 Å.

The value for the ionization energy was derived by extrapolation by Lotz [16].

Co XIII

P I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^3\ \ ^4S^\circ_{3/2}$

Ionization energy 3 057 000 cm^{-1} (379 eV)

Wavelengths for magnetic-dipole transitions within the ground configuration $3s^23p^3$ have been obtained from level values predicted by Smitt *et al.* [17]. No observations of lines connecting the quartet and the doublet systems have been reported.

Fawcett and Hayes [9] analyzed the $3s^23p^3 - 3s3p^4$ and $3s^23p^23d$ arrays in the wavelength ranges of 263.4 – 338.8 Å and 174.8 – 188.9 Å. Improved measurements of the former array with a wavelength uncertainty of ±0.02 Å were carried out by Fawcett and Hatter [15], who found 2 additional new lines: $^4S^\circ_{3/2} - {}^4P_{1/2}$ at 320.40 Å and $^2D^\circ_{3/2} - {}^2D_{3/2}$ at 310.67 Å. Note that the line at 205.38 Å in Ref. [9] has been omitted, because it does not fit with the level scheme of Smitt *et al.*

Fawcett *et al.* [10] identified five lines at about 74 Å as $3p^23d - 3p^24f$ transitions. Their wavelength uncertainty is ±0.015 Å.

The $3p^3 - 3p^24d$ transitions below 72.7 Å are given by Fawcett *et al.* [18].

The value for the ionization energy was derived by extrapolation by Lotz [16].

Co XIV

Si I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^2\ \ ^3P_0$

Ionization energy 3 315 000 cm^{-1} (411 eV)

Wavelengths of magnetic-dipole transitions within the $3s^23p^2$ ground configuration have been predicted by Sugar *et al.* [19]. The $3s^23p^2$ levels are derived from them.

Fawcett and Hayes [9] analyzed the $3s^23p^2 - 3s3p^3$ and $3s^23p^2 - 3s^23p3d$ arrays in the wavelength ranges of 224.1 – 342.3 Å and 184.4 – 207.9 Å. Their wavelength uncertainty is ±0.03 Å. Improved wavelengths with uncertainties of ±0.02 Å were reported by Fawcett and Hatter [15] for the former array. The $3s3p^3\ \ ^3S^\circ_1$ level is derived from the $3s^23p^2\ ^3P_{2,0} - 3s3p^3\ \ ^3S^\circ_1$ transitions at 236.11 Å and 224.13 Å. The wavelength uncertainty of the $3s^23p^2\ ^3P_1 - 3s3p^3\ \ ^3S^\circ_1$ transition at 230.34 Å is questionable, because this line is inconsistent by about 200 cm^{-1} with the lower $3s^23p^2\ \ ^3P_1$ level by about 0.1 Å.

Fawcett *et al.* [10] observed the $3p^2 - 3p4d$, $3p^2 - 3p4s$, and $3p3d - 3p4f$ lines in the range of 55.7 – 69.1 Å. Their wavelength uncertainty is ±0.01 Å. Kastner *et al.* [20] reobserved these lines in the extended range of 55.1 – 74.4 Å. They give tentative classifications for the $3s3p^3 - 3s^23p4f$ transitions.

The value for the ionization energy was derived by Lotz [16] by extrapolation.

Co XV

Al I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p\ \ ^2P^\circ_{1/2}$

Ionization energy 3 580 000 cm^{-1} (444 eV)

The magnetic-dipole line $3s^23p\ ^2P^\circ_{1/2} - 3s^23p\ ^2P^\circ_{3/2}$ at 4350.6 Å was identified by Price [13] in the solar coronal spectrum.

Lines at 52.583 Å and 53.173 Å were classified by Edlén [21] as the $3s^23p\ ^2P^\circ_{1/2,3/2} - 3s^24d\ \ ^2D_{3/2,5/2}$ doublet.

The array $3s^23p - 3s3p^2$ was observed by Fawcett and Hayes [9] and more accurately by Fawcett and Hatter [15]. Fawcett and Hayes also provided identifications of the $3s^23p - 3s^23d$ doublet and the $3s3p^2\ ^4P_{5/2} - 3p^3$

$^4S^o_{3/2}$ transition. The $3s3p^2\ ^4P_{1/2,3/2,5/2} - 3p^3\ ^4S^o_{3/2}$ quartet was given by Litzén and Redfors [22]. Observations in the range of 197.5 – 337.5 Å were made by Redfors and Litzén [23] with a laser-produced plasma source. They identified all the transitions between terms of the configurations $3s^23p$, $3s3p^2$, $3s^23d$, $3p^3$, and $3s3p3d$ (except ^4F). Their wavelength uncertainties are ±0.02 Å. Levashov *et al.* [24] remeasured the $3s3p^2\ ^2D_{3/2} - 3p^3\ ^3P^o_{1/2}$ line and obtained 337.467 Å instead of 337.422 Å in Ref. [22]. They also classified a new line at 198.459 Å and identified the $3s3p^2\ ^4P_{3/2} - 3s3p(^3P^o)3d\ ^4P^o_{3/2,1/2}$ transitions. However this classification has been omitted, because the recalculated wavelength is different from their observed one by about 1 Å.

The transition arrays $3p^3$, $3s3p3d - 3p^23d$, $3s3d^2$ were newly identified by Churilov and Levashov [25] in a laser-produced plasma with an estimated uncertainty of ±0.01 Å. They also redetermined energy levels of all the configurations with $n = 3$. We have adopted their results. The wavelength of 220.041 Å is apparently a misprint and should be 222.041 Å. It should be noted that the designations of $3s3p(^3P^o)3d\ ^4P^o_{1/2,3/2}$ and $3s3p(^1P^o)3d\ ^2P^o_{3/2}$ levels have been interchanged with $3s3p(^3P^o)3d\ ^4D^o_{1/2,3/2}$ and $3s3p(^1P^o)3d\ ^2D^o_{3/2}$. These levels cross at the Mn ion, as shown in the calculation of Redfors and Litzén.

Fawcett *et al.* [10] classified the $3s^23d - 3s^24f$, and $3s3p3d - 3s3p4f$ arrays in the ranges of ~67 Å and ~64 Å, respectively, with wavelength uncertainties of ±0.01 Å.

The value for the ionization energy was determined by Lotz [16] by extrapolation.

Co XVI

Mg I isoelectronic sequence

Ground state $1s^22s^22p^63s^2\ ^1S_0$

Ionization energy 4 129 200 ± 500 cm^{-1}
(511.96 ± 0.06 eV)

The magnetic dipole transition $3s3p\ ^3P^o_1 - 3s3p\ ^3P^o_2$ at 5774 Å was classified by Price [13] in the solar coronal spectrum. But this classification is questionable and omitted because its wavelength value is estimated to be 5761 Å from the level values of Churilov *et al.* [26] adopted here.

Edlén [21] found the $3s^2\ ^1S_0 - 3s4p\ ^1P^o_1$ resonance line at 47.483 Å and also the triplets $3s3p\ ^3P^o - 3s4d\ ^3D$ and $3s3d\ ^3D - 3s4f\ ^3F^o$ in the ranges of ~50 Å and ~62 Å. Identifications of the singlets $3s3p\ ^1P^o_1 - 3s4d\ ^1D_2$ at 53.043±0.01 Å and $3s3d\ ^1D_2 - 3s4f\ ^1F^o_3$ at 64.773±0.01 Å were made by Fawcett *et al.* [10]. They also identified a blended line at 56.83 Å as the $3p^2\ ^1D_2 - 3s4f\ ^1F^o_3$ transition. The $3p3d - 3p4f$ transitions were classified by Fawcett *et al.* [10] and more completely by Kastner *et al.* [20]. We have adopted the results of Kastner *et al.*, although three blended lines have multiple classifications.

Feldman *et al.* [27] classified spectral lines of the $3s3p\ ^3P^o - 3s5d\ ^3D$ array at ~37 Å, measured with wavelength uncertainties of ±0.02 Å.

The rest of the $n = 3 - 4, 5$ transitions below 59.625 Å are due to the identifications of Fawcett *et al.* [18].

The inner shell $2p^63s^2\ ^1S_0 - 2p^53s^23d\ ^1P^o_0$ transition at 14.080 Å was observed by Swartz *et al.* [28].

Transitions among the configurations $3s^2$, $3s3p$, $3p^2$, $3s3d$ and $3p3d$ in the wavelength range of 186.4 – 496.6 Å produced in a laser-generated plasma were observed and analyzed by Churilov *et al.* [26] including intersystem lines. They measured wavelengths with uncertainties of ±0.007 Å. Some revisions for the $3s3p - 3p^2$, $3p^2 - 3p3d$, and $3s3d - 3p3d$ arrays were made by Litzén and Redfors [29] who used a similar light source. Their wavelengths have uncertainties of ±0.02 Å. We have taken wavelengths and energy levels from both articles. The previous analyses of the $n = 3$ complex by Fawcett and Hayes [9], Fawcett *et al.* [10], and Fawcett and Hatter [15] were extended in the above work.

The magnetic dipole line $3s3p\ ^3P^o_1 - 3s3p\ ^3P^o_2$ at 5774 Å was classified by Price [13] in the solar coronal spectrum. But this classification is questionable and omitted because its wavelength value is estimated to be 5761 Å from the level values of Churilov *et al.* [26] adopted here.

The $3p3d - 3d^2$ array was identified by Redfors [30], Levashov and Churilov [31], and Churilov *et al.* [32] using laser-produced plasmas. In Ref. [32], 15 lines are provided in the wavelength range of 211.5 – 285.8 Å. Wavelengths given to the third or to the second decimal place have uncertainties of ±0.01 Å and ±0.02 Å, respectively. The lower level $3p3d\ ^3P^o_1$ of the lines at 221.8 Å and 241.157 Å should be actually $^3D^o_1$, according to the level scheme of Litzén and Redfors [29]. The classifications of the $3p3d\ ^3P^o_2, ^3D^o_2 - 3d^2\ ^3P_2$ lines at 220.446 Å and 228.276 Å disagree with the level scheme of Churilov *et al.* [26]. We have reduced the value of the $3d^2\ ^3P_2$ level by 200 cm^{-1} to accommodate these lines.

The value for the ionization energy was derived by Sugar and Corliss [3] from the $3snd$ series.

Co XVII

Na I isoelectronic sequence

Ground state $1s^22s^22p^63s\ ^2S_{1/2}$

Ionization energy 4 408 500 ± 500cm^{-1}
(546.58 ±0.06 eV)

Edlén [33] identified the $3s - 4p$, $3p - 4s$ and $4d$, and $3d - 4f$ and $5f$ doublets in the wavelength range of 41.4 – 59.0 Å. Feldman *et al.* [27] extended the doublet series to $3s - np$ ($n = 5,6$), $3p - nd$ ($n = 5 - 8$), and $3d - nf$ ($n = 5 - 7$). They reported the wavelengths in the range 27.9 – 41.4 Å measured with uncertainties of

±0.01 Å. This work includes the previous results of Feldman *et al.* [34]. The $3p-5s$ and $3d-8f$ transitions at 37.768 Å and

31.38 Å, respectively, are from Fawcett *et al.* [18].

Feldman and Cohen [35] observed the lines at 15.828±0.01 Å ($J = {}^1/_2 - {}^3/_2$) and 15.551±0.01 Å ($J = {}^1/_2 - {}^1/_2$) belonging to the autoionization resonance transition $2p^6 3s\ {}^2S - 2p^5 3s^2\ {}^2P°$.

Widing *et al.* [36] classified a solar coronal line at 312.54±0.05 Å as the $3s\ {}^2S_{1/2} - 3p\ {}^2P°_{3/2}$ transition. The $3s\ {}^2S_{1/2} - 3p\ {}^2P°_{1/2}$ line was observed at 339.51±0.03 Å in a solar flare spectrum by Sandlin *et al.* [37]. These were also observed in laboratory spectra by Fawcett and Hayes [9], Fawcett *et al.* [10], and Fawcett and Hatter [15]. Wavelengths of 312.54±0.03 Å ($J = {}^1/_2 - {}^3/_2$) and 339.50±0.03 Å ($J = {}^1/_2 - {}^1/_2$) were obtained with a laser-produced plasma in Ref. [15]. Fawcett *et al.* [10] also observed the $3p\ {}^2P° - 3d\ {}^2D$ doublet in the range of 234 − 250 Å with an uncertainty of ±0.02 Å.

The wavelengths of the $3s-3p$ and $3p-3d$ transitions agree with semiempirical predictions by Edlén [38] within experimental uncertainties. An isoelectronic comparison of measured wavelengths of these transitions as well as $3d-4f$ with Dirac-Fock calculations was carried out by Reader *et al.* [39] for Ar^{7+} through Xe^{43+}. They obtained fitted wavelengths with an uncertainty of ±0.007 Å. We give their results.

Lawson and Peacock [40] identified the doublets $4d-5f$ and $4f-5g$ at ~128 Å and ~139 Å. Their wavelengths have uncertainties of ±0.03 Å.

The value for the ionization energy was derived by Edlén [38] from core polarization theory applied to the nf series.

Co XVIII

Ne I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6\ {}^1S_0$

Ionization energy 11 269 000 ± 4000 cm^{-1} (1397.2 ±0.5 eV)

Resonance lines were first measured by Tyrén [41], who identified those from the $n = 3$ levels, including $2s2p^6 3p\ {}^{3,1}P°_1$, in the range of 12.6 − 15.5 Å. Subsequently, Feldman and Cohen [42] observed two lines from the $2s^2 2p^5 4d\ {}^3D°_1$, ${}^1P°_1$ levels to the ground state at ~11 Å. Swartz *et al.* [28] extended the identifications to transitions from the upper levels $2p^5 4s\ {}^{3,1}P°_1$ and $2p^5 nd\ {}^3D°_1$, ${}^1P°_1$ ($n = 5,6$). New and improved observations with laser-produced plasmas were reported by Boiko *et al.* [43], Gordon *et al.* [44], and Chang *et al.* [45]. Tabulated wavelengths with uncertainties of ±0.005 Å have been taken from Gordon *et al.* Additional wavelengths below 9.5 Å are given by Boiko *et al.* for $2p^5 7d\ {}^3D°_1$ and ${}^1P°_1$, and $2p^5 8d\ {}^3D°_1$, and by Chang *et al.* for $2p^5 8d\ {}^1P°_1$ and $2p^5 9d\ {}^3D°_1$ and ${}^1P°_1$. Chang *et al.* also identified three additional lines at 11.155 Å, 10.025 Å, and 9.748 Å as transitions from the ${}^3P°_1$ levels of the $2p^5 4d$, $2s2p^6 4p$, and $2p^5 6d$ configurations to the ground level. It should be noted that the classification of $2p^6\ {}^1S_0 - 2p^5 5d\ {}^{1,3}P°_1$ transitions at 10.234 Å and 10.368 Å by Spector *et al.* [46] does not agree with the results quoted here.

Observations of the $2p^5 3p - 2p^5 4d$ transitions were made by Kastner *et al.* [47] in the range of 44.8 − 45.7 Å.

The value for the ionization energy was derived by Sugar and Corliss [3] from the $2s^2 2p^5 nd\ {}^1P°_1$ series for $n = 3-6$.

Co XIX

F I isoelectronic sequence

Ground state $1s^2 2s^2 2p^5\ {}^2P°_{3/2}$

Ionization energy 12 077 600 cm^{-1} (1497.43 eV)

Spectral lines for the $2p^5 - 2p^4 3s$ and $2p^5 - 2p^4 3d$ arrays were observed and classified by Cohen *et al.* [48] and by Swartz *et al.* [28]. Revisions and additions to these earlier works were made by Feldman *et al.* [49] and Boiko *et al.* [50,51]. Gordon *et al.* [44] remeasured these arrays as well as $2s^2 2p^5 - 2s2p^5 3p$, $2p^5 - 2p^4 4d$, and $2p^5 - 2p^4 4s$ transitions. These lines in the range of 10.2 − 14.8 Å have uncertainties of ±0.005 Å. Three additional lines at 13.246 Å, 13.157 Å, and 12.876 Å are from Ref. [51]. The classifications $2p^5\ {}^2P°_{3/2} - 2p^4({}^3P)4d\ {}^2F_{5/2}$ at 10.471 Å and $2p^5\ {}^2P°_{1/2} - 2p^4({}^3P)4d\ {}^2D_{3/2}$ at 10.633 Å by Spector *et al.* [46] do not correspond with the results quoted here. In recent work of Chang *et al.* [45], 19 new lines belonging to the above arrays were proposed. However, there appear discrepancies of more than ±0.01 Å between their wavelengths and recalculated ones from the levels quoted here. Furthermore, the $2p^5\ {}^2P°$ splitting derived from their data shows a large range of values, some far from the average. We have therfore omitted their results.

Doschek *et al.* [52] identified the $2s^2 2p^5\ {}^2P°_{3/2,1/2} - 2s2p^6\ {}^2S_{1/2}$ transitions at 88.35±0.02 Å and 99.02±0.02 Å in a laser produced plasma. They were also observed by Lawson and Peacock [40] with a similar light source.

For the ionization energy we use a value calculated by Cheng [53] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [54].

Co XX

O I isoelectronic sequence

Ground state $1s^2 2s^2 2p^4\ {}^3P_2$

Ionization energy 12 942 100 cm^{-1} (1604.62 eV)

Doschek *et al.* [52] classified eight lines of the $2s^22p^4-2s2p^5$ array in the range of 86 – 106 Å. The line at 109.14 Å was identified by Doschek *et al.* [55] as the $2s2p^5\ ^1P_1^\circ - 2p^6\ ^1S_0$ transition. New measurements and additional classifications of the $n = 2-2$ transitions in the extended range of 74 – 145 Å were made by Lawson and Peacock [40], who gave their wavelength uncertainty as ±0.03 Å. The results of Ref. [40] have been tabulated here.

The $2p^4-2p^33s$, $2p^33d$, and $2p^34d$ arrays were identified by Gordon *et al.* [44] in the wavelength ranges of 13.2 – 13.8 Å, 12.2 – 12.6 Å, and 9.6 – 9.9 Å. The uncertainty of the wavelengths is ±0.005 Å. Some blended lines having multiple classifications are included. These transitions were also observed by Chang *et al.* [45], who identified six additional lines, including the $2s^22p^4\ ^1D_2 - 2s2p^43d\ ^1F_3$ forbidden transition. The line at 12.423 Å, classified as arising from the $2p^3(^2P^\circ)3d\ ^3P_2^\circ$ level, disagrees with the levels derived by Gordon *et al.* and has been omitted.

For the ionization energy we use a value calculated by Cheng [53] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [54].

Co XXI

N I isoelectronic sequence

Ground state $1s^22s^22p^3\ ^4S_{3/2}^\circ$

Ionization energy 13 895 500 cm^{-1} (1722.82 eV)

Doschek *et al.* [52] observed nine lines in the range of 85.4 – 125.2 Å, which they assigned to the $2s^22p^3-2s2p^4$ array. Doschek *et al.* [55] identified the $2s2p^4\ ^2D_{5/2} - 2p^5\ ^2P_{3/2}^\circ$ transition at 106.23±0.015 Å. Additional identifications in these arrays were made by Lawson and Peacock [40], who measured wavelengths of 30 lines in the extended range of 75.8 – 130.1 Å. Their wavelengths, obtained from a laser-produced plasma, have uncertainties of ±0.03 Å.

Chang *et al.* [45] identified five lines in the range of 11.5 – 12.3 Å as $2p^3-2p^23d$ transitions. Their identifications, however, have been omitted, because they do not give consistent values for the upper levels.

For the ionization energy we use a value calculated by Cheng [53] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [54].

Co XXII

C I isoelectronic sequence

Ground state $1s^22s^22p^2\ ^3P_0$

Ionization energy 14 892 400 cm^{-1} (1846.42 eV)

The $2s^22p^2-2s2p^3$ array was first identified by Feldman *et al.* [56]. It was more completely observed by Lawson and Peacock [40] with a laser-produced plasma. Wavelengths of 18 lines of this array and 20 lines of the $2s2p^3-2p^4$ array were measured in the range of 78.9 – 170.1 Å with uncertainties of ±0.03 Å. Smoothed values for these wavelengths along the isoelectronic sequence are given by Edlén [57]. They indicate that the value for $2s2p^3\ ^5S_2^\circ$ is wrong.

Chang *et al.* [45] reported the identifications of $2p^2-2p3s$ and $2p^2-2p3d$ transitions in the range of 11.4 – 12.3 Å. However, we have not adopted them because the levels derived from their data are not consistent.

For the ionization energy we use a value calculated by Cheng [53] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [54].

Co XXIII

B I isoelectronic sequence

Ground state $1s^22s^22p\ ^2P_{1/2}^\circ$

Ionization energy 15 818 800 cm^{-1} (1961.28 eV)

New measurements and classifications of the $2s^22p-2s2p^2$ array, improving those of Doschek *et al.* [55] were given by Lawson and Peacock [40] who assigned seven lines in the wavelength range of 93.9 – 147.1 Å to this array. They also identified 17 lines due to the $2s2p^2-2p^3$ array in the range of 103.8 – 171.5 Å. The spin-forbidden $^4P_{5/2} - ^2D_{5/2}^\circ$ transition at 103.80 Å is given as tentative. Edlén [58] assigned the wavelength of 103.718 Å to this transition. Tabulated wavelengths were measured with uncertainties of ±0.03 Å. Smoothed values for these wavelengths along the isoelectronic sequence are given in Ref. [58]. The designations of the two levels $2s2p^2\ ^2P_{1/2}$, $^2S_{1/2}$ were interchanged by Edlén.

The $2s2p^2-2s2p(^3P^\circ)3d$ transitions were first provided by Spector *et al.* [46] and more extensively by Chang *et al.* [45] with 19 spectral lines in the range of 10.7 – 11.2 Å, including the $2s2p^2-2s2p(^1P^\circ)3d$ transitions. However, their identifications of the $2s2p^2\ ^4P_{5/2,3/2} - 2s2p(^3P^\circ)3d\ ^4D_{5/2}^\circ$ lines at 10.901 Å and 10.899 Å are questionable, because the $2s2p^2\ ^4P$ term splitting is inconsistent with that of Lawson and Peacock. Therefore we have tabulated all of their wavelengths as tentative. The uncertainty of the wavelengths is ±0.005 Å.

For the ionization energy we use a value calculated by Cheng [53] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [54].

Co XXIV

Be I isoelectronic sequence

Ground state $1s^22s^2\ ^1S_0$

Ionization energy 17 101 000 cm^{-1} (2120.25 eV)

Lawson and Peacock [40] classified the $2s2p - 2p^2$ array in the range of 128.2−204.1 Å in addition to the $2s^2\ ^1S_0 - 2s2p\ \ ^1P^\circ_1$ resonance line at 125.15 Å. The uncertainty of the wavelengths is ±0.03 Å for lines shorter than 180 Å and ±0.06 Å for longer wavelengths. Smoothed values along the isoelectronic sequence are provided for these wavelengths by Edlén [59,60].

Transition arrays for $n = 2$ to 3 in the wavelength range of 9.9−11.5 Å were reported by Boiko *et al.* [43,61] with a measurement uncertainty of ±0.003 Å. Many of the lines are given as unresolved blended lines. A reobservation of these arrays was made by Chang *et al.* [45], who identified five lines with an uncertainty of ±0.005 Å. They also claim to resolve blended lines identified by Boiko *et al.*, however, we have not adopted these wavelengths. It should be noted that the classifications of seven lines of the $2s2p - 2p3p$, $2p^2 - 2p3d$, and $2s2p - 2s3s$ arrays by Spector *et al.* [46] do not fit with the results quoted here.

For the ionization energy we use a value calculated by Cheng [53] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [54].

Co XXV

Li I isoelectronic sequence

Ground state $1s^22s\ ^2S_{1/2}$

Ionization energy 17 897 000 ± 5000 cm^{-1}
(2219.0 ± 0.6 eV)

Spectral lines of the doublets $2s\ ^2S - 3p\ ^2P^\circ$, $2p\ \ ^2P^\circ - 3d\ ^2D$, and $2p\ \ ^2P^\circ - 3s\ ^2S$ were identified by Chang *et al.* [45] with a wavelength uncertainty of ±0.005 Å. The earlier work of Spector *et al.* [46] provided the $2s\ ^2S_{1/2} - 3p\ \ ^2P^\circ_{1/2}$ and $2p\ ^2P^\circ_{1/2,3/2} - 3d\ \ ^2D_{3/2,5/2}$ transitions.

For the $2s - 2p$ transitions, we have tabulated smoothed values of 178.221 Å and 244.233 Å of Kim *et al.* [62]. Vainshtein and Safronova [63] calculated energy levels of the configurations $1s^2nl$ with $n = 2 - 5$, and $l = s, p$, and d. We use their energy levels adjusted to the $1s^22p$ $^2P^\circ_{1/2,3/2}$ levels of Kim *et al.* by adding 200 cm^{-1}. They also calculated wavelengths of the $1s^22s - 1s2s2p$, $1s^22p - 1s2p^2$, and $1s^22p - 1s2s^2$ transitions. We use their results to derive these autoionizing levels.

The value for the ionization energy was derived by Edlén [64] from a polarization formula.

Co XXVI

He I isoelectronic sequence

Ground state $1s^2\ \ ^1S_0$

Ionization energy 76 979 300 ± 3500 cm^{-1}
(9544.221 ± 0.43 eV)

The best measurements of the $1s^2\ ^1S_0 - 1s2p\ \ ^1P^\circ_1$ line are 1.7122±0.0006 Å by Morita [65] and Morita and Fujita [66] and 1.71110±0.00015 Å by Aglitsky *et al.* [67].

Cheng *et al.* [68] give calculated total energies for the ground state and n=2 singlet states of selected He-like ions. We use a later calculation of both singlet and triplet states by Cheng [69] for all elements from Ti through Cu and Kr for $n = 1$ and 2 configurations. With these data and the binding energy of the H-like ions [70] we obtain the value for the ionization energy of the He-like ions. For the $1s3l$ states we use the level values from Drake [71].

The levels $1s4l$ and $5l$ calculated by Vainshtein and Safronova [63] have been tabulated after increasing them by 1500 cm^{-1} to correspond with corrected values of lower n by Drake. All wavelengths have been derived from differences of the adopted energy levels.

Vainshtein and Safronova also calculated wavelengths of the transitions $1s2s - 2s2p$, $1s2p - 2s^2$, and $1s2p - 2p^2$, which we have compiled without correction.

Co XXVII

H I isoelectronic sequence

Ground state $1s\ \ ^2S_{1/2}$

Ionization energy 80 753 210 cm^{-1} (10 012.13 eV)

Since no observations have been reported, we give wavelengths calculated from the theoretical level energies by Johnson and Soff [70] for the $n = 2$ shell. They are in close agreement with the calculations by Mohr [73]. All levels with $n = 3 - 5$ were calculated by Erickson [74]. For the ns and np ($n = 3 - 5$) levels, Erickson's values for the binding energies were subtracted from the ground state binding energy given by Johnson and Soff [70] to obtain the predicted wavelengths.

Transition probabilities and oscillator strengths were obtained by scaling the data tabulated for the hydrogen spectrum by Wiese *et al.* [75]. The scaling was actually performed for the line strengths S, which for a hydrogen-like ion of nuclear charge Z are reduced according to $S_Z = Z^{-2}S_H$, so that

$$S_{\mathrm{Co\ XXVII}} = S_H(27)^{-2} = S_H/729.$$

The f and A values were then obtained from the usual numerical conversion formulas, given for example in Ref. [76]. For these conversions the accurate wavelengths listed in the Co XXVII table were used, in which relativistic and QED effects in the energies were taken into account. Relativistic effects in the line strengths are only of the order of 1 – 5% for Co XXVII, according to the work by Younger and Weiss [77], and have been neglected.

The value for the ionization energy is from Johnson and Soff [70].

2.7.2. Spectroscopic Data for Co VIII through Co XXVII

Co VIII

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
192.619	$3p^63d^2\ ^1G_4$	$3p^63d4p\ ^3F^o_4$	32 360	551 524		2.2 − 3	4.4+7	E	2°,76*
192.332	$3p^63d^2\ ^3P_1$	$3p^63d4p\ ^3D^o_1$	22 839	542 701		3.3 − 2	2.0+9	D	2°,76*
191.757	1	2	22 839	544 314		1.7 − 1	6.2+9	D	2°,76*
191.645	2	3	24 055	545 834		2.1 − 1	5.4+9	D	2°,76*
191.262	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^1D^o_2$	19 624	542 430		4.2 − 1	1.5+10	D	2°,76*
190.574	$3p^63d^2\ ^3P_2$	$3p^63d4p\ ^3F^o_3$	24 055	548 799		2.7 − 2	7.1+8	E	2°,76*
190.574	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^3D^o_2$	19 624	544 314		1.0 − 1	3.7+9	E	2°,76*
190.342	$3p^63d^2\ ^1G_4$	$3p^63d4p\ ^1F^o_3$	32 360	557 736		1.8	4.7+10	D	2°,76*
189.472	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^3F^o_2$	19 624	547 400		2.0 − 1	7.4+9	E	2°,76*
189.040	$3p^63d^2\ ^1G_4$	$3p^5(^2P^o)3d^3(^2H)\ ^3G^o_5$	32 360	561 346		1.1 − 1	1.9+9	E	2°,76*
188.674	$3p^63d^2\ ^3P_2$	$3p^63d4p\ ^3P^o_1$	24 055	554 082		1.6 − 1	9.9+9	D	2°,76*
188.345	2	2	24 055	554 998		7.0 − 1	2.6+10	D	2°,76*
188.241	1	1	22 839	554 082		1.6 − 1	9.9+9	D	2°,76*
188.165	1	0	22 839	554 287		1.9 − 1	3.6+10	D	2°,76*
188.054	0	1	22 304	554 082		1.6 − 1	1.0+10	D	2°,76*
187.909	1	2	22 839	554 998		1.1 − 1	4.1+9	D	2°,76*
187.375	$3p^63d^2\ ^3P_2$	$3p^63d4p\ ^1F^o_3$	24 055	557 736		2.4 − 2	6.5+8	E	2°,76*
187.092	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^3P^o_1$	19 624	554 082		8.0 − 2	5.2+9	E	2°,76*
185.835	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^1F^o_3$	19 624	557 736		3.3 − 2	8.9+8	D	2°,76*
185.461	$3p^63d^2\ ^3P_2$	$3p^63d4p\ ^1P^o_1$	24 055	563 271		8.5 − 2	5.5+9	E	2°,76*
185.041	1	1	22 839	563 271		3.0 − 3	2.0+8	E	2°,76*
184.861	0	1	22 304	563 271		1.5 − 2	9.8+8	E	2°,76*
184.850	$3p^63d^2\ ^3F_3$	$3p^63d4p\ ^1D^o_2$	1 430	542 430		9.8 − 2	3.9+9	E	2°,76*
184.356	2	2	0	542 430		2.5 − 1	9.9+9	E	2°,76*
184.265	$3p^63d^2\ ^3F_4$	$3p^63d4p\ ^3D^o_3$	3 144	545 834		1.3	3.5+10	D	2°,76*
184.265	2	1	0	542 701		7.0 − 1	4.7+10	D	2°,76*
184.203	3	2	1 430	544 314		9.1 − 1	3.5+10	D	2°,76*
183.686	3	3	1 430	545 834		2.8 − 1	8.0+9	D	2°,76*
183.939	$3p^63d^2\ ^1D_2$	$3p^63d4p\ ^1P^o_1$	19 624	563 271		3.1 − 1	2.0+10	D	2°,76*
183.266	$3p^63d^2\ ^3F_4$	$3p^63d4p\ ^3F^o_3$	3 144	548 799		2.6 − 1	7.3+9	D	2°,76*
183.167	3	2	1 430	547 400		9.1 − 2	3.7+9	D	2°,76*
182.686	3	3	1 430	548 799		2.7 − 1	7.7+9	D	2°,76*
182.686	2	2	0	547 400		2.1 − 1	8.4+9	D	2°,76*
182.355	4	4	3 144	551 524		7.4 − 1	1.7+10	D	2°,76*
181.786	3	4	1 430	551 524		2.9 − 2	6.5+8	D	2°,76*
180.422	$3p^63d^2\ ^3F_3$	$3p^5(^2P^o)3d^3(^2H)\ ^3G^o_3$	1 430	555 699		4.5 − 2	1.3+9	D	2°,76*
179.949	2	3	0	555 699		1.6	4.8+10	D	2°,76*
179.731	3	4	1 430	557 817		3.4	7.8+10	D	2°,76*
179.147	4	5	3 144	561 346		4.6	8.6+10	D	2°,76*
179.068	$3p^63d^2\ ^1G_4$	$3p^5(^2P^o)3d^3(^2H)\ ^1H^o_5$	32 360	590 805		3.5	6.6+10	D	2°,76*
173.742	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^3(^2F)\ ^3D^o_2$	24 055	599 641		2.0 − 1	8.8+9	D	2°,76*
173.561	0	1	22 304	598 440		6.8 − 1	5.0+10	D	2°,76*
173.373	1	2	22 839	599 641		1.3	5.6+10	D	2°,76*
172.776	2	3	24 055	602 844		1.3	3.9+10	D	2°,76*
172.767	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(^2F)\ ^3D^o_1$	19 624	598 440		5.5 − 3	4.1+8	E	2°,76*
172.402	2	2	19 624	599 641		8.5 − 1	3.8+10	E	2°,76*
171.460	2	3	19 624	602 844		2.1	6.6+10	E	2°,76*
171.522	$3p^63d^2\ ^3P_1$	$3p^5(^2P^o)3d^3(^2F)\ ^1D^o_2$	22 839	605 841		3.3 − 1	1.5+10	E	2°,76*
171.107	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^3(^2G)\ ^1F^o_3$	24 055	608 501		1.9	6.1+10	E	2°,76*
170.589	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(^2F)\ ^1D^o_2$	19 624	605 841		2.5	1.2+11	D	2°,76*

Co VIII – Continued

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
170.169	$3p^63d^2\ ^3F_4$	$3p^5(^2P^o)3d^3(^2H)\ ^1H^o_5$	3 144	590 805		1.9 – 1	4.0+9	E	2°, 76*
169.819	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(^2G)\ ^1F^o_3$	19 624	608 501		1.9	6.3+10	D	2°, 76*
169.711	$3p^63d^2\ ^3P_1$	$3p^5(^2P^o)3d^3(^4P)\ ^3P^o_0$	22 839	612 076		6.3 – 1	1.4+11	D	2°, 76*
169.537	2	1	24 055	613 869		5.5 – 1	4.3+10	D	2°, 76*
169.196	1	1	22 839	613 869		5.7 – 1	4.5+10	D	2°, 76*
169.051	0	1	22 304	613 869		5.8 – 1	4.5+10	D	2°, 76*
168.084	2	2	24 055	619 010		2.5	1.2+11	D	2°, 76*
167.738	1	2	22 839	619 010		5.4 – 1	2.6+10	D	2°, 76*
168.921	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^3(^4F)\ ^3F^o_2$	24 055	616 019		2.9 – 2	1.3+9	D	2°, 76*
167.152	$3p^63d^2\ ^3F_3$	$3p^5(^2P^o)3d^3(^2F)\ ^3D^o_2$	1 430	599 641		4.1 – 1	1.9+10	D	2°, 76*
166.256	3	3	1 430	602 844		9.1 – 2	3.1+9	D	2°, 76*
167.016	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(^4F)\ ^3F^o_3$	19 624	618 348		1.8 – 1	6.2+9	E	2°, 76*
165.191	$3p^63d^2\ ^3F_4$	$3p^5(^2P^o)3d^3(^2G)\ ^1F^o_3$	3 144	608 501		1.8 – 1	6.4+9	E	2°, 76*
164.721	3	3	1 430	608 501		1.6 – 1	5.6+9	E	2°, 76*
162.708	$3p^63d^2\ ^3F_3$	$3p^5(^2P^o)3d^3(^4F)\ ^3F^o_2$	1 430	616 019		2.7 – 1	1.4+10	D	2°, 76*
162.57	4	3	3 144	618 348		2.8 – 1	1.0+10	D	2°, 76*
162.337	2	2	0	616 019		4.4	2.2+11	D	2°, 76*
162.095	3	3	1 430	618 348		6.2	2.2+11	D	2°, 76*
161.917	4	4	3 144	620 737		8.9	2.5+11	D	2°, 76*
161.733	2	3	0	618 348		5.0 – 1	1.9+10	D	2°, 76*
161.479	3	4	1 430	620 737		5.6 – 1	1.6+10	D	2°, 76*
158.783	$3p^63d^2\ ^1G_4$	$3p^5(^2P^o)3d^3(^2H)\ ^1G^o_4$	32 360	662 151		1.3+1	3.7+11	D	2°, 76*
158.066	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^3(^4F)\ ^3D^o_3$	24 055	656 715		2.1	7.8+10	D	2°, 76*
157.984	2	2	24 055	657 020		3.1 – 1	1.7+10	D	2°, 76*
157.687	1	2	22 839	657 020		1.4	7.2+10	D	2°, 76*
157.416	1	1	22 839	658 136		3.6 – 1	3.1+10	D	2°, 76*
157.266	0	1	22 304	658 136		5.1 – 1	4.6+10	D	2°, 76*
157.773	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(^2P)\ ^1P^o_1$	19 624	653 446		1.0	8.8+10	D	2°, 76*
156.958	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(^4F)\ ^3D^o_3$	19 624	656 715		1.8 – 1	7.0+9	E	2°, 76*
153.926	$3p^63d^2\ ^1G_4$	$3p^5(^2P^o)3d^3(^2F)\ ^1F^o_3$	32 360	682 051		8.1	3.3+11	D	2°, 76*
153.005	$3p^63d^2\ ^3F_4$	$3p^5(^2P^o)3d^3(^4F)\ ^3D^o_3$	3 144	656 715		7.7	3.2+11	D	2°, 76*
152.597	3	3	1 430	656 715		4.3 – 1	1.8+10	D	2°, 76*
152.534	3	2	1 430	657 020		5.3	3.0+11	D	2°, 76*
152.200	2	2	0	657 020		4.9 – 1	2.8+10	D	2°, 76*
151.944	2	1	0	658 136		3.0	2.8+11	D	2°, 76*
152.896	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^3(^4P)\ ^3S^o_1$	24 055	678 094		2.7	2.5+11	D	2°, 76*
152.597	1	1	22 839	678 094		1.7	1.7+11	D	2°, 76*
150.958	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(^2F)\ ^1F^o_3$	19 624	682 051		6.5	2.6+11	D	2°, 76*
150.701	$3p^63d^2\ ^3P_2$	$3p^5(^2P^o)3d^3(^2D)\ ^1P^o_1$	24 055	687 584		3.9 – 1	3.8+10	E	2°, 76*
149.718	$3p^63d^2\ ^1D_2$	$3p^5(^2P^o)3d^3(^2D)\ ^1P^o_1$	19 624	687 584		2.5	2.5+11	D	2°, 76*
133.985	$3p^63d^2\ ^1S_0$	$3p^63d4f\ ^3D^o_1$	74 247	820 599					2
132.756	$3p^63d^2\ ^1S_0$	$3p^63d4f\ ^1P^o_1$	74 247	827 508		1.4	1.8+11	D	2°, 76*
128.397	$3p^63d^2\ ^1G_4$	$3p^63d4f\ ^1G^o_4$	32 360	811 205		1.9	8.4+10	D	2°, 76*
127.916	$3p^63d^2\ ^1G_4$	$3p^63d4f\ ^3F^o_4$	32 360	814 130		2.7 – 1	1.2+10	E	2°, 76*
125.821	$3p^63d^2\ ^1G_4$	$3p^63d4f\ ^1H^o_5$	32 360	827 140		8.1	3.1+11	D	2°, 76*
125.566	$3p^63d^2\ ^3P_2$	$3p^63d4f\ ^3D^o_3$	24 055	820 450		9.0 – 1	5.5+10	D	2°, 76*
125.350	1	2	22 839	820 605		2.5	2.1+11	D	2°, 76*
125.350	1	1	22 839	820 599		3.3 – 1	4.7+10	D	2°, 76*
125.268	0	1	22 304	820 599		1.2	1.7+11	D	2°, 76*
125.340	$3p^63d^2\ ^3P_2$	$3p^63d4f\ ^1F^o_3$	24 055	821 881		2.8	1.7+11	E	2°, 76*
125.155	$3p^63d^2\ ^1D_2$	$3p^63d4f\ ^1D^o_2$	19 624	818 633		2.0	1.7+11	D	2°, 76*

Co VIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
125.155	$3p^63d^2\ ^3P_2$	$3p^63d4f\ ^3P^o_2$	24 055	823 064		2.2	1.9+11	D	2°, 76*
125.071	2	1	24 055	823 613		5.0 – 1	7.3+10	D	2°, 76*
124.878	1	1	22 839	823 613		6.6 – 1	9.4+10	D	2°, 76*
124.830	1	0	22 839	823 928		4.2 – 1	1.8+11	D	2°, 76*
124.795	0	1	22 304	823 613		9.3 – 2	1.3+10	D	2°, 76*
124.871	$3p^63d^2\ ^1D_2$	$3p^63d4f\ ^3D^o_3$	19 624	820 450		2.7	1.6+11	E	2°, 76*
124.649	$3p^63d^2\ ^1D_2$	$3p^63d4f\ ^1F^o_3$	19 624	821 881		1.2	7.2+10	D	2°, 76*
123.753	$3p^63d^2\ ^3F_4$	$3p^63d4f\ ^1G^o_4$	3 144	811 205		2.2 – 1	1.1+10	E	2°, 76*
123.489	3	4	1 430	811 205		2.1 – 1	1.0+10	E	2°, 76*
123.307	$3p^63d^2\ ^3F_4$	$3p^63d4f\ ^3F^o_4$	3 144	814 130		2.3	1.1+11	D	2°, 76*
123.239	3	2	1 430	812 862		1.5 – 1	1.3+10	D	2°, 76*
123.173	3	3	1 430	813 298		1.8	1.1+11	D	2°, 76*
123.045	3	4	1 430	814 130		4.3 – 1	2.1+10	D	2°, 76*
123.022	2	2	0	812 862		1.5	1.3+11	D	2°, 76*
122.956	2	3	0	813 298		4.7 – 1	2.9+10	D	2°, 76*
122.577	$3p^63d^2\ ^3F_4$	$3p^63d4f\ ^3G^o_4$	3 144	818 958		7.2 – 1	3.6+10	D	2°, 76*
122.488	3	3	1 430	817 839		5.4 – 1	3.4+10	D	2°, 76*
122.472	4	5	3 144	819 657		7.6	3.1+11	D	2°, 76*
122.320	3	4	1 430	818 958		5.4	2.7+11	D	2°, 76*
122.273	2	3	0	817 839		3.9	2.5+11	D	2°, 76*
105.594	$3p^63d^2\ ^1G_4$	$3p^63d5f\ ^3F^o_4$	32 360	979 360	1				2
104.801	$3p^63d^2\ ^1G_4$	$3p^63d5f\ ^1H^o_5$	32 360	986 549	5				2
104.180	$3p^63d^2\ ^3P_2$	$3p^63d5f\ ^1F^o_3$	24 055	983 954	4				2
104.180	$3p^63d^2\ ^3P_1$	$3p^63d5f\ ^3D^o_2$	22 839	982 716	4				2
103.809	$3p^63d^2\ ^1D_2$	$3p^63d5f\ ^3D^o_3$	19 624	982 933	2				2
103.699	$3p^63d^2\ ^1D_2$	$3p^63d5f\ ^1F^o_3$	19 624	983 954	1				2
102.480	$3p^63d^2\ ^3F_3$	$3p^63d5f\ ^1G^o_4$	1 430	977 281					2
102.439	$3p^63d^2\ ^3F_4$	$3p^63d5f\ ^3F^o_4$	3 144	979 360	2				2
102.367	3	3	1 430	978 307	2				2
102.249	2	2	0	978 005	1				2
102.086	$3p^63d^2\ ^3F_4$	$3p^63d5f\ ^3G^o_4$	3 144	982 728	1				2
102.033	4	5	3 144	983 219	4				2
101.904	3	4	1 430	982 728	3				2
101.904	2	3	0	981 316					2

Co IX

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
213.574	$3p^63d\ ^2D_{3/2}$	$3p^5(^2P^o)3d^2(^1G)\ ^2F^o_{5/2}$	0	468 222	300				7
212.907	5/2	7/2	2 451	472 140	300				7
207.180	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1D)\ ^2F^o_{7/2}$	2 451	485 123		2.0 − 1	4.0+9	D−	7°,76*
201.086	5/2	5/2	2 451	499 750		1.0 − 2	2.9+8	E	7°,76*
200.100	3/2	5/2	0	499 750		1.4 − 1	4.0+9	D−	7°,76*
172.917	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2F^o_{5/2}$	2 451	580 759		2.1 − 1	7.8+9	E	7°,76*
172.190	3/2	5/2	0	580 759		2.8	1.1+11	D−	7°,76*
170.695	5/2	7/2	2 451	588 291		4.1	1.2+11	D−	7°,76*
159.972	$3p^63d\ ^2D_{3/2}$	$3p^64p\ ^2P^o_{1/2}$	0	625 109	250				7
159.575	5/2	3/2	2 451	629 117	300				7
158.953	3/2	3/2	0	629 117	100				7
155.669	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2D^o_{5/2}$	2 451	644 843		7.2	3.3+11	D−	7°,76*
155.530	5/2	3/2	2 451	645 408		5.1 − 1	3.5+10	E	7°,76*
155.076	3/2	5/2	0	644 843		5.2 − 1	2.4+10	E	7°,76*
154.942	3/2	3/2	0	645 408		4.8	3.3+11	D−	7°,76*
153.803	$3p^63d\ ^2D_{3/2}$	$3p^5(^2P^o)3d^2(^3P)\ ^2P^o_{1/2}$	0	650 182		1.8	2.6+11	D−	7°,76*
153.308	5/2	3/2	2 451	654 735		3.4	2.4+11	D−	7°,76*
152.733	3/2	3/2	0	654 735		3.8 − 1	2.7+10	E	7°,76*
108.667	$3p^63d\ ^2D_{5/2}$	$3p^64f\ ^2F^o_{7/2}$	2 451	922 690	10				4
108.390	3/2	5/2	0	922 590	9				4
101.410	$3p^63d\ ^2D_{3/2}$	$3p^53d(^3P^o)4s\ ^2P^o_{1/2}$	0	986 100		1.6 − 1	5.1+10	D−	8°,76*
101.107	5/2	3/2	2 451	991 510		2.9 − 1	4.7+10	D−	8°,76*
100.856	3/2	3/2	0	991 510		3.3 − 2	5.4+9	E	8°,76*
100.636	$3p^63d\ ^2D_{5/2}$	$3p^53d(^3F^o)4s\ ^4F^o_{7/2}$	2 451	996 130	1				8
100.210	3/2	5/2	0	997 900	4				8
99.921	$3p^63d\ ^2D_{5/2}$	$3p^53d(^3F^o)4s\ ^2F^o_{7/2}$	2 451	1 003 240		6.6 − 1	5.3+10	D−	8°,76*
99.284	5/2	5/2	2 451	1 009 670		3.1 − 2	3.5+9	E	8°,76*
99.042	3/2	5/2	0	1 009 670		4.4 − 1	4.9+10	D−	8°,76*
97.854	$3p^63d\ ^2D_{5/2}$	$3p^53d(^3D^o)4s\ ^4D^o_{7/2}$	2 451	1 024 380	4				8
97.587	5/2	5/2	2 451	1 027 170	4				8
97.355	3/2	5/2	0	1 027 170	2				8
96.541	$3p^63d\ ^2D_{5/2}$	$3p^53d(^1F^o)4s\ ^2F^o_{7/2}$	2 451	1 038 280	3				8
96.305	$3p^63d\ ^2D_{5/2}$	$3p^53d(^3D^o)4s\ ^2D^o_{3/2}$	2 451	1 040 830	2				8
96.076	5/2	5/2	2 451	1 043 280	6				8
96.076	3/2	3/2	0	1 040 830	6				8
95.852	3/2	5/2	0	1 043 280	2				8
88.636	$3p^63d\ ^2D_{5/2}$	$3p^65f\ ^2F^o_{7/2}$	2 451	1 130 690	8				4
88.446	3/2	5/2	0	1 130 660	7				4
80.544	$3p^63d\ ^2D_{5/2}$	$3p^66f\ ^2F^o_{7/2}$	2 451	1 244 010	6				4
80.388	3/2	5/2	0	1 243 970	5				4
76.305	$3p^63d\ ^2D_{5/2}$	$3p^67f\ ^2F^o_{7/2}$	2 451	1 313 020	4				4
76.160	3/2	5/2	0	1 313 020	3				4
73.798	$3p^63d\ ^2D_{5/2}$	$3p^68f\ ^2F^o_{7/2}$	2 451	1 357 500	3				4
73.665	3/2	5/2	0	1 357 500	2				4
72.177	$3p^63d\ ^2D_{5/2}$	$3p^69f\ ^2F^o_{7/2}$	2 451	1 387 960	2				4
72.048	3/2	5/2	0	1 387 960	1				4
71.053	$3p^63d\ ^2D_{5/2}$	$3p^610f\ ^2F^o_{7/2}$	2 451	1 409 880	1				4
70.928	3/2	5/2	0	1 409 880					4

Co X

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
200.893^{P}	$3p^6\ ^1S_0$	$3p^53d\ ^3D^o_1$	0	497 780					12
158.873	$3p^6\ ^1S_0$	$3p^5(^2P^o)3d\ ^1P^o_1$	0	629 430		2.5	2.2+11	C	6°, 76*
111.542	$3p^5(^2P^o)3d\ ^1P^o_1$	$3p^5(^2P^o_{1/2})4f\ ^2[\frac{5}{2}]_2$	629 430	1 525 950	4				11
99.596^{L}	$3p^5(^2P^o)3d\ ^1F^o_3$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_4$			4				11
98.261^{L}	$3p^5(^2P^o)3d\ ^3D^o_3$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_4$			8				11
97.924^{L}	$3p^5(^2P^o)3d\ ^1F^o_3$	$3p^5(^2P^o_{1/2})4f\ ^2[\frac{7}{2}]_4$			5				11
97.575^{L}	$3p^5(^2P^o)3d\ ^3D^o_2$	$3p^5(^2P^o_{1/2})4f\ ^2[\frac{7}{2}]_3$			5				11
97.123^{L}	$3p^5(^2P^o)3d\ ^1D^o_2$	$3p^5(^2P^o_{1/2})4f\ ^2[\frac{5}{2}]_3$			3				11
96.300^{L}	$3p^5(^2P^o)3d\ ^3F^o_2$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_3$			5				11
96.215^{L}	$3p^5(^2P^o)3d\ ^3F^o_3$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{9}{2}]_4$			6				11
96.047^{L}	4	5			10				11
95.109^{L}	$3p^5(^2P^o)3d\ ^3P^o_2$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{3}{2}]_2$			2				11
94.692^{L}	1	1			1				11
94.517^{L}	1	2			3				11
94.431^{L}	0	1			2				11
94.789^{L}	$3p^5(^2P^o)3d\ ^3P^o_2$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{5}{2}]_3$			1				11
90.474	$3p^6\ ^1S_0$	$3p^5(^2P^o)4s\ ^3P^o_1$	0	1 105 290		1.6 − 1	4.3+10	D	4°, 76*
88.994	$3p^6\ ^1S_0$	$3p^5(^2P^o)4s\ ^1P^o_1$	0	1 123 670		2.3 − 1	6.5+10	D	4°, 76*
72.454	$3p^6\ ^1S_0$	$3p^5(^2P^o)4d\ ^3P^o_1$	0	1 380 190		3.9 − 1	1.7+11	D	4°, 76*
71.488	$3p^6\ ^1S_0$	$3p^5(^2P^o)4d\ ^1P^o_1$	0	1 398 800		2.0 − 1	8.7+10	D	4°, 76*
63.017	$3p^6\ ^1S_0$	$3p^5(^2P^o)5s\ ^3P^o_1$	0	1 586 870					11
62.332	$3p^6\ ^1S_0$	$3p^5(^2P^o)5s\ ^1P^o_1$	0	1 604 310					11

Co XI

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
5168.[C]	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^5\ ^2P^o_{1/2}$	0	19 345		M1	1.3+2	B	13, 76*
339.81	$3s^23p^5\ ^2P^o_{1/2}$	$3s3p^6\ ^2S_{1/2}$	19 345	313 630		6.6 − 2	1.9+9	C−	15°, 76*
318.85	$_{3/2}$	$_{1/2}$	0	313 630		1.37 − 1	4.50+9	C−	9°, 76*
177.586	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)3d\ ^2S_{1/2}$	19 345	582 510		4.14 − 1	4.38+10	C−	6°, 76*
171.668	$_{3/2}$	$_{1/2}$	0	582 510		1.2	1.3+11	C−	6°, 76*
170.337	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)3d\ ^2P_{3/2}$	19 345	606 420	2				6
168.327	$_{1/2}$	$_{1/2}$	19 345	613 480	90				6
164.913	$_{3/2}$	$_{3/2}$	0	606 420	120				6
162.998	$_{3/2}$	$_{1/2}$	0	613 480	1				6
163.323	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)3d\ ^2D_{3/2}$	19 345	631 680		2.98	1.86+11	C	6°, 76*
162.565	$_{3/2}$	$_{5/2}$	0	615 140		4.60	1.94+11	C	6°, 76*
158.278	$_{3/2}$	$_{3/2}$	0	631 680		7.2 − 2	4.7+9	D	6°, 76*
89.31[L]	$3s^23p^4(^1D)3d\ ^2F_{7/2}$	$3s^23p^4(^1D)4f\ ^2G^o_{9/2}$							18
88.52[L]	$3s^23p^4(^3P)3d\ ^2F_{7/2}$	$3s^23p^4(^3P)4f\ ^2G^o_{9/2}$							18
88.07[L]	$_{5/2}$	$_{7/2}$							18
88.20[L]	$3s^23p^4(^1S)3d\ ^2D_{5/2}$	$3s^23p^4(^1S)4f\ ^2F^o_{7/2}$							18
87.78[L]	$_{3/2}$	$_{5/2}$							18
87.49[L]	$3s^23p^4(^3P)3d\ ^4F_{7/2}$	$3s^23p^4(^3P)4f\ ^4G^o_{9/2}$							10
87.27[L]	$_{9/2}$	$_{11/2}$							10
86.95[L]	$_{3/2}$	$_{5/2}$							10
86.87[L]	$_{5/2}$	$_{7/2}$							10
87.35[L]	$3s^23p^4(^1D)3d\ ^2G_{9/2}$	$3s^23p^4(^1D)4f\ ^2H^o_{11/2}$							10
84.72[L]	$3s^23p^4(^3P)3d\ ^4D_{7/2}$	$3s^23p^4(^3P)4f\ ^4F^o_{9/2}$							10
84.67	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^3P)4s\ ^4P_{5/2}$	0	1 181 100					10
84.039	$_{3/2}$	$_{3/2}$	0	1 189 920	2				14
83.861	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)4s\ ^2P_{1/2}$	19 345	1 211 780	1				14
83.190	$_{3/2}$	$_{3/2}$	0	1 202 070	3				14
82.527	$_{3/2}$	$_{1/2}$	0	1 211 780					14
82.759	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)4s\ ^2D_{3/2}$	19 345	1 227 710	2				14
81.507	$_{3/2}$	$_{5/2}$	0	1 226 890	3				14
67.97	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^3P)4d\ ^2D_{5/2}$	0	1 471 200					10
66.49	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)4d\ ^2D_{3/2}$	19 345	1 523 400					10
66.19	$_{3/2}$	$_{5/2}$	0	1 510 800					10

Co XII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
$6319.^{C}$	$3s^23p^4\ ^3P_2$	$3s^23p^4\ ^3P_1$	0	15 820		M1	8.4+1	C+	76*
3801.2	$3s^23p^4\ ^3P_1$	$3s^23p^4\ ^1D_2$	15 820	42 120		M1	1.3+1	E	13°, 76*
2373.4^{C}	2	2	0	42 120		M1	1.6+2	E	76*
1368.7^{C}	$3s^23p^4\ ^3P_1$	$3s^23p^4\ ^1S_0$	15 820	88 880		M1	1.6+3	E	76*
343.86	$3s^23p^4\ ^3P_1$	$3s3p^5\ ^3P^o_2$	15 820	306 640	1				15
332.66^{T}	1	0	15 820	316 430?					15
332.01	0	1	17 070	318 280	1				15
330.62	1	1	15 820	318 280	1				15
326.12	2	2	0	306 640		1.8 − 1	2.3+9	E	15°, 76*
314.19	2	1	0	318 280	2				15
286.64	$3s^23p^4\ ^1D_2$	$3s3p^5\ ^1P^o_1$	42 120	390 990		3.3 − 1	8.8+9	D	9°, 76*
180.45	$3s^23p^4\ ^3P_1$	$3s^23p^3(^2D^o)3d\ ^3P^o_2$	15 820	569 990					9
175.44	2	2	0	569 990		2.8	1.2+11	D	9°, 76*
172.41	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)3d\ ^1D^o_2$	42 120	622 130		2.9	1.3+11	D	9°, 76*
172.33	$3s^23p^4\ ^1S_0$	$3s^23p^3(^2D^o)3d\ ^1P^o_1$	88 880	669 160		2.06	1.54+11	C−	9°, 76*
170.33	$3s^23p^4\ ^3P_1$	$3s^23p^3(^4S^o)3d\ ^3D^o_2$	15 820	602 920					9
169.04	0	1	17 070	608 660					9
168.68	1	1	15 820	608 660					9
168.34	2	3	0	594 040					9
165.86	2	2	0	602 920					9
169.91	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)3d\ ^1F^o_3$	42 120	630 670		5.30	1.75+11	C−	9°, 76*
80.19^{L}	$3s^23p^3(^2D^o)3d\ ^3G^o_5$	$3s^23p^3(^2D^o)4f\ ^3H_6$							10
80.14^{L}	4	5							10
79.31^{L}	$3s^23p^33d\ ^5G^o_5$	$3s^23p^34f\ ^5F_5$							10
79.21^{L}	3	4							10
63.80	$3s^23p^4\ ^3P_2$	$3s^23p^3(^4S^o)4d\ ^3D^o_3$	0	1 567 400					10
63.70	$3s^23p^4\ ^1S_0$	$3s^23p^3(^2D^o)4d\ ^1P^o_1$	88 880	1 658 800					10
63.60	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)4d\ ^1D^o_2$	42 120	1 614 400					10
63.47	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)4d\ ^1F^o_3$	42 120	1 617 700					10

Co XIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2791.7^{C}	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^3\ ^2P^o_{1/2}$	43 650	79 460		M1	1.1+2	C	76*
2598.^{C}	$_{5/2}$	$_{3/2}$	49 690	88 170		M1	1.3+2	C	76*
2245.5^{C}	$_{3/2}$	$_{3/2}$	43 650	88 170		M1	3.5+2	C	76*
2290.2^{C}	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^3\ ^2D^o_{3/2}$	0	43 650		M1	9.0+1	C	76*
1258.5^{C}	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^3\ ^2P^o_{1/2}$	0	79 460		M1	2.8+2	D	76*
1134.17^{C}	$_{3/2}$	$_{3/2}$	0	88 170		M1	4.7+2	C	76*
360.54^{C}	$3s^23p^3\ ^2P^o_{3/2}$	$3s3p^4\ ^2D_{3/2}$	88 170	365 530		2.4 − 3	3.1+7	E	76*
357.04^{C}	$_{3/2}$	$_{5/2}$	88 170	368 250		7.6 − 2	6.8+8	D	76*
349.56^{C}	$_{1/2}$	$_{3/2}$	79 460	365 530		2.4 − 2	3.4+8	D	76*
338.80	$3s^23p^3\ ^4S^o_{3/2}$	$3s3p^4\ ^4P_{5/2}$	0	295 160		1.9 − 1	1.8+9	D	15°, 76*
325.70	$_{3/2}$	$_{3/2}$	0	307 030		1.3 − 1	2.1+9	D	15°, 76*
320.40	$_{3/2}$	$_{1/2}$	0	312 110		6.4 − 2	2.1+9	D	15°, 76*
316.62^{C}	$3s^23p^3\ ^2D^o_{5/2}$	$3s3p^4\ ^2D_{3/2}$	49 690	365 530		1.9 − 3	3.2+7	E	76*
313.91	$_{5/2}$	$_{5/2}$	49 690	368 250		2.9 − 1	3.3+9	D	15°, 76*
310.67	$_{3/2}$	$_{3/2}$	43 650	365 530		2.4 − 1	4.1+9	D	15°, 76*
308.07^{C}	$_{3/2}$	$_{5/2}$	43 650	368 250		1.5 − 3	1.8+7	E	76*
271.16	$3s^23p^3\ ^2D^o_{5/2}$	$3s3p^4\ ^2P_{3/2}$	49 690	418 480	5				15
263.41	$_{3/2}$	$_{1/2}$	43 650	423 290	2				15
215.19^{C}	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^3P)3d\ ^4P_{3/2}$	88 170	552 880		7.2 − 3	2.5+8	E	76*
213.38^{C}	$_{3/2}$	$_{1/2}$	88 170	556 820		1.0 − 2	7.2+8	E	76*
209.49^{C}	$_{1/2}$	$_{1/2}$	79 460	556 820		8.8 − 3	6.7+8	E	76*
200.72^{C}	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^4P_{5/2}$	49 690	547 890		5.4 − 2	1.6+9	E	76*
198.73^{C}	$_{5/2}$	$_{3/2}$	49 690	552 880		1.2 − 2	5.0+8	E	76*
198.32^{C}	$_{3/2}$	$_{5/2}$	43 650	547 890		2.3 − 2	6.5+8	E	76*
194.87^{C}	$_{3/2}$	$_{1/2}$	43 650	556 820		5.2 − 2	4.7+9	E	76*
198.15^{C}	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2D_{3/2}$	88 170	592 830		1.2 − 2	5.2+8	E	76*
197.62^{C}	$_{3/2}$	$_{5/2}$	88 170	594 200		2.4 − 1	7.0+9	D	76*
194.79^{C}	$_{1/2}$	$_{3/2}$	79 460	592 830		1.7 − 1	7.5+9	D	76*
188.89	$3s^23p^3\ ^2P^o_{1/2}$	$3s^23p^2(^1D)3d\ ^2P_{1/2}$	79 460	608 870					9
188.42	$_{3/2}$	$_{3/2}$	88 170	618 880		1.2	5.4+10	E	9°, 76*
185.39	$_{1/2}$	$_{3/2}$	79 460	618 880		4.0 − 1	1.9+10	E	9°, 76*
184.11^{C}	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)3d\ ^2D_{3/2}$	49 690	592 830		2.5 − 1	1.3+10	D	76*
183.65	$_{5/2}$	$_{5/2}$	49 690	594 200		1.5	4.9+10	D	9°, 76*
182.09	$_{3/2}$	$_{3/2}$	43 650	592 830		1.3	6.5+10	D	9°, 76*
181.64^{C}	$_{3/2}$	$_{5/2}$	43 650	594 200		4.8 − 2	1.8+9	D	76*
182.52	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)3d\ ^4P_{5/2}$	0	547 890		2.7	8.9+10	D	9°, 76*
180.87	$_{3/2}$	$_{3/2}$	0	552 880		1.8	9.4+10	D	9°, 76*
179.59	$_{3/2}$	$_{1/2}$	0	556 820		9.2 − 1	9.4+10	D	9°, 76*
178.98	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^3P)3d\ ^2D_{5/2}$	88 170	646 890					9
175.77	$_{1/2}$	$_{3/2}$	79 460	648 390					9
175.69^{C}	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)3d\ ^2P_{3/2}$	49 690	618 880		1.6 − 2	8.7+8	E	76*
173.84^{C}	$_{3/2}$	$_{3/2}$	43 650	618 880		3.2 − 2	1.7+9	E	76*
174.82	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)3d\ ^2F_{7/2}$	49 690	621 710		4.2	1.1+11	E	9°, 76*
168.29^{C}	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2D_{5/2}$	0	594 200		5.2 − 3	2.1+8	E	76*
74.38^{L}	$3s^23p^2(^1D)3d\ ^2G_{9/2}$	$3s^23p^2(^1D)4f\ ^2H^o_{11/2}$							10
74.03^{L}	$_{7/2}$	$_{9/2}$							10
73.86^{L}	$3s^23p^2(^3P)3d\ ^4D_{7/2}$	$3s^23p^2(^3P)4f\ ^4F^o_{9/2}$							10
73.66^{L}	$3s^23p^2(^3P)3d\ ^4F_{9/2}$	$3s^23p^2(^3P)4f\ ^4G^o_{11/2}$							10
73.58^{L}	$_{7/2}$	$_{9/2}$							10
72.66	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^24d\ ^2D_{5/2}$	88 170	1 464 400					18
72.56	$_{3/2}$	$_{3/2}$	88 170	1 466 300					18

Co XIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
72.02	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^24d\ ^2P_{1/2}$	43 650	1 432 200					18
71.84	$_{5/2}$	$_{3/2}$	49 690	1 441 700					18
70.68	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^24d\ ^2D_{5/2}$	49 690	1 464 500					18
69.83	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^24d\ ^4P_{5/2}$	0	1 432 000					18
60.11	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)4d\ ^2D_{5/2}$	88 170	1 751 800					18
59.99	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^2(^3P)4d\ ^2F_{5/2}$	43 650	1 710 600					18
59.86	$_{5/2}$	$_{7/2}$	49 690	1 720 300					18
59.53	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^24d\ ^4D_{7/2}$	49 690	1 729 500					18

Co XIV

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
9242.2^P	$3s^23p^2\ ^3P_1$	$3s^23p^2\ ^3P_2$	11 844	22 661		M1	1.44+1	C+	19°,76*
8440.8^P	$_0$	$_1$	0	11 844		M1	2.99+1	C+	19°,76*
3099.2^P	$3s^23p^2\ ^3P_2$	$3s^23p^2\ ^1D_2$	22 661	54 921		M1	1.2+2	E	19°,76*
2320.4^P	$_1$	$_2$	11 844	54 921		M1	1.1+2	E	19°,76*
1120.6^P	$3s^23p^2\ ^3P_1$	$3s^23p^2\ ^1S_0$	11 844	101 080		M1	1.6+3	E	19°,76*
384.68^C	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^3D^\circ_3$	54 921	314 880		1.9 − 2	1.2+8	E	76*
342.21	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3D^\circ_3$	22 661	314 880		1.7 − 1	1.4+9	D	15°,76*
334.21	$_1$	$_2$	11 844	311 050		1.4 − 1	1.7+9	D	15°,76*
298.42	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3P^\circ_2$	22 661	357 760		2.5 − 1	3.7+9	D	15°,76*
296.66	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^1D^\circ_2$	54 921	392 010	4				15
239.33	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^1P^\circ_1$	54 921	472 750	7				15
236.11	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3S^\circ_1$	22 661	446 180	9				15
230.34	$_1$	$_1$	11 844	446 180	5				15
224.13	$_0$	$_1$	0	446 180	3				15
207.85	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^1D^\circ_2$	54 921	536 040					9
203.34^C	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^3D^\circ_3$	54 921	546 710		2.0 − 2	4.5+8	E	76*
200.75	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^3P^\circ_2$	22 661	520 800					9
197.01	$_2$	$_1$	22 661	530 230					9
196.48	$_1$	$_2$	11 844	520 800					9
188.60	$_0$	$_1$	0	530 230					9
195.66	$3s^23p^2\ ^1S_0$	$3s^23p3d\ ^1P^\circ_1$	101 080	612 170		1.0	6.0+10	D	9°,76*
191.76	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^3D^\circ_1$	22 661	544 100					9
190.82	$_2$	$_3$	22 661	546 710		2.7	7.1+10	D	9°,76*
190.65	$_2$	$_2$	22 661	547 230					9
187.89	$_1$	$_1$	11 844	544 100					9
186.79	$_1$	$_2$	11 844	547 230					9
190.75	$3s^23p^2\ ^3P_1$	$3s^23p3d\ ^1D^\circ_2$	11 844	536 040					9
184.41	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^1F^\circ_3$	54 921	597 250		2.6	7.2+10	C	9°,76*
174.04^C	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^1F^\circ_3$	22 661	597 250		1.4 − 1	4.2+9	E	76*
163.35^C	$3s^23p^2\ ^3P_0$	$3s^23p3d\ ^1P^\circ_1$	0	612 170		6.5 − 3	5.4+8	E	76*
74.379	$3s^23p3d\ ^1P^\circ_1$	$3s^23p4f\ ^1D_2$	612 170	1 956 600					20
73.402	$3s^23p3d\ ^1F^\circ_3$	$3s^23p4f\ ^1G_4$	597 250	1 959 600		5.3	7.3+11	E	20°,76*
71.493^T	$3s^23p3d\ ^3D^\circ_3$	$3s^23p4f\ ^3F_4$	546 710	1 945 400?					20
$70.698^{T,L}$	$3s^23p3d\ ^3P^\circ_0$	$3s^23p4f\ ^3D_1$							20
69.017^L	$3s^23p3d\ ^3F^\circ_3$	$3s^23p4f\ ^3G_4$							20
68.807^L	$_4$	$_5$				6.4	8.2+11	D	20°,76*
67.069	$3s^23p^2\ ^1D_2$	$3s^23p4s\ ^1P^\circ_1$	54 921	1 545 920					10
66.195^T	$3s3p^3\ ^1D^\circ_2$	$3s^23p4f\ ^3G_3$	392 010	1 902 700?					20
66.050	$3s^23p^2\ ^3P_2$	$3s^23p4s\ ^3P^\circ_2$	22 661	1 536 660					10
65.585	$_1$	$_2$	11 844	1 536 660					10
65.712^T	$3s3p^3\ ^1D^\circ_2$	$3s^23p4f\ ^1F_3$	392 010	1 913 800?					20
56.900	$3s^23p^2\ ^1S_0$	$3s^23p4d\ ^1P^\circ_1$	101 080	1 858 500					20
56.115	$3s^23p^2\ ^1D_2$	$3s^23p4d\ ^1F^\circ_3$	54 921	1 837 000		1.7	5.1+11	D	20°,76*
56.021	$3s^23p^2\ ^3P_2$	$3s^23p4d\ ^3D^\circ_3$	22 661	1 807 700					20
55.782	$_1$	$_1$	11 844	1 804 500					10
55.762	$_1$	$_2$	11 844	1 805 200					20
55.42^T	$_0$	$_1$	0	1 804 500					20

Co XIV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
55.431	$3s^23p^2\ ^3P_2$	$3s^23p4d\ ^3F^\circ_3$	22 661	1 826 700					20
55.10^T	$3s^23p^2\ ^3P_2$	$3s^23p4d\ ^3P^\circ_0$	22 661	1 838 000?					20

Co XV

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4350.6	$3s^23p\ ^2P^o_{1/2}$	$3s^23p\ ^2P^o_{3/2}$	0	22 979		M1	1.09+2	C+	13°, 76*
337.467	$3s3p^2\ ^2D_{3/2}$	$3p^3\ ^2D^o_{3/2}$	322 725	619 050	3				23, 24°
334.852	$_{5/2}$	$_{5/2}$	325 790	624 445	4				23
334.740	$3s3p(^3P^o)3d\ ^4D^o_{3/2}$	$3p^2(^3P)3d\ ^4F_{5/2}$	741 602	1 040 341	1				25
331.812	$_{7/2}$	$_{9/2}$	754 674	1 056 049	1				25
333.62[C]	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2D_{3/2}$	22 979	322 725		4.0 − 3	6.0+7	E	76*
330.247	$_{3/2}$	$_{5/2}$	22 979	325 790		2.0 − 1	2.1+9	D	23°, 76*
309.849	$_{1/2}$	$_{3/2}$	0	322 725	bl	1.6 − 1	2.7+9	D	23°, 76*
323.556	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	$3p^2(^3P)3d\ ^4F_{7/2}$	738 955	1 048 021	1				25
295.518	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	$3p^2(^3P)3d\ ^4D_{7/2}$	738 955	1 077 344	2				25
289.175	$3s3p(^3P^o)3d\ ^4F^o_{9/2}$	$3p^2(^3P)3d\ ^4F_{9/2}$	710 230	1 056 049	1				25
287.564	$_{5/2}$	$_{5/2}$	692 464	1 040 341					25
287.156	$_{7/2}$	$_{7/2}$	699 778	1 048 021	1				25
285.317	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	$3p^2(^1D)3d\ ^2D_{5/2}$	754 674	1 105 136	2				25
277.964	$3s3p(^3P^o)3d\ ^2F^o_{7/2}$	$3p^2(^1S)3d\ ^2D_{5/2}$	815 014	1 174 753	1				25
264.729	$_{5/2}$	$_{5/2}$	796 989	1 174 753	1				25
275.361	$3s3p(^3P^o)3d\ ^2F^o_{7/2}$	$3p^2(^3P)3d\ ^2F_{5/2}$	815 014	1 178 172	1				25
273.741	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	$3p^2(^3P)3d\ ^4P_{5/2}$	754 674	1 119 966	1				25
273.116	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	$3p^2(^1D)3d\ ^2D_{5/2}$	738 955	1 105 136	1				25
272.855	$3s^23d\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	508 793	875 288	7				23
268.424	$_{3/2}$	$_{5/2}$	506 230	878 778	4				23
272.389	$3s3p(^3P^o)3d\ ^4F^o_{9/2}$	$3p^2(^3P)3d\ ^4D_{7/2}$	710 230	1 077 344	2				25
271.267	$_{7/2}$	$_{5/2}$	699 778	1 068 418	1				25
266.416	$_{5/2}$	$_{3/2}$	692 464	1 067 817	1				25
265.990	$_{5/2}$	$_{5/2}$	692 464	1 068 418	1				25
272.159	$3s3p^2\ ^2D_{3/2}$	$3p^3\ ^2P^o_{1/2}$	322 725	690 171	2				23
271.126	$_{5/2}$	$_{3/2}$	325 790	694 620	2				23
271.83[C]	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2S_{1/2}$	22 979	390 855		1.7 − 2	7.6+8	E	76*
255.852	$_{1/2}$	$_{1/2}$	0	390 855	bl	4.2 − 1	2.2+10	E	23°, 76*
270.378	$3s3p^2\ ^4P_{5/2}$	$3p^3\ ^4S^o_{3/2}$	263 189	633 036		7.8 − 1	1.7+10	D	23°, 76*
262.249	$_{3/2}$	$_{3/2}$	251 699	633 036		5.2 − 1	1.3+10	D	23°, 76*
255.828	$_{1/2}$	$_{3/2}$	242 124	633 036	bl	2.8 − 1	7.3+9	D	23°, 76*
269.690	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	$3p^2(^3P)3d\ ^2D_{5/2}$	862 878	1 233 674	1				25
255.762[T]	$3s^23d\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2D^o_{3/2}$	508 793	899 693					23
253.239	$_{5/2}$	$_{5/2}$	508 793	903 677	4				23
255.113	$3s^23d\ ^2D_{3/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	506 230	898 240	3				23
251.949	$_{3/2}$	$_{3/2}$	506 230	903 152	2				23
253.326	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2P_{1/2}$	22 979	417 717		4.4 − 1	2.4+10	E	23°, 76*
247.740	$_{3/2}$	$_{3/2}$	22 979	426 629		1.36	3.7+10	C−	23°, 76*
239.376	$_{1/2}$	$_{1/2}$	0	417 717	bl	2.2 − 1	1.3+10	E	23°, 76*
234.385	$_{1/2}$	$_{3/2}$	0	426 629		2.80 − 1	8.5+9	C−	23°, 76*
246.548	$3s3p(^1P^o)3d\ ^2F^o_{5/2}$	$3s3d^2\ ^2G_{7/2}$	878 778	1 284 379	1				25
244.274	$_{7/2}$	$_{9/2}$	875 288	1 284 664	1				25
244.480	$3s3p(^3P^o)3d\ ^2D^o_{3/2}$	$3p^2(^3P)3d\ ^2F_{5/2}$	769 138	1 178 172	1				25
241.671	$_{5/2}$	$_{7/2}$	770 046	1 183 832	1				25
233.807	$3s3p(^1P^o)3d\ ^2D^o_{5/2}$	$3s3d^2\ ^2F_{7/2}$	903 677	1 331 380	1				25
232.592	$_{3/2}$	$_{5/2}$	899 693	1 329 630	bl				25
225.083	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2D^o_{5/2}$	325 790	770 046	3				23
223.992	$_{3/2}$	$_{3/2}$	322 725	769 138					23

Co XV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
222.041	$3s3p(^3P^o)3d\ ^4D^o_{5/2}$	$3s3d^2\ ^4F_{7/2}$	755 594	1 205 961	1				25
220.697	$_{7/2}$	$_{9/2}$	754 674	1 207 784	1				25
216.007	$_{3/2}$	$_{5/2}$	741 602	1 204 550	1				25
211.879	$3s3p^2\ ^2S_{1/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	390 855	862 878	1				23
211.846	$3p^3\ ^4S^o_{3/2}$	$3p^2(^1D)3d\ ^2D_{5/2}$	633 036	1 105 136	1bl				25
210.861	$3s3p^2\ ^2D_{3/2}$	$3s3p(^3P^o)3d\ ^2F^o_{5/2}$	322 725	796 989	2				23
204.394	$_{5/2}$	$_{7/2}$	325 790	815 014	3				23
209.873	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2P^o_{3/2}$	426 629	903 152	2				23
209.620	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2D^o_{5/2}$	426 629	903 677	3				23
207.458	$_{1/2}$	$_{3/2}$	417 717	899 693	3				23
208.029	$3p^3\ ^2D^o_{5/2}$	$3p^2(^1D)3d\ ^2D_{5/2}$	624 445	1 105 136	1				25
203.627	$_{3/2}$	$_{3/2}$	619 050	1 110 144	1				25
206.924	$3s^23p\ ^2P^o_{3/2}$	$3s^23d\ ^2D_{3/2}$	22 979	506 230		2.4 − 1	9.1+9	D	23°, 76*
205.848	$_{3/2}$	$_{5/2}$	22 979	508 793		1.6	4.3+10	D	23°, 76*
197.554	$_{1/2}$	$_{3/2}$	0	506 230		9.0 − 1	3.9+10	D	23°, 76*
205.375	$3p^3\ ^4S^o_{3/2}$	$3p^2(^3P)3d\ ^4P_{5/2}$	633 036	1 119 966	2				25
205.229	$3s3p^2\ ^4P_{3/2}$	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	251 699	738 955	2				23
203.468	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	263 189	754 674	3				23
203.086	$_{5/2}$	$_{5/2}$	263 189	755 594	3				23
199.558	$_{1/2}$	$_{1/2}$	242 124	743 224	1				23
198.451	$_{3/2}$	$_{5/2}$	251 699	755 594	1				23
66.913	$3s^23d\ ^2D_{5/2}$	$3s^24f\ ^2F^o_{7/2}$	508 793	2 003 200					10
66.819	$_{3/2}$	$_{5/2}$	506 230	2 002 800					10
64.480	$3s3p3d\ ^4F^o_{7/2}$	$3s3p4f\ ^4G_{9/2}$	1 449 100	3 000 000					10
64.356	$_{5/2}$	$_{7/2}$	1 446 100	3 000 000					10
64.229	$_{9/2}$	$_{11/2}$	1 443 100	3 000 000					10
53.173	$3s^23p\ ^2P^o_{3/2}$	$3s^24d\ ^2D_{5/2}$	22 979	1 903 600					21
52.583	$_{1/2}$	$_{3/2}$	0	1 901 800					21

Co XVI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
496.543	$3s3d\ ^1D_2$	$3p3d\ ^1D^o_2$	812 929	1 014 316		1.5 − 1	8.1+8	D−	26°,76*
449.391	$3s3p\ ^1P^o_1$	$3p^2\ ^1D_2$	376 323	598 840		2.6 − 1	1.7+9	E	26°,76*
402.171	$3s3p\ ^1P^o_1$	$3p^2\ ^3P_2$	376 323	624 984	190				26
390.533^C	$3s^2\ ^1S_0$	$3s3p\ ^3P^o_1$	0	256 060		3.7 − 3	5.4+7	E	26,76*
380.759^C	$3s3d\ ^3D_3$	$3p3d\ ^3F^o_2$	728 136	990 769		1.2 − 3	1.1+7	E	76*
377.779	2	2	726 039	990 769		1.1 − 1	9.8+8	D	26°,76*
375.886	1	2	724 731	990 769		3.6 − 1	3.4+9	D−	26°,76*
363.98	3	3	728 136	1 002 876		1.6 − 1	1.2+9	C	29°,76*
361.223	2	3	726 039	1 002 876		6.5 − 1	4.8+9	C−	26°,76*
345.996	3	4	728 136	1 017 157		1.09	6.7+9	C	26°,76*
310.324	$3s3d\ ^1D_2$	$3p3d\ ^1F^o_3$	812 929	1 135 167		2.1	2.0+10	D	26°,76*
310.324	$3s3d\ ^3D_3$	$3p3d\ ^3P^o_2$	728 136	1 050 383	440				26
294.575^C	2	1	726 039	1 065 511		1.3 − 1	3.3+9	E	76*
293.721^C	1	0	724 731	1 065 190		1.6 − 1	1.2+10	C	76*
293.44	1	1	724 731	1 065 511		3.3 − 1	8.5+9	E	29°,76*
309.85	$3s3d\ ^3D_2$	$3p3d\ ^3D^o_1$	726 039	1 048 776		3.1 − 1	7.2+9	E	29°,76*
308.599^C	1	1	724 731	1 048 776		9.6 − 2	2.2+9	E	76*
298.037	3	3	728 136	1 063 667		7.7 − 2	8.3+8	C−	26°,76*
296.184^C	2	3	726 039	1 063 667		2.1 − 1	2.2+9	C	76*
294.185	2	2	726 039	1 065 955	190				26
307.300	$3s3p\ ^3P^o_2$	$3p^2\ ^1D_2$	273 414	598 840		1.8 − 1	2.5+9	E	26°,76*
291.735	1	2	256 060	598 840		9.0 − 2	1.4+9	E	26°,76*
302.94	$3s3p\ ^1P^o_1$	$3p^2\ ^1S_0$	376 323	706 420		3.0 − 1	2.2+10	C−	29°,76*
302.659	$3s3p\ ^3P^o_2$	$3p^2\ ^3P_1$	273 414	603 814		3.3 − 1	7.9+9	C	26°,76*
298.444	1	0	256 060	591 131		2.6 − 1	2.0+10	C	26°,76*
287.564	1	1	256 060	603 814		2.0 − 1	5.4+9	C	26°,76*
284.434	2	2	273 414	624 984		8.0 − 1	1.3+10	D	26°,76*
281.902	0	1	249 081	603 814		2.8 − 1	7.8+9	C	26°,76*
271.057	1	2	256 060	624 984		2.6 − 1	4.6+9	D	26°,76*
298.30	$3s3d\ ^1D_2$	$3p3d\ ^1P^o_1$	812 929	1 148 160		5.5 − 1	1.4+10	D	29°,76*
285.77	$3p3d\ ^1P^o_1$	$3d^2\ ^1D_2$	1 148 160	1 498 090	1				32
271.437	$3p3d\ ^1F^o_3$	$3d^2\ ^1G_4$	1 135 167	1 503 577	5				32
265.729	$3s^2\ ^1S_0$	$3s3p\ ^1P^o_1$	0	376 323		7.96 − 1	2.51+10	C+	26°,76*
256.86	$3p^2\ ^3P_2$	$3p3d\ ^1D^o_2$	624 984	1 014 316	2				29
250.224	$3p3d\ ^3D^o_2$	$3d^2\ ^3F_3$	1 065 955	1 465 589	2				32
247.199	3	4	1 063 667	1 468 205	4				32
241.157	1	2	1 048 776	1 463 403	2				32
240.858	$3p3d\ ^3P^o_2$	$3d^2\ ^3F_3$	1 050 383	1 465 589	1				32
240.688	$3p^2\ ^1D_2$	$3p3d\ ^1D^o_2$	598 840	1 014 316		6.5 − 1	1.5+10	E	26°,76*
235.965^C	$3p^2\ ^3P_2$	$3p3d\ ^3D^o_1$	624 984	1 048 776		7.0 − 3	2.8+8	E	76*
227.955	2	3	624 984	1 063 667		1.3	2.4+10	D−	26°,76*
226.772	2	2	624 984	1 065 955	130				26
224.738^C	1	1	603 814	1 048 776		1.1 − 1	4.6+9	E	76*
218.51	0	1	591 131	1 048 776		6.0 − 1	2.8+10	E	29°,76*
216.384	1	2	603 814	1 065 955	90				26
229.037	$3s3p\ ^1P^o_1$	$3s3d\ ^1D_2$	376 323	812 929		1.8	4.5+10	D	26°,76*
228.276	$3p3d\ ^3D^o_2$	$3d^2\ ^3P_2$	1 065 955	1 504 024	1				32
221.08	1	0	1 048 776	1 501 101					32
227.188	$3p3d\ ^1P^o_1$	$3d^2\ ^1S_0$	1 148 160	1 588 324	1				32
227.001^C	$3p^2\ ^3P_2$	$3p3d\ ^3P^o_1$	624 984	1 065 511		1.6 − 1	6.9+9	E	76*
223.928	1	2	603 814	1 050 383	130				26
216.74	1	0	603 814	1 065 190		1.6 − 1	2.3+10	C−	29°,76*
216.59	1	1	603 814	1 065 511		3.3 − 1	1.6+10	E	29°,76*

Co XVI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
226.38	$3p^{2}\ {}^{1}S_{0}$	$3p3d\ {}^{1}P^{o}_{1}$	706 420	1 148 160		6.0 − 1	2.6+10	C−	29°, 76*
221.702	$3p3d\ {}^{3}F^{o}_{4}$	$3d^{2}\ {}^{3}F_{4}$	1 017 157	1 468 205	1				32
216.117	3	3	1 002 876	1 465 589	1				32
211.580	2	2	990 769	1 463 403	1				32
221.574[C]	$3s3p\ {}^{3}P^{o}_{2}$	$3s3d\ {}^{3}D_{1}$	273 414	724 731		1.4 − 2	6.3+8	D−	76*
220.921	2	2	273 414	726 039		2.2 − 1	5.9+9	C−	26°, 76*
219.915	2	3	273 414	728 136		1.20	2.35+10	C−	26°, 76*
213.370	1	1	256 060	724 731		2.2 − 1	1.1+10	C	26°, 76*
212.778	1	2	256 060	726 039		6.6 − 1	1.9+10	C−	26°, 76*
210.239	0	1	249 081	724 731		2.9 − 1	1.5+10	C−	26°, 76*
221.39	$3p3d\ {}^{3}P^{o}_{2}$	$3d^{2}\ {}^{3}P_{1}$	1 050 383	1 502 075	1				32
220.446	2	2	1 050 383	1 504 024	1				32
215.145	$3p^{2}\ {}^{1}D_{2}$	$3p3d\ {}^{3}D^{o}_{3}$	598 840	1 063 667	90				26
206.708	$3p3d\ {}^{1}D^{o}_{2}$	$3d^{2}\ {}^{1}D_{2}$	1 014 316	1 498 090	1				32
186.455	$3p^{2}\ {}^{1}D_{2}$	$3p3d\ {}^{1}F^{o}_{3}$	598 840	1 135 167					26
182.043[C]	$3p^{2}\ {}^{1}D_{2}$	$3p3d\ {}^{1}P^{o}_{1}$	598 840	1 148 160		6.5 − 3	4.4+8	E	76*
64.780[T]	$3p3d\ {}^{1}P^{o}_{1}$	$3p4f\ {}^{1}D_{2}$	1 148 160	2 691 800?					20
64.773	$3s3d\ {}^{1}D_{2}$	$3s4f\ {}^{1}F^{o}_{3}$	812 929	2 356 800					10
64.537	$3p3d\ {}^{1}F^{o}_{3}$	$3p4f\ {}^{1}G_{4}$	1 135 167	2 684 700		6.3	1.1+12	C	20°, 76*
63.017[T]	$3p3d\ {}^{3}P^{o}_{2}$	$3p4f\ {}^{1}F_{3}$	1 050 383	2 637 100					20
62.805	$3p3d\ {}^{3}D^{o}_{3}$	$3p4f\ {}^{3}F_{4}$	1 063 667	2 655 900					20
62.805	1	2	1 048 776	2 641 000					20
62.412	$3p3d\ {}^{3}D^{o}_{2}$	$3p4f\ {}^{3}D_{3}$	1 065 955	2 668 200					20
62.334	$3p3d\ {}^{3}P^{o}_{1}$	$3p4f\ {}^{3}D_{2}$	1 065 511	2 669 800					20
62.131	0	1	1 065 190	2 674 900		9.2 − 1	5.3+11	C	20°, 76*
62.131	1	1	1 065 511	2 674 900					20
61.982	$3s3d\ {}^{3}D_{3}$	$3s4f\ {}^{3}F^{o}_{4}$	728 136	2 341 500	2				21
61.916	2	3	726 039	2 341 100	2				21
61.875	1	2	724 731	2 340 900	1				21
61.621	$3p3d\ {}^{1}D^{o}_{2}$	$3p4f\ {}^{1}F_{3}$	1 014 316	2 637 100					20
61.200	$3p3d\ {}^{3}F^{o}_{3}$	$3p4f\ {}^{3}G_{4}$	1 002 876	2 636 900					20
61.025	2	3	990 769	2 629 400					20
61.025	4	5	1 017 157	2 656 400		7.2	1.2+12	C	20°, 76*
59.625	$3p^{2}\ {}^{3}P_{2}$	$3p4s\ {}^{3}P^{o}_{2}$	624 984	2 302 100					18
58.96	$3s3p\ {}^{3}P^{o}_{2}$	$3s4s\ {}^{3}S_{1}$	273 414	1 969 500					18
58.365	1	1	256 060	1 969 500					18
58.127	0	1	249 081	1 969 500					18
56.83	$3p^{2}\ {}^{1}D_{2}$	$3s4f\ {}^{1}F^{o}_{3}$	598 840	2 356 800					10
53.043	$3s3p\ {}^{1}P^{o}_{1}$	$3s4d\ {}^{1}D_{2}$	376 323	2 261 600					10
51.279	$3p^{2}\ {}^{1}D_{2}$	$3p4d\ {}^{1}F^{o}_{3}$	598 840	2 549 000					18
51.239	$3p^{2}\ {}^{3}P_{2}$	$3p4d\ {}^{3}D^{o}_{3}$	624 984	2 576 600					18
51.007	1	2	603 814	2 564 300					18
50.94	0	1	591 131	2 554 200					18
50.393	$3s3p\ {}^{3}P^{o}_{2}$	$3s4d\ {}^{3}D_{2}$	273 414	2 257 800					21
50.357	2	3	273 414	2 259 200	2				21
49.979	1	1	256 060	2 256 900					21
49.958	1	2	256 060	2 257 800	1				21
49.808	0	1	249 081	2 256 900	1				21
47.483	$3s^{2}\ {}^{1}S_{0}$	$3s4p\ {}^{1}P^{o}_{1}$	0	2 106 020		3.81 − 1	3.76+11	C	21°, 76*
46.522	$3s3p\ {}^{3}P^{o}_{2}$	$3p4p\ {}^{3}P_{1}$	273 414	2 422 900					18

Co XVI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
46.433	$3s3p\ ^3P^o_2$	$3p4p\ ^3D_3$	273 414	2 427 100					18
44.253	$3s3d\ ^3D_3$	$3s5f\ ^3F^o_4$	728 136	2 987 900					18
38.84[T]	$3s3p\ ^3P^o_2$	$3s5s\ ^3S_1$	273 414	2 848 100?					18
37.401	$3s3p\ ^3P^o_2$	$3s5d\ ^3D_3$	273 414	2 947 100	3				27
37.165	1	2	256 060	2 946 800	2				27
37.070	0	1	249 081	2 946 700	1				27
14.080	$2p^63s^2\ ^1S_0$	$2p^53s^23d\ ^1P^o_1$	0	7 102 300					28

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Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
855.066^{C}	$4s\ ^2S_{1/2}$	$4p\ ^2P^o_{1/2}$	2 079 550	2 196 500		3.4 − 1	1.5+9	C	76*
787.216^{C}	$_{1/2}$	$_{3/2}$	2 079 550	2 206 580		7.4 − 1	2.0+9	C	76*
679.763^{C}	$4p\ ^2P^o_{3/2}$	$4d\ ^2D_{3/2}$	2 206 580	2 353 690		1.6 − 1	5.6+8	C	76*
672.631^{C}	$_{3/2}$	$_{5/2}$	2 206 580	2 355 250		1.4	3.4+9	C	76*
636.173^{C}	$_{1/2}$	$_{3/2}$	2 196 500	2 353 690		8.2 − 1	3.4+9	C	76*
339.516^{S}	$3s\ ^2S_{1/2}$	$3p\ ^2P^o_{1/2}$	0	294 537		2.38 − 1	6.86+9	B	39°, 76*
312.559^{S}	$_{1/2}$	$_{3/2}$	0	319 940		5.22 − 1	8.93+9	B	39°, 76*
276.932^{C}	$5d\ ^2D_{3/2}$	$6p\ ^2P^o_{1/2}$	3 102 200	3 463 300		4.48 − 1	1.94+10	C	76*
275.330^{C}	$_{5/2}$	$_{3/2}$	3 103 000	3 466 200		7.8 − 1	1.7+10	C	76*
274.725^{C}	$_{3/2}$	$_{3/2}$	3 102 200	3 466 200		8.8 − 2	1.9+9	D	76*
269.906^{C}	$5f\ ^2F^o_{5/2}$	$6d\ ^2D_{3/2}$	3 135 200	3 505 700		2.5 − 1	5.7+9	C	76*
269.687^{C}	$_{7/2}$	$_{5/2}$	3 135 300	3 506 100		3.6 − 1	5.5+9	C	76*
269.614^{C}	$_{5/2}$	$_{5/2}$	3 135 200	3 506 100		1.8 − 2	2.8+8	D	76*
249.834^{S}	$3p\ ^2P^o_{3/2}$	$3d\ ^2D_{3/2}$	319 940	720 211		1.04 − 1	2.78+9	B	39°, 76*
247.540^{S}	$_{3/2}$	$_{5/2}$	319 940	723 915		9.52 − 1	1.72+10	B	39°, 76*
234.918^{S}	$_{1/2}$	$_{3/2}$	294 537	720 211		5.58 − 1	1.68+10	B	39°, 76*
237.248^{C}	$5d\ ^2D_{5/2}$	$6f\ ^2F^o_{7/2}$	3 103 000	3 524 500		3.7	5.5+10	C	76*
237.248^{C}	$_{5/2}$	$_{5/2}$	3 103 000	3 524 500		1.9 − 1	3.8+9	D	76*
236.798^{C}	$_{3/2}$	$_{5/2}$	3 102 200	3 524 500		2.6	5.1+10	C	76*
210.571^{C}	$5p\ ^2P^o_{3/2}$	$6d\ ^2D_{3/2}$	3 030 800	3 505 700		1.1 − 1	4.1+9	D	76*
210.393^{C}	$_{3/2}$	$_{5/2}$	3 030 800	3 506 100		1.0	2.5+10	C	76*
208.507^{C}	$_{1/2}$	$_{3/2}$	3 026 100	3 505 700		5.50 − 1	2.11+10	C	76*
201.776^{C}	$5s\ ^2S_{1/2}$	$6p\ ^2P^o_{1/2}$	2 967 700	3 463 300		1.8 − 1	1.5+10	C	76*
200.602^{C}	$_{1/2}$	$_{3/2}$	2 967 700	3 466 200		3.66 − 1	1.5+10	C	76*
163.292^{C}	$5f\ ^2F^o_{5/2}$	$7d\ ^2D_{3/2}$	3 135 200	3 747 600		4.4 − 2	2.8+9	D	76*
163.212^{C}	$_{7/2}$	$_{5/2}$	3 135 300	3 748 000		6.5 − 2	2.7+9	D	76*
163.185^{C}	$_{5/2}$	$_{5/2}$	3 135 200	3 748 000		3.2 − 3	1.3+8	E	76*
152.486^{C}	$5d\ ^2D_{5/2}$	$7f\ ^2F^o_{7/2}$	3 103 000	3 758 800		1.0	3.6+10	C	76*
152.486^{C}	$_{5/2}$	$_{5/2}$	3 103 000	3 758 800		5.0 − 2	2.4+9	D	76*
152.300^{C}	$_{3/2}$	$_{5/2}$	3 102 200	3 758 800		7.2 − 1	3.4+10	C	76*
148.719^{C}	$4d\ ^2D_{3/2}$	$5p\ ^2P^o_{1/2}$	2 353 690	3 026 100		2.9 − 1	4.3+10	C	76*
148.028^{C}	$_{5/2}$	$_{3/2}$	2 355 250	3 030 800		5.2 − 1	3.9+10	C	76*
147.686^{C}	$_{3/2}$	$_{3/2}$	2 353 690	3 030 800		5.6 − 2	4.2+9	D	76*
146.539^{C}	$4f\ ^2F^o_{5/2}$	$5d\ ^2D_{3/2}$	2 419 790	3 102 200		1.0 − 1	8.1+9	C	76*
146.501^{C}	$_{7/2}$	$_{5/2}$	2 420 410	3 103 000		1.4 − 1	7.6+9	C	76*
146.368^{C}	$_{5/2}$	$_{5/2}$	2 419 790	3 103 000		7.2 − 3	3.9+8	D	76*
139.509^{C}	$5p\ ^2P^o_{3/2}$	$7d\ ^2D_{3/2}$	3 030 800	3 747 600		3.7 − 2	3.2+9	D	76*
139.431^{C}	$_{3/2}$	$_{5/2}$	3 030 800	3 748 000		3.3 − 1	1.9+10	C	76*
138.600^{C}	$_{1/2}$	$_{3/2}$	3 026 100	3 747 600		1.8 − 1	1.6+10	C	76*
139.04	$4f\ ^2F^o_{7/2}$	$5g\ ^2G_{9/2}$	2 420 410	3 139 500	bl				40
138.97	$_{5/2}$	$_{7/2}$	2 419 790	3 139 500	bl				40
131.385^{C}	$4p\ ^2P^o_{3/2}$	$5s\ ^2S_{1/2}$	2 206 580	2 967 700		4.08 − 1	7.9+10	C	76*
129.668^{C}	$_{1/2}$	$_{1/2}$	2 196 500	2 967 700		2.0 − 1	4.1+10	C	76*
128.21^{C}	$4d\ ^2D_{5/2}$	$5f\ ^2F^o_{5/2}$	2 355 250	3 135 200		2.1 − 1	1.4+10	D	76*
128.20	$_{5/2}$	$_{7/2}$	2 355 250	3 135 300	bl	4.3	2.2+11	C	40°, 76*
127.96	$_{3/2}$	$_{5/2}$	2 353 690	3 135 200		2.8	1.9+11	C	40°, 76*
111.654^{C}	$4p\ ^2P^o_{3/2}$	$5d\ ^2D_{3/2}$	2 206 580	3 102 200		1.2 − 1	1.5+10	D	76*
111.555^{C}	$_{3/2}$	$_{5/2}$	2 206 580	3 103 000		1.0	9.2+10	C	76*
110.412^{C}	$_{1/2}$	$_{3/2}$	2 196 500	3 102 200		5.8 − 1	7.9+10	C	76*
105.647^{C}	$4s\ ^2S_{1/2}$	$5p\ ^2P^o_{1/2}$	2 079 550	3 026 100		1.7 − 1	5.1+10	C	76*
105.125^{C}	$_{1/2}$	$_{3/2}$	2 079 550	3 030 800		3.38 − 1	5.1+10	C	76*

Co XVII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
92.107^{C}	$4f\ ^2F^o_{7/2}$	$6d\ ^2D_{5/2}$	2 420 410	3 506 100		2.5 – 2	3.2+9	D	76*
92.089^{C}	$_{5/2}$	$_{3/2}$	2 419 790	3 505 700		1.7 – 2	3.4+9	D	76*
92.055^{C}	$_{5/2}$	$_{5/2}$	2 419 790	3 506 100		1.2 – 3	1.6+8	E	76*
90.122^{C}	$4d\ ^2D_{3/2}$	$6p\ ^2P^o_{1/2}$	2 353 690	3 463 300		4.80 – 2	1.97+10	C	76*
90.013^{C}	$_{5/2}$	$_{3/2}$	2 355 250	3 466 200		8.64 – 2	1.77+10	C	76*
89.887^{C}	$_{3/2}$	$_{3/2}$	2 353 690	3 466 200		9.6 – 3	1.9+9	D	76*
85.525^{C}	$4d\ ^2D_{5/2}$	$6f\ ^2F^o_{7/2}$	2 355 250	3 524 500		1.0	1.2+11	C	76*
85.525^{C}	$_{5/2}$	$_{5/2}$	2 355 250	3 524 500		5.3 – 2	8.1+9	D	76*
85.411^{C}	$_{3/2}$	$_{5/2}$	2 353 690	3 524 500		7.2 – 1	1.1+11	C	76*
76.975^{C}	$4p\ ^2P^o_{3/2}$	$6d\ ^2D_{3/2}$	2 206 580	3 505 700		3.7 – 2	1.0+10	D	76*
76.951^{C}	$_{3/2}$	$_{5/2}$	2 206 580	3 506 100		3.3 – 1	6.2+10	C	76*
76.383^{C}	$_{1/2}$	$_{3/2}$	2 196 500	3 505 700		1.9 – 1	5.3+10	C	76*
75.324^{C}	$4f\ ^2F^o_{7/2}$	$7d\ ^2D_{5/2}$	2 420 410	3 748 000		8.8 – 3	1.7+9	D	76*
75.312^{C}	$_{5/2}$	$_{3/2}$	2 419 790	3 747 600		6.0 – 3	1.8+9	D	76*
75.289^{C}	$_{5/2}$	$_{5/2}$	2 419 790	3 748 000		4.4 – 4	8.7+7	E	76*
72.267^{C}	$4s\ ^2S_{1/2}$	$6p\ ^2P^o_{1/2}$	2 079 550	3 463 300		5.4 – 2	3.5+10	C	76*
72.116^{C}	$_{1/2}$	$_{3/2}$	2 079 550	3 466 200		1.1 – 1	3.4+10	C	76*
71.248^{C}	$4d\ ^2D_{5/2}$	$7f\ ^2F^o_{7/2}$	2 355 250	3 758 800		4.1 – 1	6.8+10	C	76*
71.248^{C}	$_{5/2}$	$_{5/2}$	2 355 250	3 758 800		2.1 – 2	4.6+9	D	76*
71.169^{C}	$_{3/2}$	$_{5/2}$	2 353 690	3 758 800		2.9 – 1	6.4+10	C	76*
67.737^{C}	$3d\ ^2D_{3/2}$	$4p\ ^2P^o_{1/2}$	720 211	2 196 500		1.2 – 1	8.8+10	C–	76*
67.446^{C}	$_{5/2}$	$_{3/2}$	723 915	2 206 580		2.2 – 1	8.1+10	C–	76*
67.278^{C}	$_{3/2}$	$_{3/2}$	720 211	2 206 580		2.5 – 2	9.1+9	D	76*
64.892^{C}	$4p\ ^2P^o_{3/2}$	$7d\ ^2D_{3/2}$	2 206 580	3 747 600		1.8 – 2	7.0+9	D	76*
64.875^{C}	$_{3/2}$	$_{5/2}$	2 206 580	3 748 000		1.6 – 1	4.2+10	C	76*
64.470^{C}	$_{1/2}$	$_{3/2}$	2 196 500	3 747 600		9.0 – 2	3.6+10	C	76*
58.967^{C}	$3d\ ^2D_{5/2}$	$4f\ ^2F^o_{5/2}$	723 915	2 419 790		2.65 – 1	8.5+10	C	76*
58.945^{S}	$_{5/2}$	$_{7/2}$	723 915	2 420 410		5.3	1.3+12	C	39°, 76*
58.838^{S}	$_{3/2}$	$_{5/2}$	720 211	2 419 790		3.7	1.2+12	C	39°, 76*
56.833	$3p\ ^2P^o_{3/2}$	$4s\ ^2S_{1/2}$	319 940	2 079 550					33
56.021	$_{1/2}$	$_{1/2}$	294 537	2 079 550					33
49.171	$3p\ ^2P^o_{3/2}$	$4d\ ^2D_{3/2}$	319 940	2 353 690		1.30 – 1	9.0+10	C	33°, 76*
49.133	$_{3/2}$	$_{5/2}$	319 940	2 355 250		1.16	5.4+11	C	33°, 76*
48.564	$_{1/2}$	$_{3/2}$	294 537	2 353 690		6.2 – 1	4.4+11	C	33°, 76*
45.527	$3s\ ^2S_{1/2}$	$4p\ ^2P^o_{1/2}$	0	2 196 500		1.57 – 1	2.53+11	C+	33°, 76*
45.319	$_{1/2}$	$_{3/2}$	0	2 206 580		2.92 – 1	2.37+11	C	33°, 76*
43.367^{C}	$3d\ ^2D_{3/2}$	$5p\ ^2P^o_{1/2}$	720 211	3 026 100		2.0 – 2	3.6+10	D	76*
43.348^{C}	$_{5/2}$	$_{3/2}$	723 915	3 030 800		3.7 – 2	3.2+10	D	76*
43.279^{C}	$_{3/2}$	$_{3/2}$	720 211	3 030 800		4.0 – 3	3.6+9	E	76*
41.472^{C}	$3d\ ^2D_{5/2}$	$5f\ ^2F^o_{5/2}$	723 915	3 135 200		4.9 – 2	3.2+10	D	76*
41.462	$_{5/2}$	$_{7/2}$	723 915	3 135 300		9.72 – 1	4.73+11	C	33°, 76*
41.404	$_{3/2}$	$_{5/2}$	720 211	3 135 200		6.8 – 1	4.4+11	C	27°, 76*
37.768	$3p\ ^2P^o_{3/2}$	$5s\ ^2S_{1/2}$	319 940	2 967 700		4.8 – 2	1.1+11	C	18°, 76*
36.466^{C}	$3d\ ^2D_{5/2}$	$6p\ ^2P^o_{3/2}$	723 915	3 466 200		1.3 – 2	1.6+10	D	76*
36.455^{C}	$_{3/2}$	$_{1/2}$	720 211	3 463 300		6.8 – 3	1.7+10	D	76*
36.417^{C}	$_{3/2}$	$_{3/2}$	720 211	3 466 200		1.4 – 3	1.8+9	E	76*
35.942^{C}	$3p\ ^2P^o_{3/2}$	$5d\ ^2D_{3/2}$	319 940	3 102 200		4.0 – 2	5.1+10	D	76*
35.932	$_{3/2}$	$_{5/2}$	319 940	3 103 000		3.6 – 1	3.1+11	C	27°, 76*
35.617	$_{1/2}$	$_{3/2}$	294 537	3 102 200		2.0 – 1	2.7+11	C	27°, 76*
35.707^{C}	$3d\ ^2D_{5/2}$	$6f\ ^2F^o_{5/2}$	723 915	3 524 500		1.8 – 2	1.6+10	D	76*
35.707	$_{5/2}$	$_{7/2}$	723 915	3 524 500		3.6 – 1	2.3+11	C	27°, 76*
35.660	$_{3/2}$	$_{5/2}$	720 211	3 524 500		2.6 – 1	2.2+11	C	27°, 76*

Co XVII – Continued

Wavelength (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
33.046	$3s\ ^2S_{1/2}$	$5p\ ^2P^o_{1/2}$	0	3 026 100		4.8 – 2	1.5+11	C	27°, 76*
32.995	1/2	3/2	0	3 030 800		1.0 – 1	1.6+11	C	27°, 76*
32.951	$3d\ ^2D_{5/2}$	$7f\ ^2F^o_{7/2}$	723 915	3 758 800		1.76 – 1	1.35+11	C	27°, 76*
32.950^C	5/2	5/2	723 915	3 758 800		9.0 – 3	9.1+9	D	76*
32.910	3/2	5/2	720 211	3 758 800		1.24 – 1	1.27+11	C	27°, 76*
31.390^C	$3p\ ^2P^o_{3/2}$	$6d\ ^2D_{3/2}$	319 940	3 505 700		1.8 – 2	3.1+10	D	76*
31.386	3/2	5/2	319 940	3 506 100		1.64 – 1	1.86+11	C	27°, 76*
31.142	1/2	3/2	294 537	3 505 700		9.2 – 2	1.6+11	C	27°, 76*
31.38	$3d\ ^2D_{5/2}$	$8f\ ^2F^o_{7/2}$	723 915	3 910 700					18
29.174^C	$3p\ ^2P^o_{3/2}$	$7d\ ^2D_{3/2}$	319 940	3 747 600		1.0 – 2	2.0+10	D	76*
29.171	3/2	5/2	319 940	3 748 000		8.8 – 2	1.2+11	C	27°, 76*
28.960	1/2	3/2	294 537	3 747 600		5.04 – 2	1.0+11	C	27°, 76*
28.874	$3s\ ^2S_{1/2}$	$6p\ ^2P^o_{1/2}$	0	3 463 300		2.2 – 2	8.8+10	C	27°, 76*
28.85	1/2	3/2	0	3 466 200		4.4 – 2	8.6+10	C	27°, 76*
27.902	$3p\ ^2P^o_{3/2}$	$8d\ ^2D_{5/2}$	319 940	3 903 900					27
15.828	$2p^63s\ ^2S_{1/2}$	$2p^53s^2\ ^2P^o_{3/2}$	0	6 317 900					35
15.551	1/2	1/2	0	6 430 500					35

Co XVIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
45.640^{L}	$2p^5 3p\ ^3P_2$	$2p^5 4d\ ^3F^o_3$							47
45.454^{L}	$2p^5 3p\ ^1D_2$	$2p^5 4d\ ^1F^o_3$							47
45.454^{L}	$2p^5 3p\ ^3D_1$	$2p^5 4d\ ^3D^o_2$							47
44.959^{L}	2	3							47
45.35^{L}	$2p^5 3p\ ^3D_3$	$2p^5 4d\ ^3F^o_4$				2.1	7.6+11	D−	47°, 76*
44.869^{L}	$2p^5 3p\ ^1P_1$	$2p^5 4d\ ^1D^o_2$							47
15.437	$2p^6\ ^1S_0$	$2p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	6 477 900		1.19 − 1	1.11+12	C	44°, 76*
15.169	$2p^6\ ^1S_0$	$2p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	6 592 400		1.05 − 1	1.01+12	C	44°, 76*
14.041	$2p^6\ ^1S_0$	$2p^5 3d\ ^3P^o_1$	0	7 122 000		1.2 − 2	1.3+11	E	44°, 76*
13.868	$2p^6\ ^1S_0$	$2p^5 3d\ ^3D^o_1$	0	7 210 800		7.0 − 1	8.1+12	D	44°, 76*
13.634	$2p^6\ ^1S_0$	$2p^5 3d\ ^1P^o_1$	0	7 334 600		2.40	2.87+13	C	44°, 76*
12.667	$2s^2 2p^6\ ^1S_0$	$2s2p^6 3p\ ^3P^o_1$	0	7 894 500					44
12.606	$2s^2 2p^6\ ^1S_0$	$2s2p^6 3p\ ^1P^o_1$	0	7 932 700		2.9 − 1	4.1+12	D	44°, 76*
11.486	$2p^6\ ^1S_0$	$2p^5(^2P^o_{3/2})4s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	8 706 000		2.5 − 2	4.2+11	D	44°, 76*
11.321	$2p^6\ ^1S_0$	$2p^5(^2P^o_{1/2})4s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	8 833 000		2.2 − 2	3.8+11	D	44°, 76*
11.155	$2p^6\ ^1S_0$	$2p^5 4d\ ^3P^o_1$	0	8 965 000		3.4 − 3	6.1+10	E	45°, 76*
11.108	$2p^6\ ^1S_0$	$2p^5 4d\ ^3D^o_1$	0	9 003 000		4.2 − 1	7.6+12	D	44°, 76*
10.975	$2p^6\ ^1S_0$	$2p^5 4d\ ^1P^o_1$	0	9 112 000		5.1 − 1	9.4+12	D	44°, 76*
10.207	$2p^6\ ^1S_0$	$2p^5 5d\ ^3P^o_1$	0	9 797 000					44
10.184	$2p^6\ ^1S_0$	$2p^5 5d\ ^3D^o_1$	0	9 819 000					44
10.066	$2p^6\ ^1S_0$	$2p^5 5d\ ^1P^o_1$	0	9 934 000					44
10.030	$2s^2 2p^6\ ^1S_0$	$2s2p^6 4p\ ^1P^o_1$	0	9 970 000		1.2 − 1	2.7+12	D	44°, 76*
10.025	$2s^2 2p^6\ ^1S_0$	$2s2p^6 4p\ ^3P^o_1$	0	9 980 000					45
9.748	$2p^6\ ^1S_0$	$2p^5 6d\ ^3P^o_1$	0	10 260 000					45
9.742	$2p^6\ ^1S_0$	$2p^5 6d\ ^3D^o_1$	0	10 265 000					44
9.633	$2p^6\ ^1S_0$	$2p^5 6d\ ^1P^o_1$	0	10 381 000					44
9.501	$2p^6\ ^1S_0$	$2p^5 7d\ ^3D^o_1$	0	10 525 000					43
9.371	$2p^6\ ^1S_0$	$2p^5 7d\ ^1P^o_1$	0	10 671 000					43
9.347	$2p^6\ ^1S_0$	$2p^5 8d\ ^3D^o_1$	0	10 699 000					43
9.225	$2p^6\ ^1S_0$	$2p^5 9d\ ^3D^o_1$	0	10 840 000					45
9.200	$2p^6\ ^1S_0$	$2p^5 8d\ ^1P^o_1$	0	10 870 000					45
9.070	$2p^6\ ^1S_0$	$2p^5 9d\ ^1P^o_1$	0	11 030 000					45

Co XIX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
819.9^C	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^5\ ^2P^o_{1/2}$	0	121 960		M1	3.25+4	C+	76*
99.02	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^6\ ^2S_{1/2}$	121 960	1 131 860		1.03 − 1	3.5+10	C+	40, 52°, 76*
88.35	3/2	1/2	0	1 131 860		2.34 − 1	1.0+11	C+	40, 52°, 76*
14.794	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3s\ ^2P_{3/2}$	121 960	6 880 900					44
14.557	1/2	1/2	121 960	6 991 500	5	1.1 − 1	1.8+12	D−	44°, 51△, 76*
14.534	3/2	3/2	0	6 880 900					44°, 51△
14.303	3/2	1/2	0	6 991 500	4	9.6 − 2	1.6+12	E	44°, 51△, 76*
14.594	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3s\ ^4P_{5/2}$	0	6 852 100					44
14.355	3/2	3/2	0	6 966 200	4				44°, 51△
14.423	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3s\ ^2D_{3/2}$	121 960	7 055 300		2.0 − 1	1.6+12	D	44°, 51△, 76*
14.184	3/2	5/2	0	7 050 200		2.4 − 1	1.3+12	D	44°, 51△, 76*
14.041	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1S)3s\ ^2S_{1/2}$	121 960	7 243 900		8.0 − 2	1.3+12	D−	44°, 76*
13.314	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3d\ ^2P_{3/2}$	121 960	7 632 800	5				44°, 51△
13.289	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^4P_{1/2}$	0	7 525 000	6				44°, 51△
13.258	3/2	3/2	0	7 542 600	7				44°, 51△
13.246	3/2	5/2	0	7 549 400	8				51
13.240	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^2F_{5/2}$	0	7 552 900					44
13.192	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2S_{1/2}$	121 960	7 701 800		1.6 − 1	3.0+12	E	44°, 51△, 76*
12.985	3/2	1/2	0	7 701 800		9.6 − 1	1.9+13	D	44°, 51△, 76*
13.157	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^2D_{3/2}$	0	7 600 500	6				51
13.084	3/2	5/2	0	7 642 900	12				44°, 51△
13.151	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2P_{3/2}$	121 960	7 725 900	6				44°, 51△
13.084	1/2	1/2	121 960	7 764 900	10				44°, 51△
12.942	3/2	3/2	0	7 725 900	9				44°, 51△
12.876	3/2	1/2	0	7 764 900	7				51
13.123	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^4D_{3/2}$	0	7 620 200					44
13.097	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2D_{3/2}$	121 960	7 757 700	12				44°, 51△
12.942	3/2	5/2	0	7 726 800	10				44°, 51△
12.890	3/2	3/2	0	7 757 700	7				44°, 51△
12.828	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1S)3d\ ^2D_{3/2}$	121 960	7 917 400	5				44°, 51△
12.300	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^3P^o)3p\ ^4P_{3/2}$	121 960	8 252 000					44
12.155	3/2	5/2	0	8 227 000					44
12.281	$2s^22p^5\ ^2P^o_{3/2}$	$2s2p^5(^3P^o)3p\ ^4D_{5/2}$	0	8 143 000					44
12.238	3/2	3/2	0	8 171 000					44
12.224	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^3P^o)3p\ ^2D_{3/2}$	121 960	8 303 000					44
12.212	3/2	5/2	0	8 189 000					44
12.193	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^3P^o)3p\ ^2S_{1/2}$	121 960	8 323 000					44
12.015	3/2	1/2	0	8 323 000					44
12.168	$2s^22p^5\ ^2P^o_{3/2}$	$2s2p^5(^3P^o)3p\ ^2P_{3/2}$	0	8 218 000					44
12.155	3/2	1/2	0	8 227 000					44
11.954	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^1P^o)3p\ ^2D_{3/2}$	121 960	8 487 000					44
11.744	3/2	5/2	0	8 515 000					44
11.906	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^1P^o)3p\ ^2P_{1/2}$	121 960	8 521 000					44
11.892	1/2	3/2	121 960	8 531 000					44
10.776	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)4s\ ^2P_{3/2}$	0	9 280 000					44
10.704	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)4s\ ^2D_{3/2}$	121 960	9 464 000					44
10.568	3/2	5/2	0	9 462 000					44

Co XIX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
10.645	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)4s\ ^4P_{3/2}$	0	9 394 000					44
10.477	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)4d\ ^2D_{5/2}$	0	9 545 000					44
10.477	$3/2$	$3/2$	0	9 545 000					44
10.406	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)4d\ ^2D_{3/2}$	121 960	9 732 000					44
10.290	$3/2$	$5/2$	0	9 718 000					44
10.406	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)4d\ ^2P_{1/2}$	121 960	9 732 000					44
10.290	$3/2$	$3/2$	0	9 718 000					44
10.406	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)4d\ ^4F_{3/2}$	0	9 610 000					44
10.406	$3/2$	$5/2$	0	9 610 000					44
10.373	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)4d\ ^4P_{5/2}$	0	9 640 000					44
10.290	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^1D)4d\ ^2S_{1/2}$	0	9 718 000					44
10.275	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^1D)4d\ ^2F_{5/2}$	0	9 732 000					44
10.206	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1S)4d\ ^2D_{3/2}$	121 960	9 920 000					44

Co XX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4249.[C]	$2s^22p^4\ ^3P_0$	$2s^22p^4\ ^3P_1$	83 890	107 420		M1	1.7+2	C	76*
930.9[C]	2	1	0	107 420		M1	2.46+4	C	76*
1221.[C]	$2s^22p^4\ ^3P_1$	$2s^22p^4\ ^1D_2$	107 420	189 290		M1	8.3+2	D	76*
528.3[C]	2	2	0	189 290		M1	2.7+4	D	76*
390.9[C]	$2s^22p^4\ ^3P_1$	$2s^22p^4\ ^1S_0$	107 420	363 240		M1	2.3+5	D	76*
144.92[C]	$2s^22p^4\ ^1S_0$	$2s2p^5\ ^3P^o_1$	363 240	1 053 290		8.9 − 3	9.4+8	E	76*
126.22	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^3P^o_2$	189 290	981 550		3.3 − 2	2.7+9	E	40°, 76*
114.40	$2s^22p^4\ ^3P_1$	$2s2p^5\ ^3P^o_2$	107 420	981 550		1.07 − 1	1.09+10	C	40°, 76*
105.72	1	1	107 420	1 053 290		6.75 − 2	1.34+10	C	40°, 76*
103.16	0	1	83 890	1 053 290		8.3 − 2	1.7+10	C	40°, 76*
101.88	2	2	0	981 550		3.3 − 1	4.2+10	C	40°, 76*
99.89	1	0	107 420	1 108 520		9.99 − 2	6.7+10	C	40°, 76*
94.94	2	1	0	1 053 290		1.48 − 1	3.64+10	C	40°, 76*
109.14	$2s2p^5\ ^1P^o_1$	$2p^6\ ^1S_0$	1 349 530	2 265 740	bl	3.09 − 1	1.73+11	C	40°, 76*
101.39	$2s^22p^4\ ^1S_0$	$2s2p^5\ ^1P^o_1$	363 240	1 349 530	bl	5.2 − 2	1.1+10	C	40°, 76*
86.19	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^1P^o_1$	189 290	1 349 530		5.30 − 1	1.59+11	C	40°, 76*
82.48	$2s2p^5\ ^3P^o_1$	$2p^6\ ^1S_0$	1 053 290	2 265 740		1.7 − 2	1.6+10	E	40°, 76*
80.51	$2s^22p^4\ ^3P_1$	$2s2p^5\ ^1P^o_1$	107 420	1 349 530		3.9 − 3	1.3+9	E	40°, 76*
79.01	0	1	83 890	1 349 530	bl	5.4 − 3	1.9+9	E	40°, 76*
74.10	2	1	0	1 349 530		3.7 − 2	1.5+10	E	40°, 76*
13.825	$2s^22p^4\ ^3P_1$	$2s^22p^3(^4S^o)3s\ ^3S^o_1$	107 420	7 338 000					44
13.786	0	1	83 890	7 338 000		5.3 − 2	6.2+11	D	44°, 76*
13.634	2	1	0	7 338 000		2.4 − 1	2.9+12	D−	44°, 76*
13.775	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3s\ ^3D^o_2$	189 290	7 447 000					44
13.676	$2s^22p^4\ ^1S_0$	$2s^22p^3(^2P^o)3s\ ^1P^o_1$	363 240	7 688 000					44
13.661	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3s\ ^1D^o_2$	189 290	7 507 000		3.5 − 1	2.5+12	E	44°, 76*
13.634	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2D^o)3s\ ^3D^o_1$	107 420	7 447 000		1.3 − 1	1.5+12	D−	44°, 76*
13.634	1	2	107 420	7 447 000					44
13.425	2	2	0	7 447 000					44
13.356	2	3	0	7 487 000		2.4 − 1	1.3+12	D+	44°, 76*
13.517	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2D^o)3s\ ^1D^o_2$	107 420	7 507 000		4.2 − 2	3.1+11	E	44°, 76*
13.321[C]	2	2	0	7 507 000		2.3 − 2	1.7+11	E	76*
13.496	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3s\ ^3P^o_1$	189 290	7 599 000		5.5 − 2	6.7+11	E	44°, 76*
13.356	2	2	189 290	7 668 000					44
13.372	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2P^o)3s\ ^3P^o_0$	107 420	7 586 000		3.3 − 2	1.2+12	C	44°, 76*
13.307[C]	0	1	83 890	7 599 000		6.9 − 2	8.7+11	E	76*
13.240	1	2	107 420	7 668 000		1.0 − 1	7.8+11	E	44°, 76*
13.314	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3s\ ^1P^o_1$	189 290	7 688 000					44
12.606	$2s^22p^4\ ^3P_2$	$2s^22p^3(^4S^o)3d\ ^3D^o_3$	0	7 933 000		1.6	9.3+12	E	44°, 76*
12.551	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3d\ ^1F^o_3$	189 290	8 150 000		2.0	1.2+13	D	44°, 76*
12.551	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3d\ ^3F^o_3$	189 290	8 157 000					44
12.551	$2s^22p^4\ ^1S_0$	$2s^22p^3(^2P^o)3d\ ^1P^o_1$	363 240	8 331 000		2.4	3.4+13	D	44°, 76*
12.551	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2D^o)3d\ ^3P^o_2$	107 420	8 110 000					44
12.331	2	2	0	8 110 000					44
12.513	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3d\ ^3P^o_2$	189 290	8 181 000					44
12.348	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3d\ ^1D^o_2$	189 290	8 288 000					44
12.348	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3d\ ^1F^o_3$	189 290	8 288 000					44
12.348	$2s^22p^4\ ^3P_2$	$2s^22p^3(^2D^o)3d\ ^3D^o_3$	0	8 098 000		3.8	2.4+13	E	44°, 76*

Co XX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
12.300	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2P^o)3d\ ^3P^o_1$	107 420	8 237 000					44
12.282[C]	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3d\ ^1P^o_1$	189 290	8 331 000		1.0 – 1	1.5+12	D	76*
12.281	$2s^22p^4\ ^3P_2$	$2s^22p^3(^2D^o)3d\ ^1F^o_3$	0	8 150 000					44
12.238	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2P^o)3d\ ^3D^o_2$	107 420	8 279 000					44
11.880	$2s^22p^4\ ^1D_2$	$2s2p^43d\ ^1F_3$	189 290	8 607 000					45
9.970	$2s^22p^4\ ^3P_1$	$2s^22p^3(^4S^o)4d\ ^3D^o_2$	107 420	10 146 000					45
9.924	0	1	83 890	10 160 000					44
9.856	2	2	0	10 146 000					44
9.856	2	3	0	10 146 000					44
9.856	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)4d\ ^1D^o_2$	189 290	10 335 000					44
9.856	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)4d\ ^1F^o_3$	189 290	10 335 000					44
9.856	$2s^22p^4\ ^1S_0$	$2s^22p^3(^2P^o)4d\ ^1P^o_1$	363 240	10 509 000					44
9.828	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2D^o)4d\ ^3D^o_2$	107 420	10 306 000					44
9.694	2	3	0	10 316 000					44
9.681	2	2	0	10 306 000					44
9.784	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)4d\ ^3F^o_3$	189 290	10 410 000					45
9.742	$2s^22p^4\ ^3P_2$	$2s^22p^3(^2D^o)4d\ ^3F^o_3$	0	10 265 000					44
9.694	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)4d\ ^1F^o_3$	189 290	10 505 000					44
9.694	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)4d\ ^3D^o_2$	189 290	10 510 000					44
9.694	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2P^o)4d\ ^3P^o_2$	107 420	10 423 000					44
9.633	1	1	107 420	10 488 000					44
9.681	$2s^22p^4\ ^3P_2$	$2s^22p^3(^2D^o)4d\ ^3S^o_1$	0	10 330 000					44
9.661	$2s^22p^4\ ^3P_0$	$2s^22p^3(^2P^o)4d\ ^3D^o_1$	83 890	10 435 000					45
9.603	1	2	107 420	10 510 000					45

Co XXI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2247.^{C}	$2s^22p^3\ ^2D^o_{3/2}$	$2s^22p^3\ ^2D^o_{5/2}$	147 040	191 530		M1	6.7+2	C	76*
1270.^{C}	$2s^22p^3\ ^2P^o_{1/2}$	$2s^22p^3\ ^2P^o_{3/2}$	280 260	359 000		M1	3.0+3	C−	76*
750.6^{C}	$2s^22p^3\ ^2D^o_{3/2}$	$2s^22p^3\ ^2P^o_{1/2}$	147 040	280 260		M1	7.6+3	D	76*
597.1^{C}	5/2	3/2	191 530	359 000		M1	2.0+4	D	76*
471.8^{C}	3/2	3/2	147 040	359 000		M1	7.7+4	D	76*
680.1^{C}	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^3\ ^2D^o_{3/2}$	0	147 040		M1	2.6+4	D	76*
522.1^{C}	3/2	5/2	0	191 530		M1	2.4+3	D−	76*
356.8^{C}	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^3\ ^2P^o_{1/2}$	0	280 260		M1	5.0+4	D	76*
278.55^{C}	3/2	3/2	0	359 000		M1	3.7+4	D	76*
227.25^{C}	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^4P_{5/2}$	359 000	799 040		1.3 − 3	2.8+7	E	76*
192.12^{C}	3/2	3/2	359 000	879 510		5.2 − 3	2.3+8	E	76*
160.51^{C}	1/2	1/2	280 260	903 260		2.8 − 3	3.6+8	E	76*
164.61^{C}	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^4P_{5/2}$	191 530	799 040		8.4 − 3	3.4+8	E	76*
153.37^{C}	3/2	5/2	147 040	799 040		2.0 − 2	9.5+8	E	76*
145.35^{C}	5/2	3/2	191 530	879 510		9.0 − 4	7.1+7	E	76*
136.52^{C}	3/2	3/2	147 040	879 510		2.2 − 3	2.0+8	E	76*
132.24^{C}	3/2	1/2	147 040	903 260		2.7 − 3	5.1+8	E	76*
157.40^{C}	$2s2p^4\ ^2P_{1/2}$	$2p^5\ ^2P^o_{3/2}$	1 434 220	2 069 550		2.46 − 2	1.66+9	C	76*
133.06	3/2	3/2	1 318 040	2 069 550		3.4 − 1	3.2+10	C	40°, 76*
131.09	1/2	1/2	1 434 220	2 197 070		1.8 − 1	3.5+10	C	40°, 76*
113.76	3/2	1/2	1 318 040	2 197 070	bl	1.70 − 1	4.37+10	C	40°, 76*
133.64^{C}	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^2D_{3/2}$	359 000	1 107 300		7.2 − 3	6.7+8	D	76*
130.02	3/2	5/2	359 000	1 128 160	bl	9.64 − 2	6.3+9	C	40°, 76*
120.91	1/2	3/2	280 260	1 107 300		2.66 − 2	3.03+9	C	40°, 76*
125.15	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^4P_{5/2}$	0	799 040	bl	1.96 − 1	1.39+10	C	40°, 76*
113.70	3/2	3/2	0	879 510	bl	1.62 − 1	2.08+10	C	40°, 76*
110.71	3/2	1/2	0	903 260	bl	8.68 − 2	2.36+10	C	40°, 76*
124.67	$2s2p^4\ ^2S_{1/2}$	$2p^5\ ^2P^o_{3/2}$	1 267 430	2 069 550		9.34 − 2	1.0+10	C	40°, 76*
107.57^{C}	1/2	1/2	1 267 430	2 197 070		1.2 − 2	3.4+9	D	76*
110.08	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^2S_{1/2}$	359 000	1 267 430	bl	8.0 − 3	2.2+9	D	40°, 76*
101.30	1/2	1/2	280 260	1 267 430	bl	1.2 − 1	4.0+10	C	40°, 76*
106.76	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^2D_{5/2}$	191 530	1 128 160		3.7 − 1	3.6+10	C	40°, 76*
104.14	3/2	3/2	147 040	1 107 300		3.0 − 1	4.7+10	C	40°, 76*
101.92^{C}	3/2	5/2	147 040	1 128 160		6.0 − 4	6.4+7	E	76*
106.23	$2s2p^4\ ^2D_{5/2}$	$2p^5\ ^2P^o_{3/2}$	1 128 160	2 069 550	bl	3.1 − 1	4.6+10	C	40°, 76*
103.93	3/2	3/2	1 107 300	2 069 550		1.35 − 1	2.08+10	C	40°, 76*
91.76	3/2	1/2	1 107 300	2 197 070		1.20 − 1	4.77+10	C	40°, 76*
104.27	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^2P_{3/2}$	359 000	1 318 040		6.36 − 2	9.8+9	C	40°, 76*
96.36	1/2	3/2	280 260	1 318 040		5.80 − 2	1.04+10	C	40°, 76*
93.00	3/2	1/2	359 000	1 434 220	bl	2.8 − 1	1.1+11	C	40°, 76*
86.66	1/2	1/2	280 260	1 434 220		9.4 − 3	4.2+9	D	40°, 76*
90.31	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^2D_{3/2}$	0	1 107 300		1.5 − 2	3.0+9	E	40°, 76*
89.25	$2s^22p^3\ ^2D^o_{3/2}$	$2s2p^4\ ^2S_{1/2}$	147 040	1 267 430		1.2 − 1	5.0+10	E	40°, 76*
88.77	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^2P_{3/2}$	191 530	1 318 040		5.2 − 1	1.1+11	C	40°, 76*
85.40	3/2	3/2	147 040	1 318 040	bl	6.00 − 2	1.37+10	C	40°, 76*
77.69	3/2	1/2	147 040	1 434 220		5.16 − 2	2.85+10	C	40°, 76*
85.74^{C}	$2s2p^4\ ^4P_{1/2}$	$2p^5\ ^2P^o_{3/2}$	903 260	2 069 550		3.4 − 3	7.7+8	E	76*
84.03	3/2	3/2	879 510	2 069 550		1.0 − 2	2.4+9	E	40°, 76*
78.71	5/2	3/2	799 040	2 069 550		1.5 − 2	4.0+9	E	40°, 76*
77.29^{C}	1/2	1/2	903 260	2 197 070		2.2 − 3	1.2+9	E	76*
75.90	3/2	1/2	879 510	2 197 070	bl	6.8 − 4	3.9+8	E	40°, 76*
78.90	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^2S_{1/2}$	0	1 267 430	bl	5.2 − 3	2.8+9	E	40°, 76*
75.87	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^2P_{3/2}$	0	1 318 040	bl	2.1 − 2	6.0+9	E	40°, 76*

Co XXII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2104.^{C}	$2s^22p^2\ ^3P_1$	$2s^22p^2\ ^3P_2$	90 730	138 250		M1	1.05+3	C	76*
1102.2^C	0	1	0	90 730		M1	1.19+4	C	76*
696.5^C	$2s^22p^2\ ^3P_2$	$2s^22p^2\ ^1D_2$	138 250	281 820		M1	2.4+4	C	76*
523.3^C	1	2	90 730	281 820		M1	2.6+4	D	76*
307.89^C	$2s^22p^2\ ^3P_1$	$2s^22p^2\ ^1S_0$	90 730	415 520		M1	2.1+5	D	76*
252.71^C	$2s2p^3\ ^1P^o_1$	$2p^4\ ^3P_2$	1 356 870	1 752 580		5.7 − 3	1.2+8	E	76*
196.59^C	1	1	1 356 870	1 865 530		1.6 − 2	9.0+8	E	76*
252.20^C	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^5S^o_2$	138 250	[534 760]		2.3 − 3	4.8+7	E	76*
225.21^C	1	2	90 730	[534 760]		2.1 − 3	5.6+7	E	76*
239.05^C	$2s^22p^2\ ^1S_0$	$2s2p^3\ ^3D^o_1$	415 520	833 840		1.5 − 3	5.8+7	E	76*
185.03^C	$2s2p^3\ ^1D^o_2$	$2p^4\ ^3P_2$	1 212 130	1 752 580		2.4 − 2	9.4+8	E	76*
153.05^C	2	1	1 212 130	1 865 530		6.0 − 3	5.7+8	E	76*
181.15^C	$2s^22p^2\ ^1D_2$	$2s2p^3\ ^3D^o_1$	281 820	833 840		3.6 − 3	2.4+8	E	76*
180.36^C	2	2	281 820	836 280		9.5 − 4	3.9+7	E	76*
170.16^C	2	3	281 820	869 510		4.0 − 2	1.3+9	E	76*
171.79	$2s2p^3\ ^3S^o_1$	$2p^4\ ^3P_2$	1 170 450	1 752 580		1.5 − 1	6.9+9	C	40°, 76*
146.40	1	0	1 170 450	1 853 530		7.11 − 2	2.21+10	C	40°, 76*
143.87	1	1	1 170 450	1 865 530	bl	1.5 − 1	1.6+10	C	40°, 76*
171.49^C	$2s^22p^2\ ^1S_0$	$2s2p^3\ ^3P^o_1$	415 520	998 650		2.6 − 3	2.0+8	E	76*
170.09	$2s2p^3\ ^1P^o_1$	$2p^4\ ^1D_2$	1 356 870	1 944 800		1.17 − 1	5.4+9	C	40°, 76*
143.76^C	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^3D^o_1$	138 250	833 840		1.1 − 3	1.2+8	E	76*
143.26^C	2	2	138 250	836 280		7.5 − 4	4.9+7	E	76*
136.75	2	3	138 250	869 510		1.38 − 1	7.0+9	C	40°, 76*
134.57	1	1	90 730	833 840		5.1 − 3	6.3+8	D	40°, 76*
134.13	1	2	90 730	836 280		1.49 − 1	1.1+10	C	40°, 76*
119.92	0	1	0	833 840		9.6 − 2	1.5+10	C	40°, 76*
139.50^C	$2s^22p^2\ ^1D_2$	$2s2p^3\ ^3P^o_1$	281 820	998 650		2.5 − 3	2.9+8	E	76*
135.42^C	2	2	281 820	1 020 290		3.2 − 3	2.3+8	E	76*
136.56	$2s2p^3\ ^3P^o_2$	$2p^4\ ^3P_2$	1 020 290	1 752 580	bl	5.30 − 2	3.79+9	C	40°, 76*
132.63	1	2	998 650	1 752 580		5.43 − 2	4.12+9	C	40°, 76*
118.31	2	1	1 020 290	1 865 530		1.25 − 1	1.98+10	C	40°, 76*
116.97	1	0	998 650	1 853 530		4.44 − 2	2.16+10	C	40°, 76*
115.36^C	1	1	998 650	1 865 530		2.4 − 3	4.1+8	E	76*
113.93	0	1	987 830	1 865 530	bl	3.34 − 2	5.7+9	C	40°, 76*
136.49	$2s2p^3\ ^1D^o_2$	$2p^4\ ^1D_2$	1 212 130	1 944 800	bl	5.30 − 1	3.8+10	C	40°, 76*
132.46^C	$2s^22p^2\ ^1S_0$	$2s2p^3\ ^3S^o_1$	415 520	1 170 450		6.7 − 3	8.5+8	E	76*
119.55	$2s2p^3\ ^1P^o_1$	$2p^4\ ^1S_0$	1 356 870	2 193 340		2.0 − 1	9.1+10	C	40°, 76*
116.22	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^3P^o_1$	138 250	998 650		1.9 − 2	3.0+9	D	40°, 76*
113.37	2	2	138 250	1 020 290	bl	2.40 − 1	2.49+10	C	40°, 76*
111.47	1	0	90 730	987 830	bl	4.95 − 2	2.66+10	C	40°, 76*
110.14	1	1	90 730	998 650	bl	1.11 − 1	2.03+10	C	40°, 76*
107.58	1	2	90 730	1 020 290	bl	2.0 − 3	2.3+8	E	40°, 76*
100.14	0	1	0	998 650		1.98 − 2	4.39+9	C	40°, 76*
113.24	$2s2p^3\ ^3D^o_3$	$2p^4\ ^3P_2$	869 510	1 752 580	bl	3.09 − 1	3.21+10	C	40°, 76*
109.14	2	2	836 280	1 752 580	bl	1.45 − 1	1.62+10	C	40°, 76*
108.84	1	2	833 840	1 752 580		4.23 − 2	4.76+9	C	40°, 76*
98.07	1	0	833 840	1 853 530		5.82 − 2	4.04+10	C	40°, 76*
97.16	2	1	836 280	1 865 530	bl	1.01 − 1	2.38+10	C	40°, 76*
96.93	1	1	833 840	1 865 530	bl	7.05 − 2	1.67+10	C	40°, 76*
112.53^C	$2s^22p^2\ ^1D_2$	$2s2p^3\ ^3S^o_1$	281 820	1 170 450		2.7 − 3	4.7+8	E	76*
108.16	$2s2p^3\ ^3P^o_2$	$2p^4\ ^1D_2$	1 020 290	1 944 800	bl	3.4 − 2	3.8+9	E	40°, 76*
105.69^C	1	2	998 650	1 944 800		1.5 − 2	1.8+9	E	76*
107.49	$2s^22p^2\ ^1D_2$	$2s2p^3\ ^1D^o_2$	281 820	1 212 130	bl	4.4 − 1	5.0+10	C	40°, 76*

Co XXII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
106.23	$2s^22p^2\ ^1S_0$	$2s2p^3\ ^1P^o_1$	415 520	1 356 870	bl	1.00 − 1	1.97+10	C	40°, 76*
97.76[C]	$2s2p^3\ ^3S^o_1$	$2p^4\ ^1S_0$	1 170 450	2 193 340		9.3 − 3	6.5+9	E	76*
96.88	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^3S^o_1$	138 250	1 170 450	bl	3.0 − 1	7.0+10	C	40°, 76*
92.61	1	1	90 730	1 170 450		1.05 − 1	2.72+10	C	40°, 76*
85.43	0	1	0	1 170 450	bl	3.39 − 2	1.03+10	C	40°, 76*
93.12	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^1D^o_2$	138 250	1 212 130	bl	7.0 − 2	1.1+10	E	40°, 76*
89.17[C]	1	2	90 730	1 212 130		3.3 − 3	5.5+8	E	76*
93.02	$2s^22p^2\ ^1D_2$	$2s2p^3\ ^1P^o_1$	281 820	1 356 870	bl	3.0 − 1	7.7+10	C	40°, 76*
93.00	$2s2p^3\ ^3D^o_3$	$2p^4\ ^1D_2$	869 510	1 944 800	bl	4.8 − 2	7.3+9	E	40°, 76*
90.21[C]	2	2	836 280	1 944 800		5.0 − 3	8.2+8	E	76*
83.70[C]	$2s2p^3\ ^3P^o_1$	$2p^4\ ^1S_0$	998 650	2 193 340		6.3 − 3	6.0+9	E	76*
82.11[C]	$2s2p^3\ ^5S^o_2$	$2p^4\ ^3P_2$	534 760	1 752 580		1.1 − 2	2.1+9	E	76*
75.14[C]	2	1	534 760	1 865 530		8.5 − 4	3.3+8	E	76*
82.06[C]	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^1P^o_1$	138 250	1 356 870		1.1 − 3	3.6+8	E	76*
78.98	1	1	90 730	1 356 870	bl	1.7 − 2	6.2+9	E	40°, 76*

Co XXIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
717.9^{C}	$2s^22p\ ^2P^o_{1/2}$	$2s^22p\ ^2P^o_{3/2}$	0	139 290		M1	2.42+4	B	76*
365.23^{C}	$2s2p^2\ ^2P_{3/2}$	$2p^3\ ^4S^o_{3/2}$	1 064 960	1 338 760		3.0 − 3	3.7+7	E	76*
229.62^{C}	1/2	3/2	903 260	1 338 760		6.4 − 3	2.0+8	E	76*
347.34^{C}	$2s2p^2\ ^2S_{1/2}$	$2p^3\ ^4S^o_{3/2}$	1 050 860	1 338 760		1.1 − 3	1.5+7	E	76*
342.15^{C}	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^4P_{1/2}$	139 290	431 560		6.0 − 4	1.7+7	E	76*
277.79^{C}	3/2	3/2	139 290	499 270		4.8 − 4	1.0+7	E	76*
237.83^{C}	3/2	5/2	139 290	559 760		5.2 − 3	1.0+8	E	76*
231.72^{C}	1/2	1/2	0	431 560		2.0 − 3	1.2+8	E	76*
237.31^{C}	$2s2p^2\ ^2P_{3/2}$	$2p^3\ ^2D^o_{3/2}$	1 064 960	1 486 350		1.5 − 3	4.5+7	E	76*
218.25^{C}	3/2	5/2	1 064 960	1 523 150		1.52 − 1	3.56+9	C	76*
171.50	1/2	3/2	903 260	1 486 350		1.4 − 1	7.7+9	C	40°, 76*
229.63^{C}	$2s2p^2\ ^2S_{1/2}$	$2p^3\ ^2D^o_{3/2}$	1 050 860	1 486 350		2.32 − 2	7.3+8	C	76*
181.74^{C}	$2s2p^2\ ^2D_{3/2}$	$2p^3\ ^4S^o_{3/2}$	788 520	1 338 760		4.4 − 3	2.2+8	E	76*
164.70^{C}	$2s2p^2\ ^2P_{3/2}$	$2p^3\ ^2P^o_{1/2}$	1 064 960	1 672 130		1.8 − 2	2.2+9	D	76*
146.86	3/2	3/2	1 064 960	1 745 870	bl	3.0 − 1	2.3+10	C	40°, 76*
130.06	1/2	1/2	903 260	1 672 130	bl	1.7 − 2	3.4+9	D	40°, 76*
118.68	1/2	3/2	903 260	1 745 870		3.12 − 2	3.69+9	C	40°, 76*
160.97	$2s2p^2\ ^2S_{1/2}$	$2p^3\ ^2P^o_{1/2}$	1 050 860	1 672 130		9.50 − 2	1.22+10	C	40°, 76*
143.89	1/2	3/2	1 050 860	1 745 870	bl	2.80 − 2	2.26+9	C	40°, 76*
154.03^{C}	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^2D_{3/2}$	139 290	788 520		1.7 − 4	1.2+7	E	76*
147.09	3/2	5/2	139 290	819 150		1.31 − 1	6.7+9	C	40°, 76*
126.82	1/2	3/2	0	788 520		1.2 − 1	1.3+10	C	40°, 76*
149.88	$2s2p^2\ ^2D_{5/2}$	$2p^3\ ^2D^o_{3/2}$	819 150	1 486 350		7.44 − 2	5.5+9	C	40°, 76*
143.30	3/2	3/2	788 520	1 486 350		9.60 − 2	7.8+9	C	40°, 76*
142.05	5/2	5/2	819 150	1 523 150		2.47 − 1	1.36+10	C	40°, 76*
136.12	3/2	5/2	788 520	1 523 150	bl	7.12 − 2	4.27+9	C	40°, 76*
130.90^{C}	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^2P_{1/2}$	139 290	903 260		4.0 − 4	7.7+7	E	76*
110.71	1/2	1/2	0	903 260	bl	1.6 − 1	4.3+10	C	40°, 76*
108.03	3/2	3/2	139 290	1 064 960	bl	3.4 − 1	4.9+10	C	40°, 76*
93.90	1/2	3/2	0	1 064 960		3.42 − 2	6.5+9	C	40°, 76*
128.37	$2s2p^2\ ^4P_{5/2}$	$2p^3\ ^4S^o_{3/2}$	559 760	1 338 760		2.04 − 1	2.06+10	C	40°, 76*
119.12	3/2	3/2	499 270	1 338 760		1.35 − 1	1.59+10	C	40°, 76*
110.23	1/2	3/2	431 560	1 338 760	bl	8.44 − 2	1.16+10	C	40°, 76*
113.17	$2s2p^2\ ^2D_{3/2}$	$2p^3\ ^2P^o_{1/2}$	788 520	1 672 130	bl	1.26 − 1	3.29+10	C	40°, 76*
107.91	5/2	3/2	819 150	1 745 870		1.06 − 1	1.52+10	C	40°, 76*
104.45	3/2	3/2	788 520	1 745 870		3.6 − 2	5.6+9	D	40°, 76*
109.70	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^2S_{1/2}$	139 290	1 050 860		1.38 − 1	3.84+10	C	40°, 76*
95.16	1/2	1/2	0	1 050 860		6.4 − 3	2.4+9	D	40°, 76*
107.92^{C}	$2s2p^2\ ^4P_{5/2}$	$2p^3\ ^2D^o_{3/2}$	559 760	1 486 350		2.8 − 3	4.0+8	E	76*
103.80^{T}	5/2	5/2	559 760	1 523 150		2.6 − 2	2.7+9	E	40°, 76*
101.31^{C}	3/2	3/2	499 270	1 486 350		2.1 − 2	3.4+9	E	76*
97.67^{C}	3/2	5/2	499 270	1 523 150		5.6 − 4	6.5+7	E	76*
94.81^{C}	1/2	3/2	431 560	1 486 350		4.2 − 4	7.8+7	E	76*
84.31^{C}	$2s2p^2\ ^4P_{5/2}$	$2p^3\ ^2P^o_{3/2}$	559 760	1 745 870		7.2 − 4	1.7+8	E	76*
80.61^{C}	1/2	1/2	431 560	1 672 130		5.4 − 4	2.8+8	E	76*
80.22^{C}	3/2	3/2	499 270	1 745 870		1.4 − 3	3.5+8	E	76*
11.197^{T}	$2s2p^2\ ^2D_{3/2}$	$2s2p(^3P^o)3d\ ^2D^o_{5/2}$	788 520	9 720 000?					45
11.173^{T}	$2s2p^2\ ^2S_{1/2}$	$2s2p(^1P^o)3d\ ^2D^o_{3/2}$	1 050 860	10 000 000?					45
11.105^{T}	$2s2p^2\ ^2D_{5/2}$	$2s2p(^3P^o)3d\ ^2F^o_{5/2}$	819 150	9 832 000?					45
11.064^{T}	5/2	7/2	819 150	9 858 000?					45
11.048^{T}	3/2	5/2	788 520	9 832 000?					45
11.105^{T}	$2s2p^2\ ^2P_{3/2}$	$2s2p(^1P^o)3d\ ^2D^o_{5/2}$	1 064 960	10 070 000?					45

Co XXIII – **Continued**

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
11.070^T	$2s2p^2\ ^2P_{3/2}$	$2s2p(^1P^o)3d\ ^2P^o_{3/2}$	1 064 960	10 100 000?					45
11.010^T	$2s2p^2\ ^4P_{5/2}$	$2s2p(^3P^o)3d\ ^4F^o_{7/2}$	559 760	9 640 000?					45
10.933^T	$2s2p^2\ ^4P_{3/2}$	$2s2p(^3P^o)3d\ ^4P^o_{5/2}$	499 270	9 646 000?					45
10.868^T	5/2	3/2	559 760	9 761 000?					45
10.799^T	3/2	1/2	499 270	9 759 000?					45
10.799^T	3/2	3/2	499 270	9 761 000?					45
10.901^T	$2s2p^2\ ^4P_{5/2}$	$2s2p(^3P^o)3d\ ^4D^o_{5/2}$	559 760	9 710 000?					45
10.889^T	3/2	5/2	499 270	9 710 000?					45
10.885^T	5/2	7/2	559 760	9 747 000?					45
10.847^T	1/2	3/2	431 560	9 651 000?					45
10.835^T	1/2	1/2	431 560	9 661 000?					45
10.847^T	$2s2p^2\ ^2D_{5/2}$	$2s2p(^1P^o)3d\ ^2F^o_{7/2}$	819 150	10 040 000?					45
10.809^T	3/2	5/2	788 520	10 040 000?					45

Co XXIV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2809.^{C}	$2s2p\ ^3P^o_0$	$2s2p\ ^3P^o_1$	363 130	398 720		M1	7.18+2	C+	76*
905.06^{C}	1	2	398 720	509 210		M1	1.66+4	C+	76*
492.61^{C}	$2s2p\ ^1P^o_1$	$2p^2\ ^3P_0$	799 040	1 002 040		9.0 − 4	2.5+7	E	76*
344.65^{C}	1	1	799 040	1 089 190		5.4 − 4	1.0+7	E	76*
294.90^{C}	1	2	799 040	1 138 140		3.0 − 2	4.6+8	D	76*
345.03^{C}	$2s2p\ ^3P^o_2$	$2s2p\ ^1P^o_1$	509 210	799 040		M1	1.6+4	D	76*
249.80^{C}	1	1	398 720	799 040		M1	2.6+4	D	76*
229.41^{C}	0	1	363 130	799 040		M1	4.4+4	D	76*
204.10	$2s2p\ ^1P^o_1$	$2p^2\ ^1D_2$	799 040	1 289 000		1.63 − 1	5.20+9	B	40°, 76*
172.42	$2s2p\ ^3P^o_2$	$2p^2\ ^3P_1$	509 210	1 089 190	bl	6.20 − 2	4.64+9	B	40°, 76*
165.75	1	0	398 720	1 002 040		5.37 − 2	1.3+10	B	40°, 76*
159.00	2	2	509 210	1 138 140	bl	1.45 − 1	7.65+9	B	40°, 76*
144.83	1	1	398 720	1 089 190		4.35 − 2	4.61+9	B	40°, 76*
137.73	0	1	363 130	1 089 190		6.33 − 2	7.42+9	B	40°, 76*
135.24	1	2	398 720	1 138 140		8.43 − 2	6.15+9	B	40°, 76*
139.80	$2s2p\ ^1P^o_1$	$2p^2\ ^1S_0$	799 040	1 514 350		1.06 − 1	3.6+10	B	40°, 76*
128.24	$2s2p\ ^3P^o_2$	$2p^2\ ^1D_2$	509 210	1 289 000		7.55 − 2	6.12+9	C	40°, 76*
125.15	$2s^2\ ^1S_0$	$2s2p\ ^1P^o_1$	0	799 040	bl	1.52 − 1	2.16+10	B	40°, 76*
11.430	$2p^2\ ^1S_0$	$2p3s\ ^1P^o_1$	1 514 350	10 264 000		5.4 − 2	9.2+11	D	43°, 76*
11.141	$2p^2\ ^1D_2$	$2p3s\ ^1P^o_1$	1 289 000	10 264 000		1.4 − 1	2.4+12	D	43°, 76*
11.141	$2p^2\ ^3P_1$	$2p3s\ ^3P^o_0$	1 089 190	10 065 000		4.8 − 2	2.6+12	D	43°, 76*
10.933	$2p^2\ ^1S_0$	$2p3d\ ^1P^o_1$	1 514 350	10 661 000		1.28	2.38+13	C−	43°, 76*
10.933	$2s2p\ ^3P^o_2$	$2s3s\ ^3S_1$	509 210	9 653 000		1.3 − 1	2.4+12	D	43°, 76*
10.811	1	1	398 720	9 653 000		7.8 − 2	1.5+12	D	43°, 76*
10.764^{C}	0	1	363 130	9 653 000		2.7 − 2	5.2+11	D	76*
10.811	$2p^2\ ^1D_2$	$2p3d\ ^1D^o_2$	1 289 000	10 539 000		2.3 − 1	2.6+12	C−	43°, 76*
10.800	$2s2p\ ^1P^o_1$	$2s3d\ ^1D_2$	799 040	10 058 000		1.82	2.08+13	C	43°, 76*
10.760	$2p^2\ ^1D_2$	$2p3d\ ^3P^o_2$	1 289 000	10 578 000		8.5 − 1	9.8+12	C−	43°, 76*
10.760	$2p^2\ ^3P_2$	$2p3d\ ^3D^o_2$	1 138 140	10 430 000		1.6 − 1	1.8+12	D	43°, 76*
10.743	2	1	1 138 140	10 449 000		1.5 − 2	2.9+11	D	43°, 76*
10.709	1	2	1 089 190	10 430 000		1.43	1.67+13	C−	43°, 76*
10.674	1	1	1 089 190	10 449 000		2.6 − 1	5.1+12	C−	43°, 76*
10.593	0	1	1 002 040	10 449 000		1.30	2.58+13	C−	43°, 76*
10.674	$2p^2\ ^1D_2$	$2p3d\ ^1F^o_3$	1 289 000	10 658 000		5.0	4.18+13	C−	43°, 76*
10.674	$2p^2\ ^1D_2$	$2p3d\ ^1P^o_1$	1 289 000	10 661 000		7.5 − 2	1.5+12	D	61°, 76*
10.593	$2p^2\ ^3P_2$	$2p3d\ ^3P^o_1$	1 138 140	10 578 000		3.4 − 1	6.6+12	C−	43°, 76*
10.593	2	2	1 138 140	10 578 000		1.05	1.25+13	C−	43°, 76*
10.543	1	1	1 089 190	10 578 000		7.5 − 1	1.5+13	C−	43°, 76*
10.543	1	2	1 089 190	10 578 000		1.9 − 1	2.3+12	D	43°, 76*
10.543	1	0	1 089 190	10 578 000		3.3 − 1	2.0+13	C−	43°, 76*
10.443^{C}	0	1	1 002 040	10 578 000		1.5 − 3	3.1+10	C−	76*
10.587^{C}	$2s2p\ ^1P^o_1$	$2p3p\ ^3D_1$	799 040	10 245 000		8.1 − 2	1.6+12	D	76*
10.571	$2s2p\ ^3P^o_2$	$2s3d\ ^3D_1$	509 210	9 965 000		3.6 − 2	7.2+11	C−	43°, 76*
10.571	2	2	509 210	9 971 000		5.5 − 1	6.6+12	C−	43°, 76*
10.552	2	3	509 210	9 986 000		2.99	2.55+13	C−	43°, 76*
10.445	1	1	398 720	9 965 000		5.4 − 1	1.1+13	C−	61°, 76*
10.445	1	2	398 720	9 971 000		1.64	2.01+13	C−	43°, 76*
10.428	0	1	363 130	9 965 000		7.5 − 1	1.5+13	C−	43°, 76*
10.503	$2p^2\ ^3P_2$	$2p3d\ ^1F^o_3$	1 138 140	10 658 000	2				43
10.503	$2s2p\ ^1P^o_1$	$2p3p\ ^1P_1$	799 040	10 320 000		8.7 − 2	1.8+12	D	43°, 76*
10.389^{C}	$2s2p\ ^1P^o_1$	$2p3p\ ^3P_2$	799 040	10 425 000		2.2 − 1	2.7+12	D	76*
10.389^{C}	1	1	799 040	10 425 000		2.1 − 1	4.3+12	C−	76*

Co XXIV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
10.265	$2s2p\ ^1P^o_1$	$2p3p\ ^1D_2$	799 040	10 541 000		6.0 – 1	7.6+12	C–	43°, 76*
10.182	$2s2p\ ^1P^o_1$	$2s3s\ ^1S_0$	799 040	10 620 000?		3.3 – 2	2.1+12	D	43°, 76*
10.179^C	$2s2p\ ^3P^o_2$	$2p3p\ ^3D_2$	509 210	10 333 000		1.4 – 2	1.7+11	E	76*
10.156	1	1	398 720	10 245 000		1.6 – 1	3.4+12	E	43°, 76*
10.115	0	1	363 130	10 245 000		8.4 – 2	1.8+12	E	43°, 76*
10.066	1	2	398 720	10 333 000		4.8 – 1	6.3+12	C–	43°, 76*
10.066	2	3	509 210	10 444 000		7.5 – 1	7.0+12	C–	43°, 76*
10.115	$2s^2\ ^1S_0$	$2s3p\ ^3P^o_1$	0	9 886 000		2.7 – 1	5.9+12	C–	43°, 76*
10.085^C	$2s2p\ ^3P^o_2$	$2p3p\ ^3P_2$	509 210	10 425 000		4.6 – 1	6.0+12	C–	76*
10.066	1	0	398 720	10 333 000		1.2 – 1	7.9+12	D	43°, 76*
9.974	1	1	398 720	10 425 000	1				43
9.974	1	2	398 720	10 425 000		1.4 – 2	1.9+11	D	43°, 76*
10.053	$2s2p\ ^3P^o_0$	$2p3p\ ^1P_1$	363 130	10 320 000	3				43
10.053	$2s2p\ ^3P^o_2$	$2p3p\ ^3S_1$	509 210	10 456 000	3				43
9.974	$2s2p\ ^3P^o_2$	$2p3p\ ^1D_2$	509 210	10 541 000	1				43

Co XXV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
659.39^C	$1s^22p\ ^2P^o_{1/2}$	$1s^22p\ ^2P^o_{3/2}$	409 445	561 101		M1	3.13+4	B	76*
244.233^S	$1s^22s\ ^2S_{1/2}$	$1s^22p\ ^2P^o_{1/2}$	0	409 445		3.40 − 2	1.92+9	B+	62°, 76*
178.221^S	1/2	3/2	0	561 101		9.48 − 2	4.99+9	B+	62°, 76*
63.837^C	$1s^24p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	[13 579 530]	[15 146 030]					
63.712^C	3/2	5/2	[13 579 530]	[15 149 100]					
63.074^C	1/2	3/2	[13 560 590]	[15 146 030]					
30.2727^C	$1s^23p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	[10 209 610]	[13 512 920]					
29.8665^C	1/2	1/2	[10 164 690]	[13 512 920]					
29.5155^C	$1s^23p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	[10 209 610]	[13 597 660]					
29.4634^C	3/2	5/2	[10 209 610]	[13 603 650]					
29.1293^C	1/2	3/2	[10 164 690]	[13 597 660]					
28.4947^C	$1s^23s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	[10 051 160]	[13 560 590]					
28.3417^C	1/2	3/2	[10 051 160]	[13 579 530]					
20.4368^C	$1s^23p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	[10 209 610]	[15 102 750]					
20.2509^C	1/2	1/2	[10 164 690]	[15 102 750]					
20.2576^C	$1s^23p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	[10 209 610]	[15 146 030]					
20.2450^C	3/2	5/2	[10 209 610]	[15 149 100]					
20.0749^C	1/2	3/2	[10 164 690]	[15 146 030]					
10.5373^C	$1s^22p\ ^2P^o_{3/2}$	$1s^23s\ ^2S_{1/2}$	561 101	[10 051 160]		7.2 − 2	2.2+12	C	45, 63, 76*
10.3716^C	1/2	1/2	409 445	[10 051 160]		3.4 − 2	1.1+12	D	45, 63, 76*
10.3183^C	$1s^22p\ ^2P^o_{3/2}$	$1s^23d\ ^2D_{3/2}$	561 101	[10 252 660]		2.7 − 1	4.3+12	C	45, 63, 76*
10.3032^C	3/2	5/2	561 101	[10 266 840]		2.43	2.56+13	C+	45, 63, 76*
10.1593^C	1/2	3/2	409 445	[10 252 660]		1.36	2.19+13	C+	45, 63, 76*
9.83798^C	$1s^22s\ ^2S_{1/2}$	$1s^23p\ ^2P^o_{1/2}$	0	[10 164 690]		2.58 − 1	8.89+12	B+	45, 63, 76*
9.79469^C	1/2	3/2	0	[10 209 610]		4.94 − 1	8.58+12	B+	45, 63, 76*
7.72092^C	$1s^22p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	561 101	[13 512 920]					63
7.63156^C	1/2	1/2	409 445	[13 512 920]					63
7.67074^C	$1s^22p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	561 101	[13 597 660]					63
7.66721^C	3/2	5/2	561 101	[13 603 650]					63
7.58253^C	1/2	3/2	409 445	[13 597 660]					63
7.37431^C	$1s^22s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	0	[13 560 590]					63
7.36403^C	1/2	3/2	0	[13 579 530]					63
6.87680^C	$1s^22p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	561 101	[15 102 750]					63
6.80582^C	1/2	1/2	409 445	[15 102 750]					63
6.85639^C	$1s^22p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	561 101	[15 146 030]					63
6.85495^C	3/2	5/2	561 101	[15 149 100]					63
6.78583^C	1/2	3/2	409 445	[15 146 030]					63
6.61066^C	$1s^22s\ ^2S_{1/2}$	$1s^25p\ ^2P^o_{1/2}$	0	[15 127 080]					63
6.60643^C	1/2	3/2	0	[15 136 760]					63
1.7544^C	$1s^22p\ ^2P^o_{3/2}$	$1s2s^2\ ^2S_{1/2}$	561 101	[57 558 000]					63
1.7499^C	1/2	1/2	409 445	[57 558 000]					63
1.7362^C	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^4P_{1/2}$	561 101	[58 157 000]					63
1.7338^C	3/2	3/2	561 101	[58 237 000]					63
1.7322^C	3/2	5/2	561 101	[58 289 000]					63
1.7317^C	1/2	1/2	409 445	[58 157 000]					63
1.7293^C	1/2	3/2	409 445	[58 237 000]					63
1.7342^C	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^4P^o_{1/2}$	0	[57 663 000]					63
1.7332^C	1/2	3/2	0	[57 697 000]					63
1.7277^C	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1D)\ ^2D_{3/2}$	561 101	[58 441 000]					63
1.7259^C	3/2	5/2	561 101	[58 500 000]					63
1.7232^C	1/2	3/2	409 445	[58 441 000]					63

Co XXV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1.7275^C	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^2P_{1/2}$	561 101	[58 446 000]					63
1.7231^C	1/2	1/2	409 445	[58 446 000]					63
1.7225^C	3/2	3/2	561 101	[58 615 000]					63
1.7181^C	1/2	3/2	409 445	[58 615 000]					63
1.7241^C	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^2P^o_{1/2}$	0	[58 001 000]					63
1.7215^C	1/2	3/2	0	[58 089 000]					63
1.7180^C	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^1P^o)\ ^2P^o_{1/2}$	0	[58 207 000]					63
1.7172^C	1/2	3/2	0	[58 234 000]					63
1.7177^C	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1S)\ ^2S_{1/2}$	561 101	[58 776 000]					63
1.7134^C	1/2	1/2	409 445	[58 776 000]					63

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Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
6600^C	$1s4p\ ^3P^o_2$	$1s4d\ ^3D_2$	[72 314 300]	[72 329 400]					
4590^C	2	3	[72 314 300]	[72 336 100]					
3040^C	1	2	[72 296 500]	[72 329 400]					
3010^C	1	1	[72 296 500]	[72 329 700]					
2820^C	0	1	[72 294 300]	[72 329 700]					
6400^C	$1s5s\ ^3S_1$	$1s5p\ ^3P^o_1$	[73 972 000]	[73 987 500]		8.1 − 2	4.4+6	E	76*
4060^C	1	2	[73 972 000]	[73 996 600]					
5400^C	$1s5s\ ^1S_0$	$1s5p\ ^1P^o_1$	[73 987 000]	[74 005 400]		1.0 − 1	7.5+6	E	76*
3280^C	$1s4s\ ^3S_1$	$1s4p\ ^3P^o_1$	[72 266 000]	[72 296 500]		7.5 − 2	1.6+7	E	76*
2070^C	1	2	[72 266 000]	[72 314 300]					
2780^C	$1s4s\ ^1S_0$	$1s4p\ ^1P^o_1$	[72 295 500]	[72 331 500]		6.9 − 2	2.0+7	D	76*
1380^C	$1s3s\ ^3S_1$	$1s3p\ ^3P^o_1$	[68 560 000]	[68 632 500]		4.8 − 2	5.6+7	C	76*
1180^C	$1s3s\ ^1S_0$	$1s3p\ ^1P^o_1$	[68 630 600]	[68 715 500]		5.7 − 2	9.1+7	C	76*
408.65^C	$1s2s\ ^3S_1$	$1s2p\ ^3P^o_0$	[57 857 380]	[58 102 090]		1.01 − 2	4.04+8	B	76*
381.24^C	1	1	[57 857 380]	[58 119 680]		2.94 − 2	4.50+8	B	76*
247.65^C	1	2	[57 857 380]	[58 261 180]		8.34 − 2	1.82+9	B	76*
346.34^C	$1s2s\ ^1S_0$	$1s2p\ ^1P^o_1$	[58 122 700]	[58 411 430]		3.35 − 2	6.21+8	B	76*
180.49^C	$1s2s\ ^3S_1$	$1s2p\ ^1P^o_1$	[57 857 380]	[58 411 430]		6.78 − 3	4.62+8	B	76*
60.40^C	$1s4p\ ^1P^o_1$	$1s5s\ ^1S_0$	[72 331 500]	[73 987 000]		1.6 − 1	3.0+11	B	76*
60.32^C	$1s4p\ ^3P^o_2$	$1s5s\ ^3S_1$	[72 314 300]	[73 972 000]					
59.68^C	1	1	[72 296 500]	[73 972 000]		1.6 − 1	9.7+10	B	76*
58.48^C	$1s4s\ ^1S_0$	$1s5p\ ^1P^o_1$	[72 295 500]	[74 005 400]		4.38 − 1	2.85+11	B	76*
58.09^C	$1s4s\ ^3S_1$	$1s5p\ ^3P^o_1$	[72 266 000]	[73 987 500]		4.50 − 1	2.96+11	B	76*
27.933^C	$1s3p\ ^1P^o_1$	$1s4s\ ^1S_0$	[68 715 500]	[72 295 500]		9.9 − 2	8.5+11	B	76*
27.910^C	$1s3d\ ^3D_1$	$1s4p\ ^3P^o_0$	[68 711 300]	[72 294 300]					
27.892^C	1	1	[68 711 300]	[72 296 500]					
27.887^C	2	1	[68 710 600]	[72 296 500]					
27.872^C	3	2	[68 726 500]	[72 314 300]					
27.749^C	2	2	[68 710 600]	[72 314 300]					
27.846^C	$1s3p\ ^3P^o_2$	$1s4s\ ^3S_1$	[68 674 800]	[72 266 000]					
27.522^C	1	1	[68 632 500]	[72 266 000]		9.6 − 2	2.8+11	B	76*
27.758^C	$1s3d\ ^1D_2$	$1s4p\ ^1P^o_1$	[68 728 900]	[72 331 500]		5.5 − 2	1.6+11	C	76*
27.612^C	$1s3p\ ^1P^o_1$	$1s4d\ ^1D_2$	[68 715 500]	[72 337 100]		1.9	3.3+12	C	76*
27.363^C	$1s3p\ ^3P^o_2$	$1s4d\ ^3D_2$	[68 674 800]	[72 329 400]					
27.313^C	2	3	[68 674 800]	[72 336 100]					
27.050^C	1	2	[68 632 500]	[72 329 400]					
27.047^C	1	1	[68 632 500]	[72 329 700]					
27.011^C	0	1	[68 627 500]	[72 329 700]					
27.020^C	$1s3s\ ^1S_0$	$1s4p\ ^1P^o_1$	[68 630 600]	[72 331 500]		3.93 − 1	1.20+12	B	76*
26.763^C	$1s3s\ ^3S_1$	$1s4p\ ^3P^o_1$	[68 560 000]	[72 296 500]		3.99 − 1	1.24+12	B	76*
26.636^C	1	2	[68 560 000]	[72 314 300]					
18.970^C	$1s3p\ ^1P^o_1$	$1s5s\ ^1S_0$	[68 715 500]	[73 987 000]		2.3 − 2	4.2+11	C	76*
18.878^C	$1s3p\ ^3P^o_2$	$1s5s\ ^3S_1$	[68 674 800]	[73 972 000]					
18.728^C	1	1	[68 632 500]	[73 972 000]		2.1 − 2	1.3+11	C	76*
18.605^C	$1s3s\ ^1S_0$	$1s5p\ ^1P^o_1$	[68 630 600]	[74 005 400]		1.01 − 1	6.49+11	B	76*
18.425^C	$1s3s\ ^3S_1$	$1s5p\ ^3P^o_1$	[68 560 000]	[73 987 500]		1.0 − 1	6.7+11	B	76*
18.394^C	1	2	[68 560 000]	[73 996 600]					

Co XXVI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
9.7855^C	$1s2p$ $^1P^o_1$	$1s3s$ $^1S_0$	[58 411 430]	[68 630 600]		4.2 – 2	2.9+12	B	76*
9.7099^C	$1s2p$ $^3P^o_2$	$1s3s$ $^3S_1$	[58 261 180]	[68 560 000]					
9.5783^C	1	1	[58 119 680]	[68 560 000]		4.2 – 2	1.0+12	B	76*
9.6923^C	$1s2p$ $^1P^o_1$	$1s3d$ $^1D_2$	[58 411 430]	[68 728 900]		2.1	3.0+13	C+	76*
9.5699^C	$1s2p$ $^3P^o_2$	$1s3d$ $^3D_2$	[58 261 180]	[68 710 600]					
9.5554^C	2	3	[58 261 180]	[68 726 500]					
9.4421^C	1	2	[58 119 680]	[68 710 600]					
9.4414^C	1	1	[58 119 680]	[68 711 300]					
9.4258^C	0	1	[58 102 090]	[68 711 300]					
9.4404^C	$1s2s$ $^1S_0$	$1s3p$ $^1P^o_1$	[58 122 700]	[68 715 500]		3.58 – 1	8.93+12	B	76*
9.2806^C	$1s2s$ $^3S_1$	$1s3p$ $^3P^o_1$	[57 857 380]	[68 632 500]		3.63 – 1	9.37+12	B	76*
7.2025^C	$1s2p$ $^1P^o_1$	$1s4s$ $^1S_0$	[58 411 430]	[72 295 500]		9.3 – 3	1.2+12	C	76*
7.1810^C	$1s2p$ $^1P^o_1$	$1s4d$ $^1D_2$	[58 411 430]	[72 337 100]		3.6 – 1	9.3+12	C	76*
7.1404^C	$1s2p$ $^3P^o_2$	$1s4s$ $^3S_1$	[58 261 180]	[72 266 000]					
7.0690^C	1	1	[58 119 680]	[72 266 000]		9.0 – 3	4.0+11	C	76*
7.1082^C	$1s2p$ $^3P^o_2$	$1s4d$ $^3D_2$	[58 261 180]	[72 329 400]					
7.1048^C	2	3	[58 261 180]	[72 336 100]					
7.0374^C	1	2	[58 119 680]	[72 329 400]					
7.0373^C	1	1	[58 119 680]	[72 329 700]					
7.0286^C	0	1	[58 102 090]	[72 329 700]					
7.0379^C	$1s2s$ $^1S_0$	$1s4p$ $^1P^o_1$	[58 122 700]	[72 331 500]		8.6 – 2	3.9+12	B	76*
6.9256^C	$1s2s$ $^3S_1$	$1s4p$ $^3P^o_1$	[57 857 380]	[72 296 500]		9.3 – 2	4.3+12	B	76*
6.9171^C	1	2	[57 857 380]	[72 314 300]					
6.4203^C	$1s2p$ $^1P^o_1$	$1s5s$ $^1S_0$	[58 411 430]	[73 987 000]		3.6 – 3	5.8+11	C	76*
6.3650^C	$1s2p$ $^3P^o_2$	$1s5s$ $^3S_1$	[58 261 180]	[73 972 000]					
6.3082^C	1	1	[58 119 680]	[73 972 000]		3.6 – 3	2.0+11	C	76*
6.2962^C	$1s2s$ $^1S_0$	$1s5p$ $^1P^o_1$	[58 122 700]	[74 005 400]		3.5 – 2	2.0+12	B	76*
6.1996^C	$1s2s$ $^3S_1$	$1s5p$ $^3P^o_1$	[57 857 380]	[73 987 500]		3.6 – 2	2.1+12	B	76*
6.1961^C	1	2	[57 857 380]	[73 996 600]					
1.728388^C	$1s^2$ $^1S_0$	$1s2s$ $^3S_1$	0	[57 857 380]		M1	3.12+8	B	76*
1.720588^C	$1s^2$ $^1S_0$	$1s2p$ $^3P^o_1$	0	[58 119 680]		7.84 – 2	5.89+13	B	76*
1.716409^C	0	2	0	[58 261 180]		M2	9.05+9	D	76*
1.711994^C	$1s^2$ $^1S_0$	$1s2p$ $^1P^o_1$	0	[58 411 430]		6.93 – 1	5.26+14	B	65, 66, 67, 76*
1.6778^C	$1s2p$ $^1P^o_1$	$2s^2$ $^1S_0$	[58 411 430]	[118 012 000]		2.6 – 2	6.2+13	D	63, 76*
1.6697^C	$1s2p$ $^3P^o_1$	$2s^2$ $^1S_0$	[58 119 680]	[118 012 000]		2.7 – 2	6.4+13	D	63, 76*
1.6691^C	$1s2p$ $^1P^o_1$	$2p^2$ $^3P_0$	[58 411 430]	[118 322 000]		4.2 – 3	1.0+13	D	63, 76*
1.6664^C	1	1	[58 411 430]	[118 418 000]		2.0 – 2	1.6+13	D	63, 76*
1.6649^C	1	2	[58 411 430]	[118 474 000]		2.7 – 1	1.3+14	C	63, 76*
1.6677^C	$1s2s$ $^1S_0$	$2s2p$ $^3P^o_1$	[58 122 700]	[118 086 000]		1.9 – 2	1.5+13	D	63, 76*
1.6623^C	$1s2p$ $^3P^o_2$	$2p^2$ $^3P_1$	[58 261 180]	[118 418 000]		3.5 – 1	2.8+14	C	63, 76*
1.6611^C	1	0	[58 119 680]	[118 322 000]		2.5 – 1	6.0+14	C	63, 76*
1.6607^C	2	2	[58 261 180]	[118 474 000]		6.5 – 1	3.2+14	C	63, 76*
1.6585^C	1	1	[58 119 680]	[118 418 000]		1.9 – 1	1.5+14	C	63, 76*
1.6580^C	0	1	[58 102 090]	[118 418 000]		2.7 – 1	2.2+14	C	63, 76*
1.6570^C	1	2	[58 119 680]	[118 474 000]		4.2 – 1	2.1+14	C	63, 76*
1.6615^C	$1s2s$ $^3S_1$	$2s2p$ $^3P^o_0$	[57 857 380]	[118 044 000]		1.4 – 1	3.3+14	C	63, 76*
1.6603^C	1	1	[57 857 380]	[118 086 000]		3.9 – 1	3.2+14	C	63, 76*
1.6563^C	1	2	[57 857 380]	[118 233 000]		6.9 – 1	3.3+14	C	63, 76*
1.6598^C	$1s2p$ $^1P^o_1$	$2p^2$ $^1D_2$	[58 411 430]	[118 659 000]		1.0	4.9+14	C	63, 76*

Co XXVI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1.6556^{C}	$1s2p\ ^3P^o_2$	$2p^2\ ^1D_2$	[58 261 180]	[118 659 000]		3.7 − 1	1.8+14	C	63, 76*
1.6519^{C}	1	2	[58 119 680]	[118 659 000]					63
1.6556^{C}	$1s2s\ ^1S_0$	$2s2p\ ^1P^o_1$	[58 122 700]	[118 525 000]		3.9 − 1	3.2+14	C	63, 76*
1.6519^{C}	$1s2p\ ^1P^o_1$	$2p^2\ ^1S_0$	[58 411 430]	[118 946 000]		2.4 − 1	5.9+14	C	63, 76*
1.6483^{C}	$1s2s\ ^3S_1$	$2s2p\ ^1P^o_1$	[57 857 380]	[118 525 000]		1.8 − 2	1.5+13	D	63, 76*
1.6441^{C}	$1s2p\ ^3P^o_1$	$2p^2\ ^1S_0$	[58 119 680]	[118 946 000]					63
1.45704^{C}	$1s^2\ ^1S_0$	$1s3p\ ^3P^o_1$	0	[68 632 500]		1.8 − 2	1.9+13	E	76*
1.45528^{C}	$1s^2\ ^1S_0$	$1s3p\ ^1P^o_1$	0	[68 715 500]		1.35 − 1	1.42+14	B	76*
1.38319^{C}	$1s^2\ ^1S_0$	$1s4p\ ^3P^o_1$	0	[72 296 500]		6.6 − 3	7.7+12	E	76*
1.38252^{C}	$1s^2\ ^1S_0$	$1s4p\ ^1P^o_1$	0	[72 331 500]		4.88 − 2	5.68+13	B	76*
1.35158^{C}	$1s^2\ ^1S_0$	$1s5p\ ^3P^o_1$	0	[73 987 500]		3.3 − 3	4.0+12	E	76*
1.35125^{C}	$1s^2\ ^1S_0$	$1s5p\ ^1P^o_1$	0	[74 005 400]		2.40 − 2	2.92+13	B	76*

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Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1740[C]	$3s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[71 778 270]	[71 835 750]		5.18 − 2	2.85+7	A	75*
1695.2[C]	$3p\ ^2P^o_{1/2}$	$3d\ ^2D_{3/2}$	[71 776 650]	[71 835 640]		3.32 − 2	1.93+7	A	75*
515.04[C]	$2s\ ^2S_{1/2}$	$2p\ ^2P^o_{3/2}$	[60 511 130]	[60 705 290]		2.92 − 2	1.83+8	A	75*
25.6718[C]	$3d\ ^2D_{5/2}$	$4f\ ^2F^o_{7/2}$	[71 854 990]	[75 750 320]		5.83	7.37+12	A	75*
25.5720[C]	$3p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[71 835 750]	[75 746 270]		2.24	3.80+12	A	75*
25.2533[C]	$3s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[71 778 270]	[75 738 150]		6.58 − 1	1.72+12	A	75*
17.5567[C]	$3d\ ^2D_{5/2}$	$5f\ ^2F^o_{7/2}$	[71 854 990]	[77 550 810]		8.94 − 1	2.42+12	A	75*
17.5040[C]	$3p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[71 835 750]	[77 548 740]		5.04 − 1	1.83+12	A	75*
17.3421[C]	$3s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[71 778 270]	[77 544 580]		1.64 − 1	9.07+11	A	75*
8.968851[C]	$2p\ ^2P^o_{3/2}$	$3d\ ^2D_{5/2}$	[60 705 290]	[71 854 990]		2.51	3.47+13	A	75*
8.830318[C]	$2s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[60 511 130]	[71 835 750]		5.92 − 1	1.26+13	A	75*
6.648503[C]	$2p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[60 705 290]	[75 746 270]		4.40 − 1	1.11+13	A	75*
6.567273[C]	$2s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[60 511 130]	[75 738 150]		1.39 − 1	5.38+12	A	75*
5.937026[C]	$2p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[60 705 290]	[77 548 740]		1.60 − 1	5.05+12	A	75*
5.870801[C]	$2s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[60 511 130]	[77 544 580]		5.68 − 2	2.74+12	A	75*
1.652730[C]	$1s\ ^2S_{1/2}$	$2p\ ^2P^o_{1/2}$	0	[60 505 950]		2.80 − 1	3.42+14	A	75*
1.647303[C]	$1/2$	$3/2$	0	[60 705 290]		5.62 − 1	3.45+14	A	75*
1.393211[C]	$1s\ ^2S_{1/2}$	$3p\ ^2P^o_{1/2}$	0	[71 776 650]		5.32 − 2	9.15+13	A	75*
1.392065[C]	$1/2$	$3/2$	0	[71 835 750]		1.07 − 1	9.17+13	A	75*
1.320339[C]	$1s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	0	[75 738 150]		3.90 − 2	3.73+13	A	75*
1.289581[C]	$1s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	0	[77 544 580]		1.88 − 2	1.88+13	A	75*

2.7.3. References for Comments and Tables for Co Ions

[1] E. Alexander, U. Feldman, B. S. Fraenkel, and S. Hoory, J. Opt. Soc. Am. **56**, 651 (1966).
[2] B. C. Fawcett, A. Ridgeley, and J. O. Ekberg, Phys. Scr. **21**, 155 (1980).
[3] J. Sugar and C. Corliss, J. Phys. Chem. Ref. Data **14**, Suppl. 2 (1985).
[4] E. Alexander, U. Feldman, and B. S. Fraenkel, J. Opt. Soc. Am. **55**, 650 (1965).
[5] A. H. Gabriel, B. C. Fawcett, and C. Jordan, Proc. Phys. Soc. **87**, 825 (1966).
[6] S. Goldsmith, J. Opt. Soc. Am. **59**, 1678 (1969).
[7] A. A. Ramonas and A. N. Ryabtsev, Opt. Spectrosc. **48**, 348 (1980).
[8] S. Hoory, S. Goldsmith, B. S. Fraenkel, and U. Feldman, Astrophys. J. **160**, 781 (1970).
[9] B. C. Fawcett and R. W. Hayes, J. Phys. B **5**, 366 (1972).
[10] B. C. Fawcett, R. D. Cowan, and R. W. Hayes, J. Phys. B **5**, 2143 (1972).
[11] M. Swartz, S. O. Kastner, L. Goldsmith, and W. M. Neupert, J. Opt. Soc. Am. **66**, 240 (1976).
[12] J. Sugar, V. Kaufman, and W. L. Rowan, J. Opt. Soc. Am. B **4**, 1927 (1987).
[13] M. H. L. Price, Astrophys. J. **140**, 1192 (1964).
[14] B. Edlén, Z. Physik **104**, 407 (1937).
[15] B. C. Fawcett and A. T. Hatter, Astron. Astrophys. **84**, 78 (1980).
[16] W. Lotz, J. Opt. Soc. Am **57**, 873 (1967).
[17] R. Smitt, L. A. Svensson, and M. Outred, Phys. Scr. **13**, 293 (1976).
[18] B. C. Fawcett, R. D. Cowan, and R. W. Hayes, Supplementary Publication No. SUP 70005, unpublished (1972).
[19] J. Sugar, V. Kaufman, and W. L. Rowan, J. Opt. Soc. Am. B **7**, 152 (1990).
[20] S. O. Kastner, M. Swartz, A. K. Bhatia, and J. Lapides, J. Opt. Soc. Am. **68**, 1558 (1978).
[21] B. Edlén, Z. Physik, **103**, 536 (1936).
[22] U. Litzén and A. Redfors, Phys. Lett. A **127**, 88 (1988).
[23] A. Redfors and U. Litzén, J. Opt. Soc. Am. B **6**, 1447 (1989).
[24] V. E. Levashov, A. N. Ryabtsev, and S. S. Churilov, Opt. Spectrosc. **69**, 20 (1990).
[25] S. S. Churilov and V. E. Levashov, Phys. Scr. **48**, 425 (1993).
[26] S. S. Churilov, E. Ya. Kononov, A. N. Ryabtsev, and Yu. F. Zayikin, Phys. Scr. **32**, 501 (1985).
[27] U. Feldman, L. Katz, W. Behring, and L. Cohen, J. Opt. Soc. Am. **61**, 91 (1971).
[28] M. Swartz, S. Kastner, E. Rothe, and W. Neupart, J. Phys. B **4**, 1747 (1971).
[29] U. Litzén and A. Redfors, Phys. Scr. **36**, 895 (1987).
[30] A. Redfors, Phys. Scr. **38**, 702 (1988).
[31] V. E. Levashov and S. S. Churilov, Opt. Spectrosc. **65**, 143 (1988).
[32] S. S. Churilov, V. E. Levashov, and J. F. Wyart, Phys. Scr. **40**, 625 (1989).
[33] B. Edlén, Z. Physik **100**, 621 (1936).
[34] U. Feldman, L. Cohen, and M. Swartz, J. Opt. Soc. Am. **57**, 535 (1967).
[35] U. Feldman and L. Cohen, J. Opt. Soc. Am. **57**, 1128 (1967).
[36] K. G. Widing, G. D. Sandlin, and R. D. Cowan, Astrophys. J. **169**, 405 (1971).
[37] G. D. Sandlin, G. E. Brueckner, V. E. Scherrer, and R. Tousey, Astrophys. J. **205**, L47 (1976).
[38] B. Edlén, Phys. Scr. **17**, 565 (1978).
[39] J. Reader, V. Kaufman, J. Sugar, J. O. Ekberg, U. Feldman, C. M. Brown, J. F. Seely, and W. L. Rowan, J. Opt. Soc. Am. B **4**, 1821 (1987).
[40] K. D. Lawson and N. J. Peacock, J. Phys. B **13**, 3313 (1980).
[41] F. Tyrén, Z. Physik, **111**, 314 (1938).
[42] U. Feldman and L. Cohen, Astrophys. J. **149**, 265 (1967).
[43] V. A. Boiko, A. Ya. Faenov, and S. A. Pikuz, J. Quant. Spectrosc. Radiat. Transfer **19**, 11 (1978).
[44] H. Gordon, M. G. Hobby, and N. J. Peacock, J. Phys. B **13**, 1985 (1980).
[45] S. Chang, P. Fan, S. Zhao, J. Zhou, and R. Jin, Phys. Scr. **35**, 798 (1987).
[46] N. Spector, A. Ziqler, H. Zmora, and J. L. Schwob, J. Opt. Soc. Am. **70**, 857 (1980).
[47] S. O. Kastner, W. E. Behring, and L. Cohen, Astrophys. J. **199**, 777 (1975).
[48] L. Cohen, U. Feldman, and S. O. Kastner, J. Opt. Soc. Am. **58**, 331 (1968).
[49] U. Feldman, G. A. Doschek, R. D. Cowan, and L. Cohen, J. Opt. Soc. Am. **63**, 1445 (1973).
[50] V. A. Boiko, S. A. Pikuz, A. S. Safronova, and A. Ya. Faenov, Opt. Spectrosc. **44**, 498 (1978).
[51] V. A. Boiko, S. A. Pikuz, A. S. Safronova, A. Ya. Faenov, P. O. Bogdanovich, G. V. Merkelis, Z. B. Rudzikas, and R. D. Sadziuviene, J. Phys. B **12**, 1927 (1979).
[52] G. A. Doschek, U. Feldman, R. D. Cowan, and L. Cohen, Astrophys. J. **188**, 417 (1974).
[53] K. T. Cheng, unpublished material (1981).
[54] W. C. Martin, unpublished material (1982).
[55] G. A. Doschek, U. Feldman, J. Davis, and R. D. Cowan, Phys. Rev. A **12**, 980 (1975).
[56] U. Feldman, G. A. Doschek, R. D. Cowan, and L. Cohen, Astrophys. J. **196**, 613 (1975).
[57] B. Edlén, Phys. Scr. **31**, 345 (1985).
[58] B. Edlén, Phys. Scr. **28**, 483 (1983).
[59] B. Edlén, Phys. Scr. **28**, 51 (1983).
[60] B. Edlén, Phys. Scr. **32**, 86 (1985).
[61] V. A. Boiko, S. A. Pikuz, U. I. Safronova, and A. Ya. Faenov, J. Phys. B **10**, 1253 (1977).
[62] Y.-K. Kim, D. H. Baik, P. Indelicato, and J. P. Desclaux, Phys. Rev. A **44**, 148 (1991).
[63] L. A. Vainshtein and U. I. Safronova, Reprint No. 2, Acad. Nauk USSR, Inst. Spectrosc. Moscow (1985).
[64] B. Edlén, Phys. Scr. **19**, 255 (1979).
[65] S. Morita, J. Phys. Soc. Jpn **52**, 2673 (1983).
[66] S. Morita and J. Fujita, Nucl. Instr. Meth., B **7**, 713 (1985).
[67] E. V. Aglitsky, P. S. Antsiferov, S. L. Mandelstam, A. M. Panin, U. I. Safronova, S. A. Ulitin, and L. A. Vainshtein, Phys. Scr. **38**, 136 (1988).
[68] K. T. Cheng, M. H. Chen, W. R. Johnson, and J. Sapirstein, Phys. Rev. A **50**, 247 (1994).
[69] K. T. Cheng, Private communication (1996).
[70] W. R. Johnson and G. Soff, Atom. Data Nucl. Data Tables **33**, 405 (1985).
[71] G. W. F. Drake, *Calculated transition frequencies for helium-like ions*, unpublished (1985).
[72] P. Beiersdorfer, M. Bitter, S. von Goeler, and K. W. Hill, Phys. Rev. A **40**, 150 (1989).
[73] P. J. Mohr, Atom. Data Nucl. Data Tables **3**, 453 (1983).
[74] G. W. Erickson, J. Phys. Chem. Ref. Data **6**, 831 (1977).
[75] W. L. Wiese, M. W. Smith, and B. M. Glennon, Natl. Stand. Ref. Data Ser. **4**, Vol. I (1966).
[76] J. R. Fuhr, G. A. Martin, and W. L. Wiese, J. Phys. Chem. Ref. Data **17**, Suppl. No 4 (1988).
[77] S. M. Younger and A. W. Weiss, J. Res. Natl. Bur. Stand. Sec. **79A**, 629 (1975).

2.8. Nickel

2.8.1. Brief Comments on Each Nickel Ion

Ni IX

Ca I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^6 3d^2 \ {}^3F_2$

Ionization energy 1 560 000 cm^{-1} (193 eV)

Transitions between the configurations $3d^2$ and $3d4f$ were observed by Alexander *et al.* [1]. Corrected classifications and remeasured wavelengths were given by Even-Zohar and Fraenkel [2], which are adopted in the present compilation. The uncertainty of the wavelengths is ±0.003 Å. The singlet transitions and levels derived from them are connected to the triplet system by an estimated value for the $3d^2\ {}^1D$ term by Alexander *et al.* [1]. The systematic error is given in the form of an additive constant x: x is expected to be a few hundred cm^{-1}.

Fawcett *et al.* [3] classified the $3p^6 3d^2 - 3p^5 3d^3$ transition array. The uncertainty of the wavelengths is ±0.007 Å.

A coronal line at 7143.9 Å was classified as the $3p^6 3d^2 ({}^1D_2 - {}^1G_4)$ intrashell transition by Pryce [4].

The value for the ionization energy was obtained by Lotz [5] by extrapolation.

Ni X

K I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^6 3d \ {}^2D_{3/2}$

Ionization energy 1 812 000 cm^{-1} (224.6 eV)

In 1965, Alexander *et al.* [6] published the wavelengths for the $3d-4f$ and $5f$ transitions. The $3d-4f$ lines were observed in the solar spectrum by Feldman *et al.* [7] and Widing and Sandlin [8]. In 1968, Even-Zohar and Fraenkel [2] gave measurements of $3d - nf$ transitions (n = 4 to 7) with improved wavelengths, which are adopted in this compilation. The uncertainties of the wavelengths are in the range from ±0.005 to ±0.01 Å.

Gabriel *et al.* [9] measured the wavelengths in the region from 144 to 160 Å and identified the $3p^6 3d\ {}^2D - 3p^5 3d^2 ({}^3F)\ {}^2D^\circ$ and ${}^2F^\circ$ transitions. Goldsmith and Fraenkel [10] remeasured these lines and also added the $3p^6 3d\ {}^2D - 3p^5 3d^2 ({}^3P)\ {}^2P^\circ$ transitions. The most comprehensive investigation of the $3p^6 3d - 3p^5 3d^2$ transitions was reported by Ramonas and Ryabtsev [11], who redetermined the known level values and identified the $3p^6 3d\ {}^2D - 3p^5 3d^2 ({}^1G)\ {}^2F$ and $({}^1D)\ {}^2F$ and the $3d - 4p$ transitions, with uncertainties of about ±0.003 Å. Sugar *et al.* [12] reobserved six strong $3p^2 3d - 3p^5 3d^2$ lines in a tokamak plasma.

The lines in the wavelength range of 83 – 88 Å were identified as the $3p^6 3d - 3p^5 3d4s$ transitions by Hoory *et al.* [13] and Swartz *et al.* [14]. The wavelength values are taken from the former article, with an uncertainty of ±0.005 Å.

The value for the ionization energy was obtained by Lotz [5] by extrapolation.

Ni XI

Ar I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^6 \ {}^1S_0$

Ionization energy 2 589 000 cm^{-1} (321.0 eV)

Alexander *et al.* [6] observed two lines due to the transitions from the $3p^5 4s$ levels to the ground state. These lines were also observed in the solar spectrum by Widing and Sandlin [8] and Behring *et al.* [15].

There are many observations including those of Alexander *et al.* [16] and Gabriel *et al.* [9] for the transition from the $3p^5 3d\ {}^1P^\circ_1$ level to the ground state. The tabulated wavelengths of the transitions from the $3p^5 3d\ {}^1P^\circ_1$, $3p^5 4s$, and $3p^5 4d$ levels to the ground level are those of Even-Zohar and Fraenkel [2]. The uncertainty of the wavelengths is ±0.005 Å. The $3p^6\ {}^1S_0 - 3p^5 3d\ {}^1P^\circ_1$ line at 148.377±0.005 Å was observed by Sugar *et al.* [12] with a tokamak plasma.

Svensson *et al.* [17] classified three lines observed by Behring *et al.* [15] to the transitions from the $3p^5 3d\ {}^3P^\circ_{1,2}$ and ${}^3D^\circ_1$ levels to the ground state on the basis of an isoelectronic extrapolation. The wavelengths for these lines are taken from Behring *et al.* [18] with identifications by Edlén and Smitt [19].

An extended analysis of the forbidden transitions within the $3s^2 3p^5 3d$ configuration was made by Edlén and Smitt [19] who identified five transitions in the coronal lines: ${}^3F^\circ_3 - {}^3D^\circ_3$ (3338.5 Å) [20], ${}^3F^\circ_4 - {}^1F^\circ_3$ (2000.4 Å) [21], ${}^3P^\circ_2 - {}^3D^\circ_2$ (1717.42 Å) [21], ${}^3P^\circ_2 - {}^1F^\circ_3$ (1605.93 Å) [22], and ${}^3P^\circ_1 - {}^3D^\circ_2$ (1510.51 Å) [21].

The transition array $3p^5 3d - 3p^5 4f$ in the region of 81 – 94 Å was first identified by Fawcett *et al.* [23]. The wavelengths were remeasured by Swartz *et al.* [14], which are the values quoted here.

The value for the ionization energy was obtained by Lotz [5] by extrapolation.

Ni XII

Cl I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^5 \ {}^2P^\circ_{3/2}$

Ionization energy 2 840 000 cm^{-1} (352 eV)

Observations of the transitions $3p^5 - 3p^4 3d$ in the range 152 – 155 Å were reported by Gabriel *et al.* [9], Behring *et al.* [15], Fawcett and Hayes [24], and Malinovsky and Heroux [25]. More accurate measurements in the range 147 – 161 Å were given by Goldsmith and Fraenkel [10], who identified the $3p^5\ ^2\mathrm{P}^\circ - 3p^4(^3\mathrm{P})3d\ ^2\mathrm{D}$ and $^2\mathrm{P}$ multiplets and the $3p^5\ ^2\mathrm{P}^\circ_{3/2} - 3p^4(^1\mathrm{D})3d\ ^2\mathrm{S}_{1/2}$ line. The uncertainty of the wavelengths is estimated to be ±0.005 Å. Ryabtsev [26] remeasured the 138 – 166 Å region and obtained wavelength values for the identified lines in good agreement with the earlier values. New measurements with a tokamak plasma were made by Sugar *et al.* [12] for five strong $3p^5 - 3p^4 3d$ lines with an estimated uncertainty of ±0.005 Å.

Fawcett *et al.* [23] observed lines of the $3p^5 - 3p^4 4s$, $3p^5 - 3p^4 4d$, and $3p^4 3d - 3p^4 4f$ arrays and measured the wavelengths with accuracies ranging from ±0.01 Å to ±0.015 Å.

Fawcett and Hatter [27] observed two $3s^2 3p^5 - 3s3p^6$ transitions at 295.321 Å and 317.475 Å with an accuracy of ±0.008 Å.

Jefferies *et al.* [20] observed the forbidden $3s^2 3p^5\ ^2\mathrm{P}^\circ_{3/2} - {}^2\mathrm{P}^\circ_{1/2}$ transition in the ground configuration at 4231.2 Å in the solar spectrum.

Four coronal lines at 3167.0 Å, 1370.52 Å, and 1225.05 Å and 1686.74 Å were observed by Jefferies *et al.* [20], Sandlin *et al.* [21], and Sandlin and Tousey [22], respectively. They were classified as forbidden transitions within the configuration $3s^2 3p^4 3d$ by Edlén and Smitt [19].

No intersystem line connecting the quartet terms to the ground term has been identified. We estimate a value of 454 000 cm^{-1} for the $^4\mathrm{D}_{7/2}$ level with a systematic error "$+x$" for the levels tied to it.

The value for the ionization energy was obtained by Lotz [5] by extrapolation.

Ni XIII

S I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^4\ ^3\mathrm{P}_2$

Ionization energy 3 100 000 cm^{-1} (384 eV)

Three forbidden lines within the ground configuration were observed in the solar corona. The $^3\mathrm{P}_2 - {}^3\mathrm{P}_1$ line at 5115.8 Å was identified by Pryce [4] and Jefferies *et al.* [20]. The other two lines at 2125.5 and 1277.23 Å were classified as $^3\mathrm{P}_2 - {}^1\mathrm{D}_2$ and $^1\mathrm{S}_0$ transitions by Sandlin *et al.* [21].

Gabriel *et al.* [9] observed the lines at 157.75 and 157.56 Å in a laboratory plasma for the first time. In the solar corona a line at 157.73 Å, corresponding to the former line, was observed by Behring *et al.* [15] and Malinovsky and Heroux [25]. These lines were identified as due to the $3s^2 3p^4 - 3s^2 3p^3 3d$ transitions by Fawcett and Hayes [24], who reported identifications for seven lines in the wavelength region of 155 – 303 Å. The uncertainty of the wavelengths is ±0.03 Å. More accurate measurements with an uncertainty of ±0.005 Å were made by Sugar *et al.* [12] for six strong lines.

Fawcett *et al.* [23] measured wavelengths with an accuracy of ±0.015 Å for the $3p^4 - 3p^3 4d$ and $3p^3 3d - 3p^3 4f$ transitions in the wavelength regions of ~56 Å and ~70 Å, respectively.

The transition array $3s^2 3p^4 - 3s3p^5$ was identified by Fawcett and Hatter [27], who measured the wavelengths with an uncertainty of ±0.008 Å. Sugar *et al.* [12] also reobserved the $^3\mathrm{P}_0 - {}^3\mathrm{P}^\circ_1$ line of this array at 308.542 Å.

The value for the ionization energy was obtained by Lotz [5] by extrapolation.

Ni XIV

P I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^3\ ^4\mathrm{S}^\circ_{3/2}$

Ionization energy 3 470 000 cm^{-1} (430 eV)

Wavelengths for the forbidden lines within the ground configurations were classified by Sandlin *et al.* [21] in the solar coronal spectrum.

The $3s^2 3p^3\ ^2\mathrm{D}^\circ_{5/2} - 3s^2 3p^2(^1\mathrm{D})3d\ ^2\mathrm{F}_{7/2}$ transition was first observed and identified by Gabriel *et al.* [9]. Fawcett and Hayes [24] classified the line in the solar spectrum at 164.146 Å as this transition.

Fawcett and Hayes [24] carried out an analysis of the $3s^2 3p^3 - 3s^2 3p^2 3d$ transition array in the region from 164 – 178 Å. The uncertainty of the wavelengths is ±0.03 Å.

Fawcett *et al.* [23] identified three lines as $3p^2 3d - 3p^2 4f$ transitions in the region near 65 Å with an accuracy of ±0.015 Å.

Fawcett and Hatter [27] reported wavelengths for the $3s^2 3p^3 - 3s3p^4$ transition array. Their values are adopted here, except for the $^4\mathrm{S}^\circ_{3/2} - {}^4\mathrm{P}_{3/2}$ line at 302.264±0.005 Å observed by Sugar *et al.* [12] in a tokamak discharge. The uncertainty of their wavelengths is ±0.008 Å.

The value for the ionization energy was derived by Lotz [5] by extrapolation.

Ni XV

Si I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^2\ ^3\mathrm{P}_0$

Ionization energy 3 740 000 cm^{-1} (464 eV)

Forbidden transitions between terms in the $3s^2 3p^2$ ground configuration were observed in the solar corona. The wavelength values of the $^3\mathrm{P}_1 - {}^3\mathrm{P}_2$, $^3\mathrm{P}_0 - {}^3\mathrm{P}_1$, and $^3\mathrm{P}_1 - {}^1\mathrm{D}_2$ transitions are from Jefferies *et al.* [20] and Sandlin *et al.* [21]. Identifications of the $3s^2 3p^2\ ^3\mathrm{P}_{1,2} - 3s3p^3\ ^5\mathrm{S}^\circ_2$ intercombination transitions were first reported by

Träbert *et al.* [28] and revised by Träbert *et al.* [29] with the beam-foil excitation technique.

An analysis of the $3s^23p^2 - 3s3p^3$ transition array was performed by Fawcett and Hatter [27]. They, in addition to the earier work of Fawcett and Hayes [24], classified nine transitions in the region from 209 to 319 Å with an uncertainty of ±0.008 Å.

Fawcett and Hayes [24] also identified 11 lines as transitions from the $3s^23p3d$ levels to the ground configuration, in addition to the above transition array, with an uncertainty of ±0.03 Å.

A recent measurement of Sugar *et al.* [12] provided more accurate wavelengths with an uncertainty of ±0.005 Å for these two arrays with a tokamak plasma light source. We adopted their wavelengths to revise the level values, except for the $3s^23p^2\ ^3P_2 - 3s3p^3\ ^3S^\circ_1$ transition at 221.938 Å which is not a good fit.

Fawcett *et al.* [23] and Kastner *et al.* [30] measured wavelengths in the region of 50 – 65 Å and identified the $3s^23p^2 - 3s^23p4d$ and $4f$ transitions. Identifications of the $3p^23p^2 - 3p^23p4s$ transitions are also included in the former article. The wavelength uncertainty is ±0.015 Å.

The value for the ionization energy was obtained by Lotz [5] by extrapolation.

Ni XVI

Al I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p\ \ ^2P^\circ_{1/2}$

Ionization energy 4 020 000 cm^{-1} (499 eV)

The $3s^23p\ ^2P^\circ_{1/2} - {}^2P^\circ_{3/2}$ intrashell transition was observed in the solar corona and identified by Pryce [4] and Jefferies *et al.* [20]. The quoted wavelength is from the latter article.

The transition array $3s^23p - 3s3p^2$ in the wavelength range 218–309 Å was observed by Fawcett and Hayes [24] and more fully by Fawcett and Hatter [27] with an uncertainty of ±0.008 Å. Fawcett and Hayes [24] also reported identifications of the $3s^23p - 3s^23d$ transitions with wavelength uncertainties of ±0.03 Å. Subsequently, transitions among all terms in the configurations $3s^23p$, $3s3p^2$, $3s^23d$, $3p^3$, and $3s3p3d$ (except $^4F^\circ$) were observed by Redfors and Litzén [31] with an uncertainty of ±0.02 Å using a laser-produced plasma. A wavelength of 288.149 Å instead of 289.165 Å in Ref. [27] was assigned to the $3s^23p\ ^2P^\circ_{1/2} - 3s3p^2\ ^2D_{3/2}$ transition. The $3s^23p\ ^2P^\circ - 3s3p^2\ ^2S$ and ^2P, and $3s^23p\ ^2P^\circ_{3/2} - 3s^23d\ ^2D_{5/2}$ transitions were reobserved by Sugar *et al.* [12] with an estimated uncertainty of ±0.005 Å. Additional identifications were made by Träbert *et al.* [29] and Pinnington *et al.* [32] in beam-foil experiments with estimated wavelength uncertainties of ±0.2 – 0.4 Å and ±0.1 Å, respectively. The $3s^23p\ ^2P^\circ - 3s3p^2\ ^4P$ transitions were reported by Träbert *et al.* The $3p^3\ ^2P^\circ_{1/2,3/2}$ levels are derived tentatively from the wavelengths of Pinnington *et al.* [32]. Five tentative classifications of Buchet-Poulizac and Buchet [33] with a similar light source were omitted, because of inconsistencies with the wavelengths adopted here.

The transition arrays $3s3p3d - 3p^23d$, $3s3d^2$ were newly identified by Churilov and Levashov [34] in a laser-produced plasma with an estimated uncertainty of ±0.01 Å. They also determined energy levels of the configurations with $n = 3$. We have adopted their results but included the $3s3p^2\ ^4P_{5/2}$ level of Ref. [31] and the levels of Ref. [12]. It should be noted that the term designations of $3s3p(^3P^\circ)3d\ ^4P^\circ_{1/2}$, $^4D^\circ_{3/2}$ and $3s3p(^1P^\circ)3d\ ^2P^\circ_{3/2}$ have been interchanged with $3s3p(^3P^\circ)3d\ ^4D^\circ_{1/2}$, $^4P^\circ_{3/2}$ and $3s3p(^1P^\circ)3d\ ^2D^\circ_{3/2}$, due to the level crossing at the Mn ion, as is shown the calculation of Redfors and Litzén [31].

Fawcett *et al.* [23] analyzed the $3s^23d - 3s^24f$, $3s^23p - 3s^24d$, and $3s3p3d - 3s3p4f$ transitions from observations of a laser produced plasma. They measured the wavelengths with an uncertainty of ±0.015 Å.

The value for the ionization energy was obtained by Lotz [5] by extrapolation.

Ni XVII

Mg I isoelectronic sequence

Ground state $1s^22s^22p^63s^2\ \ ^1S_0$

Ionization energy 4 606 000 ± 1000 cm^{-1}
(571.08 ± 0.12 eV)

Pryce [4] tentatively identified the $3s3p\ ^3P^\circ_1 - {}^3P^\circ_2$ transition at 4744 Å in the coronal spectrum.

Fawcett *et al.* [35] measured wavelengths in the region from 30 to 55 Å and classified the singlet transitions: $3s^2 - 3snp\ (n = 4,5)$; $3s3d - 3snf (n = 4,5)$, and also the triplet transitions: $3s3p - 3snd\ (n = 4,5)$, $3s4s$; $3s3d - 3snf\ (n = 4$ to $6)$. Feldman *et al.* [36] remeasured the wavelengths, mainly for the triplet transitions, with improved accuracy of ±0.01 Å and added several new classifications. Fawcett *et al.* [23] revised the classification of $3s3d\ ^1D_2 - 3s4f\ \ ^1F^\circ_3$ and extended their measurements to the $3p^2\ ^1D_2 - 3s4f\ ^1F^\circ_3$, $3s3p\ ^1P^\circ_1 - 3s4d\ ^1D_2$, and $3p3d - 3p4f$ transitions in the wavelength range of 47 – 58 Å.

Transitions among the configurations $3s^2$, $3s3p$, $3p^2$, $3s3d$, and $3p3d$ were observed and identified in the region 175 – 462 Å in a laser-produced spectrum by Churilov *et al.* [37], whose wavelengths and energy levels are adopted in the present compilation. Wavelengths were measured with an accuracy of ±0.007 Å. Additional identifications completing the levels of $3p3d$ were reported by Litzén and Redfors [38]. Their wavelengths with an uncertainty of ±0.02 Å and their level values were included except for the $3s3p\ ^1P^\circ_1$ level derived from the wavelength of 249.189±0.005 Å measured by Sugar *et al.* [12]. New observations of these arrays were made by Buchet-Poulizac and Buchet [33] in a beam-foil spectrum, from which the $3s3d\ ^3D_2 - 3p3d\ ^3D^\circ_3$ line at 277.31±0.2 Å has been adopted. It should be noted that the $3p3d\ ^3D^\circ_{1,2}$ and $^3P^\circ_{1,2}$ levels in Ref. [37] have been interchanged according to the level scheme in Ref. [38].

The $3p3d - 3d^2$ transitions were first identified by Redfors [39] in the range 203.3 – 254.9 Å and reobserved by Levashov and Churilov [40] and Churilov *et al.* [41], who added seven new lines, three of which are blended. Wavelengths were given with an uncertainty of ±0.02 Å. The $3d^2\ ^3F$ and ^1G levels are taken from Ref. [39].

Kastner *et al.* [30] published an investigation of the $3p3d - 3p4f$ and $3s3d^3D - 3s4f\ ^3F^\circ$ transitions. It should be noted that identification of the $3p3d\ ^3D^\circ_3 - 3p4f\ ^3F_4$ and $3p3d\ ^3F^\circ_3 - 3p4f\ ^3F_4$ transitions at 55.887 and 54.384 Å by Kastner *et al.* [30] is doubtful because the position of the $3p4f\ ^3F_4$ level obtained from the lower $3p3d$ levels by Churilov *et al.* [37] is inconsistent with those results.

The $3s^2\ ^1S_0 - 3s3p\ ^3P^\circ_1$ intercombination line at 366.7±0.3 Å was first observed in a tokamak plasma by Finkenthal *et al.* [42]. Peacock *et al.* [43] observed the line at 366.82±0.04 Å in a similar source. Dere [44] had obtained the wavelengh value of 366.80±0.03 Å in a solar flare measurement without giving a line identification. Dere's wavelength value is adopted here.

The value for the ionization energy was derived by Sugar and Corliss [45] from the three member $3snd\ ^3D$ series.

Ni XVIII

Na I isoelectronic sequence

Ground state $1s^22s^22p^63s\ ^2S_{1/2}$

Ionization energy 4 896 200 ± 500 cm^{-1}
(607.06 ± 0.06 eV)

Fawcett *et al.* [35] and Feldman *et al.* [46] observed the transitions: $3s - np$ ($n = 4, 5$), $3p - 4s$, $3p - nd$ ($n = 4$ to 7), and $3d - nf$ ($n = 4 - 7$). The observations were followed by Feldman *et al.* [36] who measured and identified 24 lines in the wavelength range of 24 – 53 Å. The uncertainty of the wavelengths is ±0.01 Å. Fawcett *et al.* [23] added identifications of the $3d - 4p$ transitions at 60.212 and 59.950±0.015 Å.

Lines of the transition array $3p - 3d$ at 220 – 236 Å were observed by Feldman *et al.* [36], Fawcett *et al.* [23], and Sandlin *et al.* [47]. An isoelectronic comparison of the measured wavelengths of the $3p - 3d$ and $3d - 4f$ doublet, with Dirac-Fock calculations was made by Reader *et al.* [48] for Ar^{7+} to Xe^{43+}, and least squares adjusted wavelength values were derived from the differences between theory and experiment. The overall uncertainty estimate is ±0.007 Å. We give these results.

There are many observations for the $3s - 3p$ transitions. We adopted the most accurate wavelength values of Sugar *et al.* [12], 320.558±0.005 Å, and 291.985±0.005 Å, for the $^2S_{1/2} - {}^2P^\circ_{1/2,3/2}$ transitions, respectively.

Kononov *et al.* [49] and Lawson and Peacock [50] identified lines of the $4f - 5g$ and $4d - 5f$ transition arrays.

Feldman and Cohen [51] measured wavelengths for the $2p^63s\ ^2S - 3p^53s^2\ ^2P^\circ$ transitions with an uncertainty of ±0.01 Å.

Jupén *et al.* [52] identified the core excited $2p^53s3p\ ^4D_{7/2} - 2p^53s3d\ ^4F^\circ_{9/2}$ line at 220.70±0.05 Å in a beam-foil spectrum.

The value for the ionization energy was derived by Edlén [53] from core polarization theory applied to the nf series.

Ni XIX

Ne I isoelectronic sequence

Ground state $1s^22s^22p^6\ ^1S_0$

Ionization energy 12 430 000 ± 10 000 cm^{-1}
(1541 ± 1 eV)

Wavelengths for the resonance transitions from the configurations $2s^22p^53s$, $2s^22p^53d$, and $2s2p^63p$ were measured by Feldman *et al.* [54]. Swartz *et al.* [55] observed the spectrum below 14 Å, improved the wavelengths of the resonance transitions mentioned above and classified additional lines of $2p^6 - 2p^54s$, $2p^55d$ and $2p^56d$. Boiko *et al.* [56] identified 18 resonance transitions from the configurations $2p^53s$, $4s$, $2p^5nd$ for $n = 3$ to 8, and $2s2p^63p$. Gordon *et al.* [57] remeasured the transitions observed by Boiko *et al.* [56] except for $n = 7$ and 8, with an uncertainty of ±0.005 Å.

Klapisch *et al.* [58] observed and identified the $2p^6\ ^1S_0 - 2p^53s\ ^3P^\circ_2$ magnetic quadrupole transition at 14.077 Å as well as the transitions from the $J = 1$ states of $2p^53s$ and $2p^53d$ to the ground state in a tokamak plasma.

Kastner *et al.* [59] identified four lines as the $2p^53p - 2p^54d$ transitions in the wavelength region from 40.6 to 41.4 Å.

Jupén [60] tentatively identified the spectral lines at 303.63, 306.29, 254.53, and 237.61 Å in the solar spectrum, measured by Dere [44], as $2p^53s - 2p^53p$ and $2p^53p - 2p^53d$ transitions. Fifteen lines of the $2p^53s - 2p^53p$ array in the range of 176 – 362 Å and 13 lines of the $2p^53p - 2p^53d$ array in the range of 225 – 273 Å were identified by Buchet *et al.* [61] in a beam-foil study. The uncertainty of the wavelengths is ±0.05 Å. For blended lines, it is ±0.1 Å. Their level values have been adopted.

The $2s^22p^53s - 2s2p^63s$ transitions were observed and identified in a tokamak plasma by Finkenthal *et al.* [62]. The uncertainty of the wavelengths is ±0.02 Å.

The value for the ionization energy was derived by Sugar and Corliss [45] from the $2s^22p^5nd\ ^3D_1^\circ$ series for $n = 3-6$.

Ni XX

F I isoelectronic sequence

Ground state $1s^22s^22p^5\ ^2P_{3/2}^\circ$

Ionization energy 13 265 000 cm^{-1} (1644.6 eV)

Lines of the $2p^5 - 2p^43s$ and $2p^5 - 2p^43d$ arrays were observed and classified in the wavelength range of 11.5 – 13.3 Å by Cohen *et al.* [63], Swartz *et al.* [55], and Boiko *et al.* [64,65,66]. They were remeasured by Gordon *et al.* [57], who also reported additional line identifications of the $2s^22p^5 - 2s2p^53p$ and $2p^5 - 2p^44d$ and $2p^44s$ transition arrays in the wavelength region from 9 to 11.5 Å with uncertainties of ±0.005 Å.

Doschek *et al.* [67] measured and identified the $2s^22p^5\ ^2P_{3/2,1/2}^\circ - 2s2p^6\ ^2S_{1/2}$ transitions in a laser produced plasma. Breton *et al.* [68], Lawson and Peacock [50], and Sugar *et al.* [12] reobserved these lines in tokamak-produced plasmas. The most accurate wavelength values of 83.185±0.005 Å and 94.492±0.005 Å in Ref. [12] are quoted here.

The magnetic dipole transition $2p^5\ ^2P_{3/2}^\circ - ^2P_{1/2}^\circ$ was first observed by Hinnov and Suckewer [69], and subsequently by Hinnov *et al.* [70], Peacock *et al.* [43], and Finkenthal *et al.* [71]. The wavelength value of 694.64 ±0.03 Å is from Ref. [43].

Fifteen transitions among the $2p^43s$, $3p$, and $3d$ configurations were newly identified by Buchet-Poulizac and Buchet [33] in a beam-foil device with an uncertainty of ±0.05 Å in the range of 259 – 366 Å. The $2p^4(^3P)3p\ ^4P_{5/2}^\circ - 2p^4(^3P)3d\ ^4D_{7/2}^\circ$ line at 265.36 Å has no connection with the other observed lines.

For the ionization energy we use a value calculated by Cheng [72] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [73].

Ni XXI

O I isoelectronic sequence

Ground state $1s^22s^22p^4\ ^3P_2$

Ionization energy 14 175 000 cm^{-1} (1757.4 eV)

The $2s^22p^4 - 2s2p^5$ transition array was analyzed by Doschek *et al.* [67]. The wavelength of the $2s2p^5\ ^1P_1^\circ - 2p^6\ ^1S_0$ transition was given by Doschek *et al.* [74]. A comprehensive analysis of the $n = 2-2$ transitions in the wavelength region from 69 to 120 Å was reported by Lawson and Peacock [50]. Their wavelengths are adopted in this compilation, except for those of the $2s^22p^4\ ^3P - 2s2p^5\ ^3P^\circ$ triplet reobserved by Sugar *et al.* [12] with an uncertainty of ±0.005 Å in a tokamak plasma. The uncertainty of the wavelengths of Lawson and Peacock is ±0.03 Å.

The M1 transition $^3P_2 - ^1D_2$ in the ground configuration was observed at 471.15 Å in the solar corona by Widing [75] and at 471.3 ±0.3 Å in a tokamak plasma by Hinnov *et al.* [70]. Hinnov *et al.* [70] also measured two other magnetic dipole transitions $^3P_2 - ^3P_1$ at 779.5 Å and $^3P_0 - ^3P_1$ at 2818.2 Å. The wavelength of the latter line was corrected as 2818.52±0.10 Å by Hinnov *et al.* [76] The $^3P_1 - ^1D_2$ line at 1191.1±0.4 Å was identified by Finkenthal *et al.* [71].

Classifications for the transitions $2p^4 - 2p^33s$, $2p^33d$, and $2p^34d$ were provided by Gordon *et al.* [57] in the wavelength ranges of 12 – 12.7 Å, 11 – 11.6 Å, and 8.7 – 9.2 Å. The uncertainty of the wavelengths is ±0.005 Å.

For the ionization energy we use a value calculated by Cheng [72] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [73].

Ni XXII

N I isoelectronic sequence

Ground state $1s^22s^22p^3\ ^4S_{3/2}^\circ$

Ionization energy 15 158 000 cm^{-1} (1879.4 eV)

Lawson and Peacock [50] measured the $2s^22p^3 - 2s2p^4$ transition array observed previously by Doschek *et al.* [67]. They extended the measurements to include the $2s2p^4 - 2p^5$ transition array and found intersystem lines. They measured wavelengths in the range from 71 to 124.5 Å with an uncertainty of ±0.03 Å. Sugar *et al.* [12] gave more accurate wavelengths with an uncertainty of ±0.005 Å for six strong lines of the $2s^22p^3\ ^4S^\circ - 2s2p^4\ ^4P$, $^2P_{1/2}^\circ - ^2S_{1/2}$, and $^2D^\circ - ^2D$ transitions. Level values of Lawson and Peacock have been adjusted to those derived from the wavelengths of Sugar *et al.* [12].

Hinnov *et al.* [70] observed two magnetic dipole lines assigned to the $2s^22p^3\ ^4S_{3/2}^\circ - ^2D_{3/2,5/2}^\circ$ transitions at 634.8 ±0.3 Å and 477.6±0.3 Å, respectively. Hinnov *et al.* [76] found an additional magnetic dipole line $^2D_{3/2}^\circ - ^2D_{5/2}^\circ$ at 1928.88±0.01 Å.

For the ionization energy we use a value calculated by Cheng [72] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [73].

Ni XXIII

C I isoelectronic sequence

Ground state $1s^22s^22p^2\ ^3P_0$

Ionization energy 16 219 000 cm^{-1} (2010.9 eV)

Lawson and Peacock [50] extended the earlier measurements of the $2s^22p^2 - 2s2p^3$ transition array by Feldman *et al.* [77]. They reported classifications of 18 lines for this array and also for the $2s2p^3 - 2p^4$ array. Wavelengths were measured in the range of 74 – 134 Å with an uncertainty of ±0.03 Å. Four strong lines of the $2s^22p^2\ {}^3P_{2,1} - 2s2p^3\ {}^3P^\circ_{2,1}$, ${}^1D_2 - {}^1D^\circ_2$, and ${}^3P_2 - {}^3S^\circ_1$ transitions were reobserved by Sugar *et al.* [12] with an uncertainty of ±0.005 Å in a tokamak plasma. These wavelengths have been employed to adjust the level values of Lawson and Peacock.

Hinnov *et al.* [70] measured the magnetic dipole transitions of the ground configuration, i.e., $2s^22p^2\ {}^3P_0 - {}^3P_1$ at 911.0 Å, ${}^3P_1 - {}^3P_2$ at 1915.0 Å, ${}^3P_2 - {}^1D_2$ at 614.8 Å, and ${}^3P_1 - {}^1D_2$ at 465.4 Å. The uncertainty of the wavelengths is ±0.3 Å. The wavelength of the second transition was revised to 1917.47±0.01 Å in a new measurement of Hinnov *et al.* [76].

For the ionization energy we use a value calculated by Cheng [72] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [73].

Ni XXIV

B I isoelectronic sequence

Ground state $1s^22s^22p\ {}^2P^\circ_{1/2}$

Ionization energy 17 187 000 cm^{-1} (2131.0 eV)

Four lines due to the transitions $2s^22p - 2s2p^2$ were observed by Doschek *et al.* [78]. Lawson and Peacock [50] measured lines in the range of 87 – 160 Å and identified seven $2s^22p - 2s2p^2$ and sixteen $2s2p^2 - 2p^3$ transitions with an uncertainty of ±0.03 Å. The adopted wavelengths are from Lawson and Peacock except for four strong lines from Sugar *et al.* [12] who remeasured their wavelengths with an uncertainty of ±0.005 Å in a tokamak plasma. Three intercombination lines $2s^22p\ {}^2P^\circ - 2s2p^2\ {}^4P$ at 185.283±0.030 Å, 218.608±0.025 Å, and 224.712±0.025 Å were identified by Myrnäs *et al.* [79] in tokamak discharges. They also showed that the $2s2p^2\ {}^4P$ levels are about 1000 cm^{-1} lower than those given in Ref. [50]. This fact makes the identification of the $2s2p^2\ {}^4P_{5/2} - 2p^3\ {}^2D^\circ_{5/2}$ line at 98.39 Å in Ref. [50] questionable, because the difference between the observed and calculated wavelengths is as large as 0.08 Å. The designations of the two levels $2s2p^2\ {}^2P_{1/2}$ and ${}^2S_{1/2}$ have been interchanged according to Edlén [80] and are confirmed by the calculated percentage composition in Sugar and Corliss [81].

The magnetic dipole transition $2s^22p\ {}^2P^\circ_{1/2} - {}^2P^\circ_{3/2}$ was observed in tokamak plasmas by Hinnov *et al.* [70]. The wavelength value of 609.9 ±0.3 Å is taken from this article.

For the ionization energy we use a value calculated by Cheng [72] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [73].

Ni XXV

Be I isoelectronic sequence

Ground state $1s^22s^2\ {}^1S_0$

Ionization energy 18 523 000 cm^{-1} (2296.5 eV)

A faint image at 238.82 Å was observed in a solar flare spectrum by Sandlin *et al.* [47], who tentatively identified the line as the $2s^2\ {}^1S_0 - 2s2p\ {}^3P^\circ_1$ line by extrapolation along the isoelectronic sequence. The wavelength of the $2s^2\ {}^1S_0 - 2s2p\ {}^1P^\circ_1$ transition was measured by Breton *et al.* [68], Hinnov [82], Lawson and Peacock [50], and Sugar *et al.* [12]. The value of 117.933 ±0.005 Å is from the last author. A corrected value of 117.933 Å was obtained from the author.

The transition arrays $2s^2 - 2s3p$, $2s2p - 2s3d$, $2p^2 - 2p3d$, and $2s2p - 2p3p$ in the wavelength range 9.3 – 10 Å were analyzed by Fawcett *et al.* [83]. Wavelengths were given with an accuracy of ±0.006 Å. Earlier identifications by Boiko *et al.* [56,84] were substantially revised by the analysis in this article.

Lawson and Peacock [50] investigated the $2s2p - 2p^2$ array in the range of 120 – 190 Å. The uncertainty of the wavelengths is ±0.03 Å.

For the ionization energy we use a value calculated by Cheng [72] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [73].

Ni XXVI

Li I isoelectronic sequence

Ground state $1s^22s\ {}^2S_{1/2}$

Ionization energy 19 510 000 ± 5000 cm^{-1}
(2399.2 ± 0.6 eV)

The $2s - 2p$ doublet was observed in solar flares by Widing and Purcell [85] and Sandlin *et al.* [47]. These lines were also measured in a tokamak plasma by Hinnov [82] who identified the ${}^2S_{1/2} - {}^2P^\circ_{3/2}$ line at 165.3 ±0.2 Å and ${}^2S_{1/2} - {}^2P^\circ_{1/2}$ at 234.1±0.1 Å. These wavelength values were remeasured as 165.396±0.01 and 234.155±0.01 Å by Hinnov *et al.* [86] and as 165.400±0.005 and 234.153±0.005 Å by Sugar *et al.* [12]. The smoothed values of 165.406 and 234.152 Å of Kim *et al.* [87] are adopted here.

Spectral line classifications at 9 Å for the $2s-3p$, $2p-3d$ and $2p-3s$ transitions were reported by Fawcett *et al.* [83].

The $1s^22p\ ^2P^\circ_{3/2} - 1s2p3p$, $1s2p4p\ ^2D_{5/2}$ transitions were measured with an uncertainty of ±0.0002 Å in a spark discharge by Aglitskii and Panin [88].

Vainshtein and Safronova [89] calculated energy levels of the $1s^2nl$ with $n = 2-5$, and $l = s, p$, and d. We use their energy levels adjusted to the $1s^22p\ ^2P^\circ_{1/2,3/2}$ levels of Kim *et al.* by adding 270 cm^{-1}. They also calculated wavelengths of the $1s^22s - 1s2s2p$, $1s^22p - 1s2p^2$, and $1s^22p - 1s2s^2$ transitions. We use their results to derive these autoionizing levels. All theoretical levels from Ref. [89] are given in brackets.

The value for the ionization energy was calculated by Edlén [90].

Ni XXVII

He I isoelectronic sequence

Ground state $1s^2\ ^1S_0$

Ionization energy 82 985 800 ± 3500 cm^{-1}
(10 288.93 ± 0.4 eV)

Cohen *et al.* [91] and Morita [92] measured the wavelength of the $1s^2 - 1s2p$ transitions. Low-inductive vacuum spark measurements were made by Aglitskii and Panin [88] for the blended $1s^2\ ^1S_0 - 1s3p$, $1s4p$, $1s5p\ ^{1,3}P^\circ_1$ lines and by Aglitsky *et al.* [93] for the $1s^2\ ^1S_0 - 1s2p\ ^1P^\circ_1$ resonance line at 1.58837 Å.

Cheng *et al.* [94] give calculated total energies for the ground and n=2 singlet states of selected He-like ions. We use a later calculation of both singlet and triplet states by Cheng [95] for all elements from Ti through Cu and Kr for the $n = 1$ and 2 configurations. With these data and the binding energy of the H-like ions [96] we obtain the value for the ionization energy of the He-like ions. For the $1s3l$ states we use the level values from Drake [97].

The levels $1s4l$ and $5l$ calculated by Vainshtein and Safronova [89] have been tabulated after increasing them by 1500 cm^{-1} to correspond with corrected values of lower n by Drake. We have adopted the calculated wavelengths of Vainshtein and Safronova [89] for transitions from the $n = 2$ doubly-excited states without correction. All wavelengths have been derived from differences of the adopted energy levels.

Ni XXVIII

H I isoelectronic sequence

Ground state $1s\ ^2S_{1/2}$

Ionization energy 86 909 350 ± 30 cm^{-1}
(10 775.3900 ± 0.0039 eV)

No observations of this spectrum have been reported. We have tabulated the wavelengths calculated from the theoretical energy levels of Johnson and Soff [96] for the $n = 2$ shell whose estimated uncertainty is ±30 cm^{-1}. Their energy differences are in close agreement with those of Mohr [99]. The binding energies for the levels with $n = 3-5$ have been calculated by Erickson [100]. We subtract these energies from the binding energy of the ground state obtained by Johnson and Soff to obtain predicted energies.

Transition probabilities and oscillator strengths were obtained by scaling the data tabulated for the hydrogen spectrum by Wiese *et al.* [101]. The scaling was actually performed for the line strengths S, which for a hydrogen-like ion of nuclear charge Z are reduced according to $S_Z = Z^{-2}S_H$, so that

$$S_{\mathrm{Ni\ XXVIII}} = S_H(28)^{-2} = S_H/784.$$

The f and A values were then obtained from the usual numerical conversion formulas, given for example in Ref. [101]. For these conversions the accurate wavelengths listed in the Ni XXVIII table were used, in which relativistic and QED effects in the energies were taken into account. Relativistic effects in the line strengths are only of the order of 1–5% for Ni XXVIII, according to the work by Younger and Weiss [102], and have been neglected.

The value for the ionization energy is from Johnson and Soff [96].

2.8.2. Spectroscopic Data for Ni IX through Ni XXVIII

Ni IX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
7141.9[T]	$3p^6 3d^2\ ^1D_2$	$3p^6 3d^2\ ^1G_4$	21 900+x	35 898+x		E2	8.1 − 4	E	4°, 109*
166.306	$3p^6 3d^2\ ^3F_2$	$3p^5(^2P^o)3d^3(^2H)\ ^3G^o_3$	0	601 300	4	1.3	4.3+10	D	3°, 109*
166.079	3	4	1 880	604 000	4	3.2	8.7+10	D	3°, 109*
165.436	4	5	4 070	608 530	6	4.4	9.7+10	D	3°, 109*
165.436	$3p^6 3d^2\ ^1G_4$	$3p^5(^2P^o)3d^3(^2G)\ ^1H^o_5$	35 898+x	640 360+x	6	3.3	7.3+10	D	3°, 109*
151.700	$3p^6 3d^2\ ^3F_3$	$3p^5(^2P^o)3d^3(^4F)\ ^3F^o_2$	1 880	661 050	1				3
151.281	2	2	0	661 050	3	4.0	2.3+11	D	3°, 109*
151.022	3	3	1 880	664 080	4	5.3	2.2+11	D	3°, 109*
150.836	4	4	4 070	667 080	4	8.6	2.8+11	D	3°, 109*
150.574	2	3	0	664 080	1	4.2 − 1	1.8+10	D	3°, 109*
150.32	3	4	1 880	667 080	1	5.4 − 1	1.8+10	D	3°, 109*
147.013	$3p^6 3d^2\ ^1G_4$	$3p^5(^2P^o)3d^3(^2H)\ ^1G^o_4$	35 898+x	716 110+x	4	1.2+1	4.1+11	D	3°, 109*
141.356	$3p^6 3d^2\ ^3F_4$	$3p^5(^2P^o)3d^3(^4F)\ ^3D^o_3$	4 070	711 510	5	5.5	2.6+11	D	3°, 109*
141.002	2	1	0	709 210	3	1.7	1.9+11	D	3°, 109*
140.917	3	2	1 880	711 520	4	3.9	2.6+11	D	3°, 109*
140.917	3	3	1 880	711 510		2.4 − 1	1.2+10	D	3°, 109*
140.542	2	2	0	711 520	1	3.4 − 1	2.3+10	D	3°, 109*
103.993	$3d^2\ ^3P_2$	$3d4f\ ^3D^o_3$	27 160+x	988 760+x	10				1, 2°
103.981[L]	1	2			10				1, 2°
103.926[L]	0	1							1, 2°
103.871	$3d^2\ ^1D_2$	$3d4f\ ^1D^o_2$	21 900+x	984 630+x	6				1, 2°
103.620	$3d^2\ ^1D_2$	$3d4f\ ^1F^o_3$	21 900+x	986 960+x	8				1, 2°
103.428	$3d^2\ ^1D_2$	$3d4f\ ^3D^o_3$	21 900+x	988 760+x	4				1, 2°
102.710	$3d^2\ ^3F_4$	$3d4f\ ^3F^o_3$	4 070	977 680					1, 2°
102.602	4	4	4 070	978 740	10				1, 2°
102.539	3	2	1 880	977 130					1, 2°
102.480	3	3	1 880	977 680	6				1, 2°
102.364	3	4	1 880	978 740					1, 2°
102.340	2	2	0	977 130	6				1, 2°
102.283	2	3	0	977 680	1				1, 2°
101.932	$3d^2\ ^3F_4$	$3d4f\ ^3G^o_4$	4 070	985 140	2				1, 2°
101.846	4	5	4 070	985 940	10				1, 2°
101.701	3	4	1 880	985 140	8				1, 2°
101.657	2	3	0	983 700	8				1, 2°

Ni x

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
197.909	$3p^63d\ ^2D_{3/2}$	$3p^5(^2P^o)3d^2(^1G)\ ^2F^o_{5/2}$	0	505 283	150				11
197.405	5/2	7/2	3 178	509 751	170				11
192.599	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1D)\ ^2F^o_{7/2}$	3 178	522 391	250				11°, 26
184.937	3/2	5/2	0	540 725	150				11°, 26
160.794	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2F^o_{5/2}$	3 178	625 091	40				10, 11°, 26
159.977	3/2	5/2	0	625 091	600				9, 10, 11°, 12, 25, 26
158.377	5/2	7/2	3 178	634 583	600				9, 10, 11°, 12, 25, 26
146.081	$3p^63d\ ^2D_{3/2}$	$3p^5(^2P^o)3d^2(^3P)\ ^2P^o_{1/2}$	0	684 552	250				10, 11°, 12, 26
145.733	5/2	3/2	3 178	689 365	400				10, 11°, 12, 26
145.061	3/2	3/2	0	689 365	100				10, 11°, 26
144.988	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2D^o_{5/2}$	3 178	692 890	500				9, 10, 11°, 12, 15, 25, 26
144.880	5/2	3/2	3 178	693 404	80				9, 10, 11°, 26
144.323	3/2	5/2	0	692 890	100				9, 10, 11°, 25, 26
144.216	3/2	3/2	0	693 404	400				9, 10, 11°, 12, 15, 25, 26
129.258	$3d\ ^2D_{3/2}$	$4p\ ^2P^o_{1/2}$	0	773 647	70				11
128.796	5/2	3/2	3 178	779 600	120				11
128.273	3/2	3/2	0	779 600	10				11
91.790	$3d\ ^2D_{5/2}$	$4f\ ^2F^o_{7/2}$	3 178	1 093 440	6				2°, 6, 7, 8, 15
91.527	3/2	5/2	0	1 093 360	4				2°, 6, 7, 8
87.680	$3p^63d\ ^2D_{3/2}$	$3p^53d(^3P^o)4s\ ^2P^o_{1/2}$	0	1 140 510	4				13°, 14
87.317	5/2	3/2	3 178	1 148 420	5				13°, 14
87.077	3/2	3/2	0	1 148 420					13°, 14
86.865	$3p^63d\ ^2D_{5/2}$	$3p^53d(^3F^o)4s\ ^4F^o_{7/2}$	3 178	1 154 390	1				13°, 14
86.464	3/2	5/2	0	1 156 550	2				13°, 14
86.300	$3p^63d\ ^2D_{5/2}$	$3p^53d(^3F^o)4s\ ^2F^o_{7/2}$	3 178	1 161 930	7				13°, 14
85.753	5/2	5/2	3 178	1 169 300	2				13°, 14
85.523	3/2	5/2	0	1 169 300	5				13°, 14
84.659	$3p^63d\ ^2D_{5/2}$	$3p^53d(^3D^o)4s\ ^4D^o_{7/2}$	3 178	1 184 390	2				13°, 14
84.418	5/2	5/2	3 178	1 187 750	2				13°, 14
84.194	3/2	5/2	0	1 187 750	1				13°, 14
83.676	$3p^63d\ ^2D_{5/2}$	$3p^53d(^1F^o)4s\ ^2F^o_{7/2}$	3 178	1 198 260	3				13°, 14
83.326	$3p^63d\ ^2D_{5/2}$	$3p^53d(^3D^o)4s\ ^2D^o_{3/2}$	3 178	1 203 270	1				13°, 14
83.108	3/2	3/2	0	1 203 270	5				13°, 14
83.108	5/2	5/2	3 178	1 206 410	5				13
82.892	3/2	5/2	0	1 206 410	1				13
74.266	$3p^63d\ ^2D_{5/2}$	$3p^65f\ ^2F^o_{7/2}$	3 178	1 349 690	3				2°, 6
74.097	3/2	5/2	0	1 349 580	2				2°, 6
66.687	$3p^63d\ ^2D_{5/2}$	$3p^66f\ ^2F^o_{7/2}$	3 178	1 502 720	1				2
66.542	3/2	5/2	0	1 502 810	1				2
61.915	$3p^63d\ ^2D_{5/2}$	$3p^67f\ ^2F^o_{7/2}$	3 178	1 618 310					2
61.809	3/2	5/2	0	1 617 890					2

Ni XI

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3338.5	$3p^53d\ ^3F^o_3$	$3p^53d\ ^3D^o_3$	497 520	527 470		M1			19, 20°
2000.4	$3p^53d\ ^3F^o_4$	$3p^53d\ ^1F^o_3$	493 250	543 220		M1			17, 19, 21°
1717.42	$3p^53d\ ^3P^o_2$	$3p^53d\ ^3D^o_2$	480 950	539 180		M1			17, 19, 21°
1510.51	1	2	472 970	539 180		M1			19, 21°
1605.93	$3p^53d\ ^3P^o_2$	$3p^53d\ ^1F^o_3$	480 950	543 220		M1			19, 22°
211.428	$3p^6\ ^1S_0$	$3p^53d\ ^3P^o_1$	0	472 970	20	2.9 − 4	1.4+7	E	17, 18°, 19, 109*
207.93	0	2	0	480 950	30	M2			17, 18°, 19
186.976	$3p^6\ ^1S_0$	$3p^53d\ ^3D^o_1$	0	534 830	20	6.8 − 3	4.3+8	E	17, 18°, 19, 109*
148.377	$3p^6\ ^1S_0$	$3p^53d\ ^1P^o_1$	0	673 960	50	2.31	2.34+11	C+	2, 7, 9, 12°, 15, 16, 17, 19, 24, 25, 26, 103, 109*
93.85	$3p^53d\ ^1P^o_1$	$3p^5(^2P^o_{1/2})4f\ ^2[\frac{5}{2}]_2$	673 960	1 739 500	1				14
85.226	$3p^53d\ ^1F^o_3$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_4$	543 220	1 716 600	1				14
84.092	$3p^53d\ ^3D^o_3$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_4$	527 470	1 716 600	7				14°, 23
83.798	$3p^53d\ ^1F^o_3$	$3p^5(^2P^o_{1/2})4f\ ^2[\frac{7}{2}]_4$	543 220	1 736 600	6				14°, 23
83.546	$3p^53d\ ^3D^o_2$	$3p^5(^2P^o_{1/2})4f\ ^2[\frac{7}{2}]_3$	539 180	1 736 100	4				14°, 23
83.139	$3p^53d\ ^1D^o_2$	$3p^5(^2P^o_{1/2})4f\ ^2[\frac{5}{2}]_3$	530 830	1 733 700	6				14°, 23
82.625	$3p^53d\ ^3F^o_2$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_3$	504 070	1 714 400	6				14°, 23
82.530	$3p^53d\ ^3F^o_3$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{9}{2}]_4$	497 520	1 709 200	7				14°, 23
82.417	4	5	493 250	1 706 600	10				14°, 23
81.732	$3p^53d\ ^3P^o_2$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{3}{2}]_2$	480 950	1 704 400	5				14°, 23
81.378	1	1	472 970	1 701 800	4				14
81.213	1	2	472 970	1 704 400	5				14°, 23
81.138	0	1	469 310	1 701 800	3				14°, 23
81.468	$3p^53d\ ^3P^o_2$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{5}{2}]_3$	480 950	1 708 500	7				14°, 23
78.744	$3p^6\ ^1S_0$	$3p^54s\ ^3P^o_1$	0	1 269 940	6	1.7 − 1	6.1+10	D	2°, 6, 8, 15, 103, 109*
77.393	$3p^6\ ^1S_0$	$3p^54s\ ^1P^o_1$	0	1 292 110	8	2.3 − 1	8.5+10	D	2°, 6, 8, 15, 103, 109*
63.641	$3p^6\ ^1S_0$	$3p^54d\ ^3P^o_1$	0	1 571 310	4	4.5 − 1	2.5+11	D	2°, 109*
62.730	$3p^6\ ^1S_0$	$3p^54d\ ^1P^o_1$	0	1 594 130	2	2.2 − 1	1.2+11	D	2°, 15, 109*

Ni XII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4231.2	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^5\ ^2P^o_{1/2}$	0	23 629		M1	2.37+2	B	4, 20°, 109*
3167.0	$3s^23p^4(^3P)3d\ ^4D_{7/2}$	$3s^23p^4(^3P)3d\ ^4F_{9/2}$	454 000+x	485 570+x		M1			19, 20°
1686.74	$3s^23p^4(^3P)3d\ ^4D_{7/2}$	$3s^23p^4(^3P)3d\ ^2F_{7/2}$	454 000+x	513 290+x		M1			19, 22°
1370.52	$3s^23p^4(^3P)3d\ ^4D_{7/2}$	$3s^23p^4(^1D)3d\ ^2G_{7/2}$	454 000+x	526 960+x		M1			19, 21°
1225.05	$3s^23p^4(^3P)3d\ ^4F_{9/2}$	$3s^23p^4(^1D)3d\ ^2F_{7/2}$	485 570+x	567 200+x		M1			19, 22°
317.475	$3s^23p^5\ ^2P^o_{1/2}$	$3s3p^6\ ^2S_{1/2}$	23 629	338 615	4	6.4 − 2	2.1+9	C−	27°, 109*
295.321	3/2	1/2	0	338 615	6	1.35 − 1	5.2+9	C−	27°, 109*
166.88	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)3d\ ^2S_{1/2}$	23 629	622 840		3.78 − 1	4.53+10	C−	24°, 109*
160.556	3/2	1/2	0	622 840	5	1.1	1.4+11	C−	10, 12°, 24, 26, 109*
159.970	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)3d\ ^2P_{3/2}$	23 629	648 670	10				10, 12°
157.795	1/2	1/2	23 629	657 290	5				10, 12°, 26
154.171	3/2	3/2	0	648 670	20				9, 10, 12°, 15, 24, 25, 26, 103
152.151	3/2	1/2	0	657 290	40				10, 12°
153.174	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)3d\ ^2D_{3/2}$	23 629	676 420	2	2.80	1.99+11	C	9, 10°, 24, 25, 26, 103, 109*
152.153	3/2	5/2	0	657 230	4	4.32	2.08+11	C	9, 10°, 15, 24, 25, 26, 103, 109*
147.847	3/2	3/2	0	676 420		5.2 − 2	4.1+9	D	10°, 24, 26, 109*
75.83	$3s^23p^4(^3P)3d\ ^4F_{7/2}$	$3s^23p^4(^3P)4f\ ^4G^o_{9/2}$	492 750+x	1 811 400+x					23
75.62	9/2	11/2	485 570+x	1 808 000+x					23
75.69	$3s^23p^4(^1D)3d\ ^2G_{9/2}$	$3s^23p^4(^1D)4f\ ^2H^o_{11/2}$	527 230+x	1 848 400+x					23
74.44	$3s^23p^4(^3P)3d\ ^4D_{7/2}$	$3s^23p^4(^3P)4f\ ^4F^o_{9/2}$	454 000+x	1 797 400+x					23
72.77	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^3P)4s\ ^2P_{3/2}$	0	1 374 200					23
72.17	3/2	1/2	0	1 385 600					23
72.57	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^1D)4s\ ^2D_{3/2}$	23 629	1 401 600					23
71.4	3/2	5/2	0	1 401 000					23
60.02	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^3P)4d\ ^2D_{5/2}$	0	1 666 100					23

Ni XIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
5115.8	$3s^23p^4\ ^3P_2$	$3s^23p^4\ ^3P_1$	0.0	19 541.8		M1	1.57+2	C+	4, 20°, 109*
2125.50	$3s^23p^4\ ^3P_2$	$3s^23p^4\ ^1D_2$	0.0	47 032.9		M1	2.6+2	E	21°, 106, 107, 109*
1277.23	$3s^23p^4\ ^3P_1$	$3s^23p^4\ ^1S_0$	19 541.8	97 836.2		M1	2.5+3	E	21°, 109*
321.881	$3s^23p^4\ ^3P_1$	$3s3p^5\ ^3P^\circ_2$	19 541.8	330 215	1				27
308.542	0	1	20 060	344 156	3				12°, 27
308.049	1	1	19 541.8	344 156	1	1.2 − 1	2.9+9	D	27°, 109*
302.844	2	2	0.0	330 215	5				24, 27°
290.574	2	1	0.0	344 156	2				27
267.468	$3s^23p^4\ ^1D_2$	$3s3p^5\ ^1P^\circ_1$	47 032.9	420 910	3	3.3 − 1	1.0+10	D	27°, 109*
169.61C	$3s^23p^4\ ^3P_1$	$3s^23p^3(^2D^\circ)3d\ ^3P^\circ_2$	19 541.8	609 120		4.5 − 1	2.1+10	D	109*
164.172	2	2	0.0	609 120	30	2.6	1.3+11	D	12°, 24, 109*
161.752	$3s^23p^4\ ^1S_0$	$3s^23p^3(^2P^\circ)3d\ ^1P^\circ_1$	97 836.2	716 070	1	1.93	1.64+11	C	12°, 24, 109*
161.547	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^\circ)3d\ ^1D^\circ_2$	47 032.9	666 050	2	2.7	1.4+11	C	12°, 24, 109*
159.970	$3s^23p^4\ ^3P_1$	$3s^23p^3(^4S^\circ)3d\ ^3D^\circ_2$	19 541.8	644 660	10				12°, 24
158.77	0	1	20 060	649 900					24
157.732	2	3	0.0	633 990	10				9, 12°, 15, 24, 25, 103
155.12	2	2	0.0	644 660					24
157.532	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^\circ)3d\ ^1F^\circ_3$	47 032.9	681 820	5	5.00	1.92+11	C	9, 12°, 24, 103, 109*
154.68C	$3s^23p^4\ ^3P_1$	$3s^23p^3(^2D^\circ)3d\ ^1D^\circ_2$	19 541.8	666 050		2.6 − 1	1.5+10	D	109*
70.07L	$3s^23p^3(^2D^\circ)3d\ ^3G^\circ_5$	$3s^23p^3(^2D^\circ)4f\ ^3H_6$							23
69.37L	$3s^23p^33d\ ^5D^\circ_4$	$3s^23p^34f\ ^5F_5$							23
69.25L	3	4							23
56.57	$3s^23p^4\ ^3P_2$	$3s^23p^3(^4S^\circ)4d\ ^3D^\circ_3$	0.0	1 767 700					23
56.39	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^\circ)4d\ ^1D^\circ_2$	47 032.9	1 820 400					23
56.18	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^\circ)4d\ ^1F^\circ_3$	47 032.9	1 827 000					23

Ni XIV

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2184.26	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^3\ ^2D^o_{3/2}$	0.0	45 767.8		M1	1.6+2	C	21°, 107, 109*
1866.75	3/2	5/2	0.0	53 569.0		M1	7.6	D	21°, 106, 107, 109*
1174.72	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^3\ ^2P^o_{1/2}$	0.0	85 126.7		M1	4.6+2	D	21°, 109*
369.58^C	$3s^23p^3\ ^2D^o_{3/2}$	$3s3p^4\ ^4P_{5/2}$	45 767.8	316 343		4.0 − 3	3.4+7	E	109*
338.65^C	$3s^23p^3\ ^2P^o_{3/2}$	$3s3p^4\ ^2D_{3/2}$	96 630+x	391 916		3.0 − 3	4.4+7	E	109*
334.52^C	3/2	5/2	96 630+x	395 567		7.6 − 2	7.6+8	D	109*
325.96^C	1/2	3/2	85 126.7	391 916		2.4 − 2	3.7+8	D	109*
316.113	$3s^23p^3\ ^4S^o_{3/2}$	$3s3p^4\ ^4P_{5/2}$	0.0	316 343	6	1.8 − 1	2.0+9	D	24, 27°, 109*
302.264	3/2	3/2	0.0	330 837	4	1.2 − 1	2.2+9	D	12°, 24, 27, 109*
295.55^C	$3s^23p^3\ ^2D^o_{5/2}$	$3s3p^4\ ^2D_{3/2}$	53 569.0	391 916		8.4 − 4	1.6+7	E	109*
292.399	5/2	5/2	53 569.0	395 567	4	2.8 − 1	3.6+9	D	24, 27°, 109*
288.894	3/2	3/2	45 767.8	391 916	3	2.3 − 1	4.6+9	D	27°, 109*
285.88^C	3/2	5/2	45 767.8	395 567		8.0 − 4	1.1+7	E	109*
253.681	$3s^23p^3\ ^2D^o_{5/2}$	$3s3p^4\ ^2P_{3/2}$	53 569.0	447 765	5				24, 27°
245.650	3/2	1/2	45 767.8	452 850	2				27
202.97^C	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^3P)3d\ ^4P_{3/2}$	96 630+x	589 310		9.2 − 3	3.7+8	E	109*
200.73^C	3/2	1/2	96 630+x	594 810		4.4 − 2	3.8+9	E	109*
196.20^C	1/2	1/2	85 126.7	594 810		3.2 − 2	2.9+9	E	109*
188.69^C	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^4P_{5/2}$	53 569.0	583 530		6.0 − 2	1.9+9	E	109*
186.66^C	5/2	3/2	53 569.0	589 310		2.0 − 2	9.3+8	E	109*
185.96^C	3/2	5/2	45 767.8	583 530		3.1 − 2	1.0+9	E	109*
182.14^C	3/2	1/2	45 767.8	594 810		1.5 − 1	1.5+10	E	109*
186.69^C	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2D_{3/2}$	96 630+x	632 280		1.5 − 2	7.1+8	E	109*
185.94^C	3/2	5/2	96 630+x	634 430		2.2 − 1	7.1+9	D	109*
182.76^C	1/2	3/2	85 126.7	632 280		1.7 − 1	8.4+9	D	109*
177.56	$3s^23p^3\ ^2P^o_{1/2}$	$3s^23p^2(^1D)3d\ ^2P_{1/2}$	85 126.7	648 320					24
177.28	3/2	3/2	96 630+x	660 710+x		1.1	5.6+10	E	24°, 109*
173.74^C	1/2	3/2	85 126.7	660 710+x		4.0 − 1	2.4+10	E	109*
172.80^C	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)3d\ ^2D_{3/2}$	53 569.0	632 280		2.5 − 1	1.4+10	D	109*
172.16	5/2	5/2	53 569.0	634 430		1.3	4.7+10	D	24°, 109*
170.50	3/2	3/2	45 767.8	632 280		1.2	7.1+10	D	24°, 109*
169.88^C	3/2	5/2	45 767.8	634 430		4.4 − 2	1.7+9	D	109*
171.37	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)3d\ ^4P_{5/2}$	0.0	583 530		2.5	9.4+10	D	24°, 109*
169.69	3/2	3/2	0.0	589 310		1.7	9.8+10	D	24°, 109*
168.12	3/2	1/2	0.0	594 810		7.2 − 1	8.5+10	D	24°, 109*
168.37	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^3P)3d\ ^2D_{5/2}$	96 630+x	690 560+x					24
164.80	1/2	3/2	85 126.7	691 930					24
164.71^C	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)3d\ ^2P_{3/2}$	53 569.0	660 710+x		1.3 − 2	7.7+8	E	109*
162.62^C	3/2	3/2	45 767.8	660 710+x		3.3 − 2	2.2+9	E	109*
164.146	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^2F_{7/2}$	53 569.0	662 780		3.9	1.2+11	D	9, 15°, 24, 25, 103, 109*
157.62^C	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2D_{5/2}$	0.0	634 430		5.2 − 3	2.3+8	E	109*
65.40^L	$3s^23p^23d\ ^2G_{9/2}$	$3s^23p^24f\ ^2H^o_{11/2}$							23
65.01^L	$3s^23p^23d\ ^4D_{7/2}$	$3s^23p^24f\ ^4F^o_{9/2}$							23
64.79^L	$3s^23p^23d\ ^4F_{9/2}$	$3s^23p^24f\ ^4G^o_{11/2}$							23

Ni XV

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
8024.1	$3s^23p^2\ ^3P_1$	$3s^23p^2\ ^3P_2$	14 917.5	27 376.5		M1	2.27+1	C	4, 20°, 109*
6701.7	$_0$	$_1$	0.0	14 917.5		M1	5.65+1	C	4, 20°, 109*
2085.51	$3s^23p^2\ ^3P_1$	$3s^23p^2\ ^1D_2$	14 917.5	62 852.1		M1	2.0+2	E	21°, 106, 107, 109*
439.86	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^5S^o_2$	27 376.5	254 700					28, 29°
416.92	$_1$	$_2$	14 917.5	254 700					28, 29°
359.79^{C}	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^3D^o_3$	62 852.1	340 794		2.4 − 2	1.7+8	E	109*
324.65^{C}	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3D^o_1$	27 376.5	335 400		9.5 − 4	2.0+7	E	109*
324.35^{C}	$_2$	$_2$	27 376.5	335 682		1.7 − 3	2.1+7	E	109*
319.063	$_2$	$_3$	27 376.5	340 794	6	1.6 − 1	1.5+9	D	24, 27°, 44, 109*
312.03^{C}	$_1$	$_1$	14 917.5	335 400		1.5 − 2	3.3+8	D−	109*
311.756	$_1$	$_2$	14 917.5	335 682	3	1.5 − 1	2.0+9	D	24, 27°, 109*
298.15	$_0$	$_1$	0.0	335 400	1	7.4 − 2	1.9+9	D	27°, 109*
278.386	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3P^o_2$	27 376.5	386 590	5	2.5 − 1	4.3+9	D	27°, 109*
269.05^{C}	$_1$	$_2$	14 917.5	386 590		2.0 − 2	3.7+8	D−	109*
277.775	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^1D^o_2$	62 852.1	422 855	4				27
224.057	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^1P^o_1$	62 852.1	509 167	1				12°, 24, 27
215.925	$3s^23p^2\ ^3P_1$	$3s3p^3\ ^3S^o_1$	14 917.5	478 041	3				12°, 24, 27
209.18	$_0$	$_1$	0.0	478 041	3				24°, 27
195.52	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^1D^o_2$	62 852.1	574 267					24
189.21	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^3P^o_2$	27 376.5	555 797					24
184.884	$_1$	$_2$	14 917.5	555 797	1				12°, 24
176.741	$_0$	$_1$	0.0	565 800	7				12°, 24
180.06	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^3D^o_1$	27 376.5	582 760					24
179.273	$_2$	$_3$	27 376.5	585 185	4	2.6	7.5+10	D	12°, 24, 44, 109*
178.890	$_2$	$_2$	27 376.5	586 379	1				12°, 24
176.10	$_1$	$_1$	14 917.5	582 760					24
174.99	$_1$	$_2$	14 917.5	586 379					24
178.779	$3s^23p^2\ ^3P_1$	$3s^23p3d\ ^1D^o_2$	14 917.5	574 267	1				12°, 24
173.724	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^1F^o_3$	62 852.1	638 477	2	2.40	7.6+10	C	12°, 24, 109*
163.64^{C}	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^1F^o_3$	27 376.5	638 477		1.6 − 1	5.6+9	E	109*
65.415^{L}	$3s^23p3d\ ^1P^o_1$	$3s^23p4f\ ^1D_2$							30
64.635	$3s^23p3d\ ^1F^o_3$	$3s^23p4f\ ^1G_4$	638 477	2 185 600		5.4	9.6+11	D	30°, 109*
62.369^{L}	$3s^23p3d\ ^3P^o_0$	$3s^23p4f\ ^3D_1$							30
61.152^{L}	$3s^23p3d\ ^3F^o_3$	$3s^23p4f\ ^3G_4$							23, 30°
60.890^{L}	$_4$	$_5$				6.4	1.0+12	D	23, 30°, 109*
59.947^{L}	$3s^23p^2\ ^1S_0$	$3s^23p4d\ ^1P^o_1$							30
59.58	$3s^23p^2\ ^1D_2$	$3s^23p4s\ ^1P^o_1$	62 852.1	1 741 300					23
58.71	$3s^23p^2\ ^3P_2$	$3s^23p4s\ ^3P^o_2$	27 376.5	1 730 700					23
50.249	$3s^23p^2\ ^1D_2$	$3s^23p4d\ ^1F^o_3$	62 852.1	2 053 000		1.8	6.8+11	D	23, 30°, 109*
50.172	$3s^23p^2\ ^3P_2$	$3s^23p4d\ ^3D^o_3$	27 376.5	2 020 500					23, 30°
49.914	$_1$	$_2$	14 917.5	2 018 400					23, 30°
49.626	$3s^23p^2\ ^3P_2$	$3s^23p4d\ ^3F^o_3$	27 376.5	2 042 500					30

Ni XVI

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3601.23	$3s^23p\ ^2P^o_{1/2}$	$3s^23p\ ^2P^o_{3/2}$	0	27 760.4		M1	1.92+2	C	4, 20, 76°, 109*
471.622^{C}	$3s3p^2\ ^2P_{3/2}$	$3p^3\ ^2D^o_{5/2}$	457 912	669 946					32
466.181^{C}	$1/2$	$3/2$	448 169	662 678					32
453.502^{C}	$3s3p^2\ ^2P_{3/2}$	$3p^3\ ^4S^o_{3/2}$	457 912	678 418		1.5 − 2	1.2+8	E	109*
434.312^{C}	$1/2$	$3/2$	448 169	678 418		3.8 − 3	3.3+7	E	109*
431.539^{C}	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^4P_{1/2}$	27 760.4	259 489					29
410.542^{C}	$3/2$	$3/2$	27 760.4	271 341					29
388.820^{C}	$3/2$	$5/2$	27 760.4	284 949		7.6 − 3	5.6+7	E	29, 109*
385.373^{C}	$1/2$	$1/2$	0	259 489		2.6 − 3	5.7+7	E	29, 109*
368.540^{C}	$1/2$	$3/2$	0	271 341					29
407.905^{C}	$3s3p^2\ ^2S_{1/2}$	$3p^3\ ^2D^o_{3/2}$	417 523	662 678					32
407.677^{C}	$3s^23d\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	543 107	788 399		7.2 − 3	5.0+7	E	109*
355.1^{C}	$3s3p^2\ ^2P_{3/2}$	$3p^3\ ^2P^o_{1/2}$	457 912	739 500?		2.9 − 2	7.7+8	E	109*
347.0^{C}	$3/2$	$3/2$	457 912	746 100?		2.4 − 1	3.4+9	D	109*
343.3^{C}	$1/2$	$1/2$	448 169	739 500?		1.5 − 1	4.3+9	E	109*
335.6^{C}	$1/2$	$3/2$	448 169	746 100?		2.8 − 3	4.3+7	E	109*
325.904^{C}	$3s^23d\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2F^o_{5/2}$	543 107	849 946		5.1 − 2	5.4+8	E	109*
322.469^{C}	$3/2$	$5/2$	539 839	849 946		1.5 − 1	1.6+9	E	109*
304.436^{C}	$5/2$	$7/2$	543 107	871 583		2.9 − 1	2.6+9	E	109*
316.811	$3s3p^2\ ^2D_{3/2}$	$3p^3\ ^2D^o_{3/2}$	347 032	662 678	3				31°, 32
313.724	$5/2$	$5/2$	351 185	669 946	4	3.2 − 1	3.6+9	E	31°, 32, 109*
309.680^{C}	$3/2$	$5/2$	347 032	669 946		3.5 − 2	4.1+8	E	32, 109*
313.213^{C}	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2D_{3/2}$	27 760.4	347 032		2.5 − 3	4.3+7	E	109*
309.196	$3/2$	$5/2$	27 760.4	351 185	5	2.0 − 1	2.3+9	D	24, 27, 31°, 33, 109*
288.149	$1/2$	$3/2$	0	347 032	4	1.6 − 1	3.2+9	D	27, 31°, 109*
310.016	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	$3p^2(^3P)3d\ ^4F_{9/2}$	807 214	1 129 778	1				34
304.3^{C}	$3s3p^2\ ^2S_{1/2}$	$3p^3\ ^2P^o_{3/2}$	417 523	746 100?		1.3 − 1	2.3+9	E	109*
302.584^{C}	$3s3p^2\ ^2P_{3/2}$	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	457 912	788 399		4.4 − 3	5.2+7	E	109*
301.763^{C}	$3s3p^2\ ^2D_{3/2}$	$3p^3\ ^4S^o_{3/2}$	347 032	678 418		1.4 − 2	2.6+8	E	109*
271.638	$3s3p(^3P^o)3d\ ^4F^o_{9/2}$	$3p^2(^3P)3d\ ^4F_{9/2}$	761 641	1 129 778	2				34
269.645^{L}	$5/2$	$5/2$			1				34
269.118^{L}	$7/2$	$7/2$			2				34
265.649^{C}	$3s^23d\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	543 107	919 543		3.0 − 2	7.0+8	E	109*
263.363^{C}	$3/2$	$3/2$	539 839	919 543		4.8 − 2	1.1+9	E	109*
259.742^{C}	$3s3p^2\ ^4P_{5/2}$	$3p^3\ ^2D^o_{5/2}$	284 949	669 946		1.1 − 2	1.8+8	E	109*
257.842	$3s3p(^3P^o)3d\ ^2F^o_{7/2}$	$3p^2(^3P)3d\ ^2F_{5/2}$	871 583	1 259 417	1				34
254.628	$7/2$	$7/2$	871 583	1 264 313	1				34
256.566^{C}	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2S_{1/2}$	27 760.4	417 523		7.6 − 3	3.8+8	E	109*
239.508	$1/2$	$1/2$	0	417 523	3	4.4 − 1	2.6+10	E	12°, 24, 27, 31, 33, 44, 109*
255.741	$3s^23d\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	543 107	934 137	5	2.4	3.0+10	E	31°, 32, 109*
253.155^{C}	$5/2$	$5/2$	543 107	938 122		4.9 − 2	8.5+8	E	109*
251.088	$3/2$	$5/2$	539 839	938 122	3	1.7	3.0+10	E	31°, 32, 109*
255.164	$3s3p(^3P^o)3d\ ^4F^o_{9/2}$	$3p^2(^3P)3d\ ^4D_{7/2}$	761 641	1 153 546	1				34
248.996^{L}	$5/2$	$3/2$			1				34
254.798^{C}	$3s3p^2\ ^2D_{3/2}$	$3p^3\ ^2P^o_{1/2}$	347 032	739 500?		3.0 − 1	1.5+10	D	32, 109*
253.219^{C}	$5/2$	$3/2$	351 185	746 100?		4.6 − 1	1.2+10	D	32, 109*
250.6^{C}	$3/2$	$3/2$	347 032	746 100?		5.6 − 2	1.4+9	D	109*
254.139	$3s3p^2\ ^4P_{5/2}$	$3p^3\ ^4S^o_{3/2}$	284 949	678 418	3	7.2 − 1	1.8+10	D	$31^{\triangle}$, 109*, 114°
245.671	$3/2$	$3/2$	271 341	678 418	2	5.2 − 1	1.4+10	D	$31^{\triangle}$, 33, 109*, 114°
238.699	$1/2$	$3/2$	259 489	678 418	1	2.6 − 1	7.5+9	D	$31^{\triangle}$, 109*, 114°

Ni XVI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
251.609	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	$3p^2(^3P)3d\ ^2D_{5/2}$	919 543	1 316 985	1				34
239.904	$3s^23d\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2D^o_{3/2}$	543 107	959 869	2	4.4 – 1	1.3+10	E	31°, 32, 109*
238.078^C	3/2	3/2	539 839	959 869		4.0 – 1	1.2+10	E	109*
237.470	5/2	5/2	543 107	964 187	4	1.2	2.4+10	E	31°, 32, 109*
235.656^C	3/2	5/2	539 839	964 187		8.0 – 3	1.6+8	E	109*
239.055	$3s^23d\ ^2D_{3/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	539 839	958 134	1	6.4 – 1	3.6+10	D	31°, 32, 109*
237.612^C	5/2	3/2	543 107	963 961		7.8 – 2	2.3+9	D	109*
235.776	3/2	3/2	539 839	963 961	1	5.2 – 1	1.5+10	D	31°, 32, 109*
237.864	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2P_{1/2}$	27 760.4	448 169	2	4.4 – 1	2.6+10	E	12°, 24, 27, 31, 33, 109*
232.484	3/2	3/2	27 760.4	457 912	4	1.32	4.07+10	C–	12°, 24, 27, 31, 33, 44, 109*
223.117	1/2	1/2	0	448 169	1	1.9 – 1	1.3+10	E	24, 27, 31°, 33, 44, 109*
218.376	1/2	3/2	0	457 912	1	2.72 – 1	9.5+9	C–	12°, 24, 27, 31, 33, 44, 109*
231.367	$3s3p(^1P^o)3d\ ^2F^o_{5/2}$	$3s3d^2\ ^2G_{7/2}$	938 122	1 370 336	1bl				34
229.128	7/2	9/2	934 137	1 370 574	2				34
228.721^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	351 185	788 399		6.6 – 2	1.4+9	E	109*
226.913	$3s3p(^3P^o)3d\ ^2D^o_{5/2}$	$3p^2(^3P)3d\ ^2F_{7/2}$	823 538	1 264 313	2bl				34
219.857	$3s3p(^1P^o)3d\ ^2D^o_{5/2}$	$3s3d^2\ ^2F_{7/2}$	964 187	1 419 028					34
219.284^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^4D^o_{7/2}$	351 185	807 214		3.9 – 2	6.7+8	E	109*
216.786^C	3/2	5/2	347 032	808 316		7.6 – 3	1.8+8	E	109*
216.8^C	$3s3p^2\ ^4P_{5/2}$	$3p^3\ ^2P^o_{3/2}$	284 949	746 100?		8.4 – 3	2.9+8	E	109*
210.6^C	3/2	3/2	271 341	746 100?		2.2 – 2	8.1+8	E	109*
205.5^C	1/2	3/2	259 489	746 100?		1.0 – 2	4.1+8	E	109*
216.623^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	457 912	919 543		3.1 – 1	1.1+10	D	32, 109*
212.146^C	1/2	3/2	448 169	919 543		2.8 – 3	1.1+8	E	109*
212.234^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2D^o_{3/2}$	351 185	822 364					32
211.715	5/2	5/2	351 185	823 538	3				31°, 32
210.375	3/2	3/2	347 032	822 364	2				31°, 32
209.861^C	3/2	5/2	347 032	823 538					32
209.008	$3s3p(^3P^o)3d\ ^4D^o_{5/2}$	$3s3d^2\ ^4F_{7/2}$	808 316	1 286 767	bl				34
208.242^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2F^o_{5/2}$	457 912	938 122		2.9 – 2	7.5+8	E	109*
202.557	$3s3p(^3P^o)3d\ ^4P^o_{3/2}$	$3s3d^2\ ^4F_{5/2}$	791 390	1 285 078	1				34
200.497^C	$3s3p^2\ ^2D_{5/2}$	$3s3p(^3P^o)3d\ ^2F^o_{5/2}$	351 185	849 946		1.5 – 1	4.2+9	E	32, 109*
198.844	3/2	5/2	347 032	849 946	1	5.2 – 1	1.4+10	E	31°, 32, 109*
192.187	5/2	7/2	351 185	871 583	3	8.4 – 1	1.9+10	E	31°, 32, 109*
199.911^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	457 912	958 134		1.4 – 1	1.1+10	C–	109*
197.614	3/2	3/2	457 912	963 961		8.0 – 1	3.3+10	D	31°, 32, 109*
196.092^C	1/2	1/2	448 169	958 134		6.0 – 2	5.2+9	E	109*
199.220^C	$3s3p^2\ ^2P_{3/2}$	$3s3p(^1P^o)3d\ ^2D^o_{3/2}$	457 912	959 869		1.2 – 1	5.1+9	E	109*
197.515	3/2	5/2	457 912	964 187	2	2.3	6.6+10	E	31°, 32, 109*
195.391	1/2	3/2	448 169	959 869	1	1.2	5.4+10	E	31°, 32, 109*
199.210	$3s3p^2\ ^2S_{1/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	417 523	919 543	2	1.2	4.9+10	E	31°, 32, 109*
198.629^C	$3s3p^2\ ^4P_{5/2}$	$3s3p(^3P^o)3d\ ^4P^o_{5/2}$	284 949	788 399		1.1 – 1	3.3+9	E	109*
193.412	3/2	5/2	271 341	788 399	2	9.6 – 1	2.8+10	E	31°, 109*
195.266	$3s^23p\ ^2P^o_{3/2}$	$3s^23d\ ^2D_{3/2}$	27 760.4	539 839		2.2 – 1	9.5+9	D	31°, 109*
194.046	3/2	5/2	27 760.4	543 107	7	1.6	4.6+10	D	12°, 24, 31, 33, 44, 109*
185.251	1/2	3/2	0	539 839	1	8.6 – 1	4.2+10	D	24, 31°, 33, 44, 109*
191.654^C	$3s3p^2\ ^4P_{3/2}$	$3s3p(^3P^o)3d\ ^4D^o_{1/2}$	271 341	793 115		1.0 – 2	9.5+8	E	109*
191.486	5/2	7/2	284 949	807 214	3	2.02	4.58+10	D	31°, 109*
191.055	5/2	5/2	284 949	808 316	1	1.0	3.1+10	D	31°, 109*
187.404	1/2	1/2	259 489	793 115	1	5.0 – 1	4.8+10	D	31°, 109*
186.228^C	3/2	5/2	271 341	808 316		3.9 – 1	1.3+10	D	109*

Ni XVI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
184.976[C]	$3s3p^2\ ^2S_{1/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	417 523	958 134		2.4 – 1	2.4+10	E	109*
183.003[C]	$1/2$	$3/2$	417 523	963 961		1.4 – 1	6.8+9	E	109*
184.384[C]	$3s3p^2\ ^2S_{1/2}$	$3s3p(^1P^o)3d\ ^2D^o_{3/2}$	417 523	959 869		4.2 – 2	2.0+9	E	32, 109*
174.669[C]	$3s3p^2\ ^2D_{3/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	347 032	919 543		8.4 – 4	4.6+7	E	109*
172.829[C]	$3s3p^2\ ^4P_{3/2}$	$3s3p(^3P^o)3d\ ^2F^o_{5/2}$	271 341	849 946		4.0 – 3	1.5+8	E	109*
170.464[C]	$5/2$	$7/2$	284 949	871 583		2.9 – 2	8.2+8	E	109*
171.541[C]	$3s3p^2\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	351 185	934 137		1.0	3.0+10	E	109*
170.376[C]	$5/2$	$5/2$	351 185	938 122		3.7 – 2	1.4+9	E	109*
169.179[C]	$3/2$	$5/2$	347 032	938 122		7.6 – 1	2.9+10	E	109*
164.289[C]	$3s3p^2\ ^2D_{5/2}$	$3s3p(^1P^o)3d\ ^2D^o_{3/2}$	351 185	959 869		3.9 – 3	2.4+8	E	109*
163.176[C]	$3/2$	$3/2$	347 032	959 869		3.4 – 3	2.1+8	E	109*
163.639[C]	$3s3p^2\ ^2D_{3/2}$	$3s3p(^1P^o)3d\ ^2P^o_{1/2}$	347 032	958 134		9.2 – 4	1.1+8	E	109*
163.192[C]	$5/2$	$3/2$	351 185	963 961		6.0 – 3	3.8+8	E	109*
162.093[C]	$3/2$	$3/2$	347 032	963 961		6.8 – 3	4.4+8	E	109*
154.039[C]	$3s3p^2\ ^4P_{5/2}$	$3s3p(^1P^o)3d\ ^2F^o_{7/2}$	284 949	934 137		1.8 – 2	6.3+8	E	109*
151.503[C]	$3s3p^2\ ^4P_{1/2}$	$3s3p(^3P^o)3d\ ^2P^o_{3/2}$	259 489	919 543		7.8 – 3	5.7+8	E	109*
59.336	$3s^23d\ ^2D_{5/2}$	$3s^24f\ ^2F^o_{7/2}$	543 107	2 228 500					23
59.217	$3/2$	$5/2$	539 839	2 228 600					23
57.349[L]	$3s3p(^3P^o)3d\ ^4F^o_{7/2}$	$3s3p4f\ ^4G_{9/2}$							23
57.257[L]	$5/2$	$7/2$							23
57.137[L]	$9/2$	$11/2$	761 641						23
47.772	$3s^23p\ ^2P^o_{3/2}$	$3s^24d\ ^2D_{5/2}$	27 760.4	2 121 100					23
47.184	$1/2$	$3/2$	0	2 119 400					23

Ni XVII

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4744^{T}	$3s3p\ ^{3}P^{o}_{1}$	$3s3p\ ^{3}P^{o}_{2}$	272 634	293 686		M1	1.25+2	C+	4°, 109*
461.515	$3s3d\ ^{1}D_{2}$	$3p3d\ ^{1}D^{o}_{2}$	864 465	1 081 126	110	1.4 − 1	8.6+8	D	37°, 109*
441.289	$3s3p\ ^{1}P^{o}_{1}$	$3p^{2}\ ^{3}P_{0}$	401 302	627 914	170	4.2 − 3	1.4+8	E	37°, 109*
412.363^{C}	1	1	401 302	643 807		1.0 − 3	1.4+7	E	109*
372.833	1	2	401 302	669 535	190	6.0 − 2	5.9+8	E	37°, 109*
421.020	$3s3p\ ^{1}P^{o}_{1}$	$3p^{2}\ ^{1}D_{2}$	401 302	638 820	520	2.4 − 1	1.8+9	E	37°, 109*
366.80	$3s^{2}\ ^{1}S_{0}$	$3s3p\ ^{3}P^{o}_{1}$	0	272 634		3.5 − 3	5.8+7	E	42, 43, 44°, 109*
359.234^{C}	$3s3d\ ^{3}D_{3}$	$3p3d\ ^{3}F^{o}_{2}$	775 567	1 053 937		9.8 − 4	1.0+7	E	109*
355.886	2	2	772 953	1 053 937	40	1.0 − 1	1.0+9	D	37°, 38, 109*
353.773	1	2	771 268	1 053 937	190	3.6 − 1	3.8+9	D	33, 37°, 109*
341.23	3	3	775 567	1 068 632	2	1.6 − 1	1.3+9	C	38°, 109*
338.205	2	3	772 953	1 068 632	220	6.0 − 1	5.0+9	C	33, 37°, 109*
322.033	3	4	775 567	1 086 107	330	1.05	7.5+9	C	33, 37°, 109*
291.913^{C}	$3s3d\ ^{3}D_{2}$	$3p3d\ ^{3}D^{o}_{1}$	772 953	1 115 521		2.9 − 1	7.4+9	E	109*
291.697	3	2	775 567	1 118 392	130				37
290.004	1	1	771 268	1 115 521	70	9.6 − 2	2.5+9	E	37°, 109*
279.163	3	3	775 567	1 133 775	370b	7.0 − 1	8.4+9	C	33, 37°, 109*
277.145^{C}	2	3	772 953	1 133 775		2.1 − 1	2.6+9	C	33, 109*
290.232	$3s3d\ ^{1}D_{2}$	$3p3d\ ^{1}F^{o}_{3}$	864 465	1 209 017	650	2.0	2.2+10	D	33, 37°, 109*
289.743	$3s3p\ ^{3}P^{o}_{2}$	$3p^{2}\ ^{1}D_{2}$	293 686	638 820	200	1.7 − 1	2.7+9	E	37°, 109*
273.093	1	2	272 634	638 820	170	8.4 − 2	1.5+9	E	37°, 109*
285.619	$3s3p\ ^{3}P^{o}_{2}$	$3p^{2}\ ^{3}P_{1}$	293 686	643 807	350	3.1 − 1	8.5+9	C	23, 27, 33, 37°, 109*
281.468	1	0	272 634	627 914	300	2.5 − 1	2.1+10	C	23, 27, 33, 37°, 109*
269.417	1	1	272 634	643 807	220	1.9 − 1	5.8+9	C	23, 27, 33, 37°, 109*
266.062	2	2	293 686	669 535	610	7.5 − 1	1.4+10	D	23, 27, 33, 37°, 109*
263.579	0	1	264 431	643 807	310	2.7 − 1	8.6+9	C	23, 27, 33, 37°, 109*
251.949	1	2	272 634	669 535	260	2.4 − 1	5.0+9	D	23, 27, 33, 37°, 109*
283.122	$3s3p\ ^{1}P^{o}_{1}$	$3p^{2}\ ^{1}S_{0}$	401 302	754 513	430	2.9 − 1	2.4+10	C	37°, 109*
279.12	$3s3d\ ^{1}D_{2}$	$3p3d\ ^{1}P^{o}_{1}$	864 465	1 222 730	4	5.5 − 1	1.5+10	D	38°, 109*
275.353^{C}	$3s3d\ ^{3}D_{2}$	$3p3d\ ^{3}P^{o}_{1}$	772 953	1 136 123		1.3 − 1	3.7+9	E	109*
274.967	2	2	772 953	1 136 643	240				33, 37°
274.376^{C}	1	0	771 268	1 135 732		1.5 − 1	1.3+10	C	109*
274.08	1	1	771 268	1 136 123	5	3.3 − 1	9.6+9	E	38°, 109*
270.295^{C}	$3s3p\ ^{1}P^{o}_{1}$	$3s3d\ ^{3}D_{1}$	401 302	771 268		1.4 − 3	4.1+7	E	109*
269.070^{C}	1	2	401 302	772 953		1.1 − 3	2.0+7	E	109*
268.702	$3p3d\ ^{1}P^{o}_{1}$	$3d^{2}\ ^{1}D_{2}$	1 222 730	1 594 821	1				41
254.851	$3p3d\ ^{1}F^{o}_{3}$	$3d^{2}\ ^{1}G_{4}$	1 209 017	1 601 404	5				39°, 40, 41
249.189	$3s^{2}\ ^{1}S_{0}$	$3s3p\ ^{1}P^{o}_{1}$	0	401 302	60	7.67 − 1	2.75+10	C	12°, 24, 25, 27, 33, 37, 44, 109*, 112
240.90	$3p^{2}\ ^{1}D_{2}$	$3p3d\ ^{3}F^{o}_{2}$	638 820	1 053 937	1				38
235.941	$3p3d\ ^{3}P^{o}_{2}$	$3d^{2}\ ^{3}F_{3}$	1 136 643	1 560 490	2				39°, 40, 41
232.516	$3p3d\ ^{3}D^{o}_{3}$	$3d^{2}\ ^{3}F_{4}$	1 133 775	1 563 822					39°, 40, 41
226.093	1	2	1 115 521	1 557 900?	b				41
226.093	$3p^{2}\ ^{1}D_{2}$	$3p3d\ ^{1}D^{o}_{2}$	638 820	1 081 126	170	6.0 − 1	1.6+10	E	33, 37°, 109*
224.222^{C}	$3p^{2}\ ^{3}P_{2}$	$3p3d\ ^{3}D^{o}_{1}$	669 535	1 115 521		6.0 − 3	2.6+8	E	109*
215.413	2	3	669 535	1 133 775	150	1.2	2.4+10	D	33, 37°, 109*
211.710	1	1	643 807	1 115 521	90	9.9 − 2	4.8+9	E	33, 37°, 109*
210.704	1	2	643 807	1 118 392	170				33, 37°
205.08	0	1	627 914	1 115 521	3	5.7 − 1	3.0+10	E	38°, 109*
215.905	$3s3p\ ^{1}P^{o}_{1}$	$3s3d\ ^{1}D_{2}$	401 302	864 465	440	1.7	4.8+10	D	23, 33, 37°, 109*
215.014	$3p3d\ ^{3}P^{o}_{2}$	$3d^{2}\ ^{3}P_{2}$	1 136 643	1 601 729	1				41

Ni XVII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
214.079	$3p^2\ ^3P_2$	$3p3d\ ^3P^o_2$	669 535	1 136 643	110				33, 37°
203.28	1	0	643 807	1 135 732	1	1.5 − 1	2.4+10	C	38°, 109*
203.12	1	1	643 807	1 136 123	1	3.3 − 1	1.8+10	E	38°, 109*
202.90	1	2	643 807	1 136 643	2				38
213.58	$3p^2\ ^1S_0$	$3p3d\ ^1P^o_1$	754 513	1 222 730	2	5.7 − 1	2.7+10	C	38°, 109*
209.388^C	$3s3p\ ^3P^o_2$	$3s3d\ ^3D_1$	293 686	771 268		1.3 − 2	6.6+8	D	109*
208.653	2	2	293 686	772 953	70	2.0 − 1	6.1+9	C	23, 33, 37°, 109*
207.519	2	3	293 686	775 567	460	1.13	2.5+10	C	23, 33, 37°, 109*
200.546	1	1	272 634	771 268	90	2.1 − 1	1.2+10	C	23, 33, 37°, 109*
199.873	1	2	272 634	772 953	320	6.3 − 1	2.1+10	C	23, 33, 37°, 109*
197.304	0	1	264 431	771 268	130	2.8 − 1	1.6+10	C	23, 33, 37°, 109*
209.337	$3p3d\ ^3F^o_4$	$3d^2\ ^3F_4$	1 086 107	1 563 822	2				39°, 40, 41
203.300	3	3	1 068 632	1 560 490	2				39°, 41
198.391	2	2	1 053 937	1 557 900?	1bl				41
208.118	$3p3d\ ^3D^o_2$	$3d^2\ ^3P_1$	1 118 392	1 598 889	1				41
207.518	1	0	1 115 521	1 597 400?	b				41
207.521^C	$3s3p\ ^3P^o_1$	$3p^2\ ^1S_0$	272 634	754 513		2.0 − 3	3.2+8	E	109*
202.046	$3p^2\ ^1D_2$	$3p3d\ ^3D^o_3$	638 820	1 133 775	110				37
194.668	$3p3d\ ^1D^o_2$	$3d^2\ ^1D_2$	1 081 126	1 594 821	1				41
185.389	$3p^2\ ^3P_2$	$3p3d\ ^1F^o_3$	669 535	1 209 017	70b				37
175.399	$3p^2\ ^1D_2$	$3p3d\ ^1F^o_3$	638 820	1 209 017					33, 37°
175.199^C	$3s3p\ ^3P^o_2$	$3s3d\ ^1D_2$	293 686	864 465		6.5 − 4	2.8+7	E	109*
168.967^C	1	2	272 634	864 465		1.1 − 2	5.1+8	E	109*
57.579	$3s3d\ ^1D_2$	$3s4f\ ^1F^o_3$	864 465	2 601 200					23°, 35
55.258	$3s3d\ ^3D_3$	$3s4f\ ^3F^o_4$	775 567	2 585 260	4				30°, 35, 36
55.186	2	3	772 953	2 585 000	3				30°, 36
55.136	1	2	771 268	2 584 960	2				30°, 36
52.801	$3s3p\ ^3P^o_2$	$3s4s\ ^3S_1$	293 686	2 187 600	2				36
52.224	1	1	272 634	2 187 600	3				35, 36°
52.000	0	1	264 431	2 187 600	2				36
50.958	$3p^2\ ^1D_2$	$3s4f\ ^1F^o_3$	638 820	2 601 200					23
47.663	$3s3p\ ^1P^o_1$	$3s4d\ ^1D_2$	401 302	2 499 400					23
45.424	$3s3p\ ^3P^o_2$	$3s4d\ ^3D_2$	293 686	2 495 200	2				36
45.382	2	3	293 686	2 497 300	4				35, 36°
45.018	1	1	272 634	2 494 100					36
44.995	1	2	272 634	2 495 200	3				35, 36°
44.850	0	1	264 431	2 494 100	2				35, 36°
42.855	$3s^2\ ^1S_0$	$3s4p\ ^1P^o_1$	0	2 333 400		3.92 − 1	4.75+11	C	35, 36°, 109*
39.415	$3s3d\ ^3D_3$	$3s5f\ ^3F^o_{2,3,4}$	775 567	3 312 800	2				35, 36°
39.373	2	2,3,4	772 953	3 312 800	3				36
39.346	1	2,3,4	771 268	3 312 800	1				36
38.96	$3s3d\ ^1D_2$	$3s5f\ ^1F^o_3$	864 465	3 431 300					35
33.96	$3s3d\ ^3D_3$	$3s6f\ ^3F^o_4$	775 567	3 720 200					35
33.567	$3s3p\ ^3P^o_2$	$3s5d\ ^3D_3$	293 686	3 272 900	1				35, 36°
33.340	1	1,2	272 634	3 272 200	1				35, 36°
33.249	0	1,2	264 431	3 272 200	2				35, 36°
30.91	$3s^2\ ^1S_0$	$3s5p\ ^1P^o_1$	0	3 234 300		1.19 − 1	2.77+11	C	35°, 109*

Ni XVIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
804.5^{C}	$2p^6 4s\ ^2S_{1/2}$	$2p^6 4p\ ^2P^o_{1/2}$	2 301 800	2 426 100		3.2 − 1	1.6+9	C	109*
733.7^{C}	1/2	3/2	2 301 800	2 438 100		6.82 − 1	2.12+9	C	109*
639.8^{C}	$2p^6 4p\ ^2P^o_{3/2}$	$2p^6 4d\ ^2D_{3/2}$	2 438 100	2 594 400		1.4 − 1	5.8+8	C	109*
631.3^{C}	3/2	5/2	2 438 100	2 596 500		1.3	3.7+9	C	109*
594.2^{C}	1/2	3/2	2 426 100	2 594 400		7.8 − 1	3.7+9	C	109*
320.558	$2p^6 3s\ ^2S_{1/2}$	$2p^6 3p\ ^2P^o_{1/2}$	0	311 956		2.28 − 1	7.38+9	B	12°, 23, 27, 33, 36, 43, 44, 47, 48, 109*, 111, 112
291.985	1/2	3/2	0	342 485		5.06 − 1	9.91+9	B	12°, 23, 25, 27, 33, 36, 44, 47, 48, 109*, 111, 112
246.5^{C}	$2p^6 5d\ ^2D_{3/2}$	$2p^6 6p\ ^2P^o_{1/2}$	3 433 700	3 839 400		4.28 − 1	2.35+10	C	109*
244.7^{C}	5/2	3/2	3 434 600	3 843 200		7.8 − 1	2.1+10	C	109*
244.2^{C}	3/2	3/2	3 433 700	3 843 200		8.4 − 2	2.4+9	D	109*
240.0^{C}	$2p^6 5f\ ^2F^o_{5/2}$	$2p^6 6d\ ^2D_{3/2}$	3 469 100	3 885 700		2.48 − 1	7.2+9	C	109*
240.0^{C}	7/2	5/2	3 469 400	3 886 100		3.56 − 1	6.9+9	C	109*
239.8^{C}	5/2	5/2	3 469 100	3 886 100		1.8 − 2	3.4+8	D	109*
236.334^{S}	$2p^6 3p\ ^2P^o_{3/2}$	$2p^6 3d\ ^2D_{3/2}$	342 485	765 620		9.84 − 2	2.94+9	B	23, 33, 36, 47, 48°, 109*
233.759^{S}	3/2	5/2	342 485	770 280		9.00 − 1	1.83+10	B	23, 33, 36, 44, 47, 48°, 109*
220.424^{S}	1/2	3/2	311 956	765 620		5.32 − 1	1.83+10	B	23, 33, 36, 44, 47, 48°, 109*
220.00^{L}	$2p^5 3s3p\ ^4D_{7/2}$	$2p^5 3s3d\ ^4F^o_{9/2}$							52
212.2^{C}	$2p^6 5d\ ^2D_{5/2}$	$2p^6 6f\ ^2F^o_{5/2}$	3 434 600	3 905 800		1.9 − 1	4.6+9	D	109*
212.1^{C}	5/2	7/2	3 434 600	3 906 100		3.7	6.9+10	C	109*
211.8^{C}	3/2	5/2	3 433 700	3 905 800		2.6	6.4+10	C	109*
189.54^{C}	$2p^6 5p\ ^2P^o_{3/2}$	$2p^6 6d\ ^2D_{3/2}$	3 358 100	3 885 700		1.1 − 1	5.3+9	D	109*
189.39^{C}	3/2	5/2	3 358 100	3 886 100		1.0	3.2+10	C	109*
187.51^{C}	1/2	3/2	3 352 400	3 885 700		5.78 − 1	2.74+10	C	109*
145.75^{C}	$2p^6 5f\ ^2F^o_{5/2}$	$2p^6 7d\ ^2D_{3/2}$	3 469 100	4 155 200		4.4 − 2	3.4+9	D	109*
145.50^{C}	7/2	5/2	3 469 400	4 156 700		6.2 − 2	3.3+9	D	109*
145.43^{C}	5/2	5/2	3 469 100	4 156 700		3.1 − 3	1.6+8	E	109*
136.17^{C}	$5d\ ^2D_{5/2}$	$2p^6 7f\ ^2F^o_{5/2}$	3 434 600	4 169 000		5.1 − 2	3.1+9	D	109*
136.15^{C}	5/2	7/2	3 434 600	4 169 100		1.0	4.6+10	C	109*
136.00^{C}	3/2	5/2	3 433 700	4 169 000		7.2 − 1	4.3+10	C	109*
131.9^{C}	$2p^6 4d\ ^2D_{3/2}$	$2p^6 5p\ ^2P^o_{1/2}$	2 594 400	3 352 400		2.8 − 1	5.3+10	C	109*
131.3^{C}	5/2	3/2	2 596 500	3 358 100		4.9 − 1	4.7+10	C	109*
130.9^{C}	3/2	3/2	2 594 400	3 358 100		5.2 − 2	5.2+9	D	109*
130.30^{C}	$2p^6 4f\ ^2F^o_{5/2}$	$2p^6 5d\ ^2D_{3/2}$	2 666 230	3 433 700		1.01 − 1	1.00+10	C	109*
130.29^{C}	7/2	5/2	2 667 100	3 434 600		1.4 − 1	9.5+9	C	109*
130.15^{C}	5/2	5/2	2 666 230	3 434 600		7.2 − 3	4.8+8	D	109*
125.45^{C}	$2p^6 5p\ ^2P^o_{3/2}$	$2p^6 7d\ ^2D_{3/2}$	3 358 100	4 155 200		3.9 − 2	4.1+9	D	109*
125.22^{C}	3/2	5/2	3 358 100	4 156 700		3.4 − 1	2.4+10	C	109*
124.56^{C}	1/2	3/2	3 352 400	4 155 200		1.9 − 1	2.1+10	C	109*
124.04	$2p^6 4f\ ^2F^o_{7/2}$	$2p^6 5g\ ^2G_{9/2}$	2 667 100	3 473 300	bl				50
123.96	5/2	7/2	2 666 230	3 473 000	bl				50
114.74	$2p^6 4d\ ^2D_{5/2}$	$2p^6 5f\ ^2F^o_{7/2}$	2 596 500	3 469 400		4.3	2.7+11	C	49, 50°, 109*
114.6^{C}	5/2	5/2	2 596 500	3 469 100		2.1 − 1	1.8+10	D	109*
114.46	3/2	5/2	2 594 400	3 469 100	bl	2.9	2.5+11	C	49, 50°, 109*
110.52^{C}	$5d\ ^2D_{5/2}$	$2p^6 8f\ ^2F^o_{7/2}$	3 434 600	4 339 400		4.4 − 1	3.0+10	C	109*
110.50^{C}	5/2	5/2	3 434 600	4 339 600		2.2 − 2	2.0+9	D	109*
110.39^{C}	3/2	5/2	3 433 700	4 339 600		3.0 − 1	2.8+10	C	109*
102.77^{C}	$2p^6 5p\ ^2P^o_{3/2}$	$2p^6 8d\ ^2D_{3/2}$	3 358 100	4 331 100		1.8 − 2	2.9+9	D	109*
102.75^{C}	3/2	5/2	3 358 100	4 331 300		1.6 − 1	1.7+10	C	109*
102.18^{C}	1/2	3/2	3 352 400	4 331 100		9.2 − 2	1.5+10	C	109*

Ni XVIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
100.44^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^65d\ ^2D_{3/2}$	2 438 100	3 433 700		1.2 – 1	1.9+10	D	109*
100.35^{C}	3/2	5/2	2 438 100	3 434 600		1.0	1.2+11	C	109*
99.25^{C}	1/2	3/2	2 426 100	3 433 700		6.2 – 1	1.0+11	C	109*
95.18^{C}	$2p^64s\ ^2S_{1/2}$	$2p^65p\ ^2P^o_{1/2}$	2 301 800	3 352 400		1.8 – 1	6.5+10	D	109*
94.67^{C}	1/2	3/2	2 301 800	3 358 100		3.52 – 1	6.6+10	C	109*
82.034^{C}	$2p^64f\ ^2F^o_{7/2}$	$2p^66d\ ^2D_{5/2}$	2 667 100	3 886 100		2.3 – 2	3.9+9	D	109*
82.003^{C}	5/2	3/2	2 666 230	3 885 700		1.6 – 2	4.0+9	D	109*
81.976^{C}	5/2	5/2	2 666 230	3 886 100		1.1 – 3	1.9+8	E	109*
80.321^{C}	$2p^64d\ ^2D_{3/2}$	$2p^66p\ ^2P^o_{1/2}$	2 594 400	3 839 400		4.60 – 2	2.39+10	C	109*
80.212^{C}	5/2	3/2	2 596 500	3 843 200		8.34 – 2	2.16+10	C	109*
80.077^{C}	3/2	3/2	2 594 400	3 843 200		9.2 – 3	2.4+9	D	109*
76.377^{C}	$2p^64d\ ^2D_{5/2}$	$2p^66f\ ^2F^o_{5/2}$	2 596 500	3 905 800		5.2 – 2	9.9+9	D	109*
76.359^{C}	5/2	7/2	2 596 500	3 906 100		1.03	1.47+11	C	109*
76.254^{C}	3/2	5/2	2 594 400	3 905 800		7.20 – 1	1.38+11	C	109*
69.080^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^66d\ ^2D_{3/2}$	2 438 100	3 885 700		3.8 – 2	1.3+10	D	109*
69.061^{C}	3/2	5/2	2 438 100	3 886 100		3.4 – 1	8.0+10	C	109*
68.512^{C}	1/2	3/2	2 426 100	3 885 700		1.9 – 1	6.8+10	C	109*
67.161^{C}	$2p^64f\ ^2F^o_{5/2}$	$2p^67d\ ^2D_{3/2}$	2 666 230	4 155 200		6.6 – 3	2.3+9	D	109*
67.132^{C}	7/2	5/2	2 667 100	4 156 700		8.8 – 3	2.1+9	D	109*
67.093^{C}	5/2	5/2	2 666 230	4 156 700		4.4 – 4	1.1+8	E	109*
65.036^{C}	$2p^64s\ ^2S_{1/2}$	$2p^66p\ ^2P^o_{1/2}$	2 301 800	3 839 400		5.6 – 2	4.4+10	C	109*
64.876^{C}	1/2	3/2	2 301 800	3 843 200		1.1 – 1	4.3+10	C	109*
63.593^{C}	$2p^64d\ ^2D_{5/2}$	$2p^67f\ ^2F^o_{5/2}$	2 596 500	4 169 000		2.0 – 2	5.6+9	D	109*
63.589^{C}	5/2	7/2	2 596 500	4 169 100		4.1 – 1	8.5+10	C	109*
63.508^{C}	3/2	5/2	2 594 400	4 169 000		2.9 – 1	7.9+10	C	109*
60.212	$2p^63d\ ^2D_{3/2}$	$2p^64p\ ^2P^o_{1/2}$	765 620	2 426 100		1.2 – 1	1.1+11	C–	23°, 109*
59.950	5/2	3/2	770 280	2 438 100		2.1 – 1	9.6+10	C–	23°, 109*
59.791^{C}	3/2	3/2	765 620	2 438 100		2.3 – 2	1.1+10	D	109*
60.089^{C}	$2p^64f\ ^2F^o_{7/2}$	$2p^68d\ ^2D_{5/2}$	2 667 100	4 331 300		4.1 – 3	1.2+9	E	109*
60.065^{C}	5/2	3/2	2 666 230	4 331 100		2.8 – 3	1.3+9	E	109*
60.058^{C}	5/2	5/2	2 666 230	4 331 300		2.0 – 4	6.2+7	E	109*
58.238^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^67d\ ^2D_{3/2}$	2 438 100	4 155 200		1.8 – 2	9.0+9	D	109*
58.187^{C}	3/2	5/2	2 438 100	4 156 700		1.7 – 1	5.5+10	C	109*
57.834^{C}	1/2	3/2	2 426 100	4 155 200		9.4 – 2	4.7+10	C	109*
57.376^{C}	$2p^64d\ ^2D_{5/2}$	$2p^68f\ ^2F^o_{7/2}$	2 596 500	4 339 400		2.2 – 1	5.6+10	C	109*
57.369^{C}	5/2	5/2	2 596 500	4 339 600		1.1 – 2	3.8+9	D	109*
57.300^{C}	3/2	5/2	2 594 400	4 339 600		1.5 – 1	5.2+10	C	109*
52.826^{C}	$2p^64p\ ^2P^o_{3/2}$	$2p^68d\ ^2D_{3/2}$	2 438 100	4 331 100		1.0 – 2	6.2+9	D	109*
52.821^{C}	3/2	5/2	2 438 100	4 331 300		9.32 – 2	3.71+10	C	109*
52.493^{C}	1/2	3/2	2 426 100	4 331 100		5.2 – 2	3.2+10	C	109*
52.744^{C}	$2p^63d\ ^2D_{5/2}$	$2p^64f\ ^2F^o_{5/2}$	770 280	2 666 230		2.66 – 1	1.06+11	C	109*
52.721^{S}	5/2	7/2	770 280	2 667 100		5.3	1.6+12	C	$36^{\triangle}$, 46, 48°, 109*
52.614^{S}	3/2	5/2	765 620	2 666 230		3.7	1.5+12	C	$36^{\triangle}$, 46, 48°, 109*
51.042	$2p^63p\ ^2P^o_{3/2}$	$2p^64s\ ^2S_{1/2}$	342 485	2 301 800					35, 36°, 46
50.253	1/2	1/2	311 956	2 301 800					35, 36°, 46
44.405	$2p^63p\ ^2P^o_{3/2}$	$2p^64d\ ^2D_{3/2}$	342 485	2 594 400		1.35 – 1	1.14+11	C	36°, 109*
44.365	3/2	5/2	342 485	2 596 500		1.20	6.80+11	C	36°, 46, 109*
43.814	1/2	3/2	311 956	2 594 400		6.4 – 1	5.5+11	C	36°, 46, 109*
41.218	$2p^63s\ ^2S_{1/2}$	$2p^64p\ ^2P^o_{1/2}$	0	2 426 100		1.63 – 1	3.20+11	C+	35, 36°, 46, 109*
41.015	1/2	3/2	0	2 438 100		3.00 – 1	2.97+11	C	35, 36°, 46, 109*

Ni XVIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
38.658[C]	$2p^63d\ ^2D_{3/2}$	$2p^65p\ ^2P^o_{1/2}$	765 620	3 352 400		1.9 – 2	4.2+10	D	109*
38.643[C]	5/2	3/2	770 280	3 358 100		3.5 – 2	3.9+10	D	109*
38.573[C]	3/2	3/2	765 620	3 358 100		3.8 – 3	4.3+9	E	109*
37.053[C]	$2p^63d\ ^2D_{5/2}$	$2p^65f\ ^2F^o_{5/2}$	770 280	3 469 100		4.9 – 2	3.9+10	D	109*
37.049	5/2	7/2	770 280	3 469 400		9.66 – 1	5.9+11	C	35, 36°, 46, 109*
36.990	3/2	5/2	765 620	3 469 100		6.80 – 1	5.5+11	C	36°, 46, 109*
32.542[C]	$2p^63d\ ^2D_{5/2}$	$2p^66p\ ^2P^o_{3/2}$	770 280	3 843 200		1.2 – 2	1.9+10	D	109*
32.533[C]	3/2	1/2	765 620	3 839 400		6.8 – 3	2.1+10	D	109*
32.493[C]	3/2	3/2	765 620	3 843 200		1.4 – 3	2.2+9	E	109*
32.350[C]	$2p^63p\ ^2P^o_{3/2}$	$2p^65d\ ^2D_{3/2}$	342 485	3 433 700		4.0 – 2	6.6+10	D	109*
32.340	3/2	5/2	342 485	3 434 600		3.8 – 1	4.0+11	C	35, 36°, 46, 109*
32.034	1/2	3/2	311 956	3 433 700		2.0 – 1	3.4+11	C	35, 36°, 46, 109*
31.893[C]	$2p^63d\ ^2D_{5/2}$	$2p^66f\ ^2F^o_{5/2}$	770 280	3 905 800		1.8 – 2	2.0+10	D	109*
31.890	5/2	7/2	770 280	3 906 100		3.6 – 1	3.0+11	C	35, 36°, 46, 109*
31.845	3/2	5/2	765 620	3 905 800		2.5 – 1	2.7+11	C	36°, 109*
29.829	$2p^63s\ ^2S_{1/2}$	$2p^65p\ ^2P^o_{1/2}$	0	3 352 400		5.0 – 2	1.9+11	D	36°, 109*
29.779	1/2	3/2	0	3 358 100		1.0 – 1	1.9+11	C	35, 36°, 109*
29.423[C]	$2p^63d\ ^2D_{5/2}$	$2p^67f\ ^2F^o_{5/2}$	770 280	4 169 000		9.0 – 3	1.1+10	D	109*
29.422	5/2	7/2	770 280	4 169 100		1.76 – 1	1.69+11	C	35, 36°, 109*
29.383	3/2	5/2	765 620	4 169 000		1.23 – 1	1.58+11	C	36°, 109*
28.223[C]	$2p^63p\ ^2P^o_{3/2}$	$2p^66d\ ^2D_{3/2}$	342 485	3 885 700		1.8 – 2	3.8+10	D	109*
28.220	3/2	5/2	342 485	3 886 100		1.67 – 1	2.33+11	C	35, 36°, 109*
27.982	1/2	3/2	311 956	3 885 700		9.4 – 2	2.0+11	C	35, 36°, 109*
28.018	$2p^63d\ ^2D_{5/2}$	$2p^68f\ ^2F^o_{7/2}$	770 280	4 339 400		1.0 – 1	1.1+11	C	36°, 109*
28.017[C]	5/2	5/2	770 280	4 339 600		5.1 – 3	7.2+9	E	109*
27.98	3/2	5/2	765 620	4 339 600		7.2 – 2	1.0+11	C	36°, 109*
26.228[C]	$2p^63p\ ^2P^o_{3/2}$	$2p^67d\ ^2D_{3/2}$	342 485	4 155 200		1.0 – 2	2.4+10	D	109*
26.218	3/2	5/2	342 485	4 156 700		9.2 – 2	1.5+11	C	35, 36°, 109*
26.02	1/2	3/2	311 956	4 155 200		5.10 – 2	1.26+11	C	35, 36°, 109*
26.046	$2p^63s\ ^2S_{1/2}$	$2p^66p\ ^2P^o_{1/2}$	0	3 839 400		2.2 – 2	1.1+11	C	36°, 109*
26.020	1/2	3/2	0	3 843 200		4.4 – 2	1.1+11	C	36°, 109*
25.071[C]	$2p^63p\ ^2P^o_{3/2}$	$2p^68d\ ^2D_{3/2}$	342 485	4 331 100		6.0 – 3	1.6+10	D	109*
25.070	3/2	5/2	342 485	4 331 300		5.6 – 2	9.9+10	C	36°, 109*
24.881	1/2	3/2	311 956	4 331 100		3.2 – 2	8.6+10	C	36°, 109*
14.37	$2p^63s\ ^2S_{1/2}$	$2p^53s^2\ ^2P^o_{3/2}$	0	6 959 000					51
14.10	1/2	1/2	0	7 092 000					51

Ni XIX

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
388.24	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})3p\ (\frac{3}{2},\frac{3}{2})_0$	7 258 100	7 515 675					61
361.32	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_2$	$2s^22p^5(^2P^o_{3/2})3p\ (\frac{3}{2},\frac{1}{2})_1$	7 105 260	7 381 990					61
348.05	1	2	7 122 600	7 409 915					61
328.24	2	2	7 105 260	7 409 915					61
346.43	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{1/2})3p\ (\frac{1}{2},\frac{1}{2})_1$	7 258 100	7 546 760					61
334.3	0	1	7 247 700	7 546 760	bl				61
315.01	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{3/2})3p\ (\frac{3}{2},\frac{3}{2})_1$	7 122 600	7 440 050					61
306.30	2	3	7 105 260	7 431 735		8.0 − 1	8.0+9	D	60, 61°, 109*
297.90	1	2	7 122 600	7 458 260					61
283.30	2	2	7 105 260	7 458 260					61
254.10	1	0	7 122 600	7 515 675					61
307.90	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{1/2})3p\ (\frac{1}{2},\frac{3}{2})_1$	7 258 100	7 582 880					61
303.80	1	2	7 258 100	7 587 265					60, 61°
298.42	0	1	7 247 700	7 582 880	bl				61
272.10	$2s^22p^5(^2P^o_{3/2})3p\ (\frac{3}{2},\frac{3}{2})_2$	$2s^22p^5(^2P^o_{3/2})3d\ (\frac{3}{2},\frac{5}{2})^o_2$	7 458 260	7 825 770					61
254.10	3	4	7 431 735	7 825 280		1.1	1.2+10	D	60, 61°, 109*
250.39	2	3	7 458 260	7 857 640	bl				61
234.90	3	3	7 431 735	7 857 640	bl				61
251.30	$2s^22p^5(^2P^o_{1/2})3p\ (\frac{1}{2},\frac{3}{2})_1$	$2s^22p^5(^2P^o_{1/2})3d\ (\frac{1}{2},\frac{5}{2})^o_2$	7 582 880	7 980 810					61
250.39	2	3	7 587 265	7 986 640					61
245.65	$2s^22p^5(^2P^o_{3/2})3p\ (\frac{3}{2},\frac{3}{2})_1$	$2s^22p^5(^2P^o_{3/2})3d\ (\frac{3}{2},\frac{3}{2})^o_2$	7 440 050	7 847 100					61
240.40	$2s^22p^5(^2P^o_{3/2})3p\ (\frac{3}{2},\frac{1}{2})_1$	$2s^22p^5(^2P^o_{3/2})3d\ (\frac{3}{2},\frac{3}{2})^o_0$	7 381 990	7 797 965					61
237.52	2	3	7 409 915	7 830 930					60, 61°
234.90	1	1	7 381 990	7 807 700	bl				61
228.76	2	2	7 409 915	7 847 100					61
234.90	$2s^22p^5(^2P^o_{1/2})3p\ (\frac{1}{2},\frac{1}{2})_1$	$2s^22p^5(^2P^o_{1/2})3d\ (\frac{1}{2},\frac{3}{2})^o_2$	7 546 760	7 972 475					61
225.34	$2s^22p^5(^2P^o_{3/2})3p\ (\frac{3}{2},\frac{1}{2})_1$	$2s^22p^5(^2P^o_{3/2})3d\ (\frac{3}{2},\frac{5}{2})^o_2$	7 381 990	7 825 770					61
176.01	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s^22p^5(^2P^o_{1/2})3p\ (\frac{1}{2},\frac{1}{2})_0$	7 122 600	7 690 800					61
91.02	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s2p^63s\ ^3S_1$	7 258 100	8 358 000		1.1 − 1	2.9+10	D	62°, 109*
86.36	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2s2p^63s\ ^1S_0$	7 258 100	8 416 000		4.8 − 2	4.4+10	D	62°, 109*
80.91	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s2p^63s\ ^3S_1$	7 122 600	8 358 000					62
77.32	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2s2p^63s\ ^1S_0$	7 122 600	8 416 000		7.5 − 2	8.3+10	D	62°, 109*
41.385	$2s^22p^5(^2P^o_{1/2})3p\ (\frac{1}{2},\frac{3}{2})_2$	$2s^22p^54d\ ^3F^o_3$	7 587 265	10 003 600					59
41.132	$2s^22p^5(^2P^o_{3/2})3p\ (\frac{3}{2},\frac{3}{2})_3$	$2s^22p^54d\ ^3F^o_4$	7 431 735	9 863 000		2.2	9.4+11	D	59°, 109*
40.731	$2s^22p^5(^2P^o_{3/2})3p\ (\frac{3}{2},\frac{1}{2})_2$	$2s^22p^54d\ ^3D^o_3$	7 409 915	9 865 100					59
40.650	$2s^22p^5(^2P^o_{1/2})3p\ (\frac{1}{2},\frac{1}{2})_1$	$2s^22p^54d\ ^1D^o_2$	7 546 760	10 006 800					59
14.077	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_2$	0	7 105 260		M2	4.2+5		58°, 109*
14.043	0	1	0	7 122 600		1.16 − 1	1.31+12	C−	54, 55, 56, 57°, 58, 109*
13.779	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	7 258 100		1.05 − 1	1.23+12	C−	54, 55, 56, 57°, 58, 109*
12.812	$2s^22p^6\ ^1S_0$	$2s^22p^53d\ ^3P^o_1$	0	7 805 200		8.1 − 3	1.1+11	E	54, 55, 56, 57°, 109*
12.656	$2s^22p^6\ ^1S_0$	$2s^22p^53d\ ^3D^o_1$	0	7 901 400		7.2 − 1	1.0+13	D	54, 55, 56, 57°, 58, 109*
12.435	$2s^22p^6\ ^1S_0$	$2s^22p^53d\ ^1P^o_1$	0	8 041 800		2.55	3.66+13	C−	54, 55, 56, 57°, 58, 109*
11.599	$2s^22p^6\ ^1S_0$	$2s2p^63p\ ^3P^o_1$	0	8 621 400		3.8 − 2	6.3+11	E	54, 55, 56, 57°, 109*

Ni XIX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
11.539	$2s^22p^6\ ^1S_0$	$2s2p^63p\ ^1P^o_1$	0	8 666 300		2.9 – 1	4.8+12	D	54, 55, 56, 57°, 109*
10.433	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})4s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	9 585 000		2.5 – 2	5.1+11	D	55, 56, 57°, 109*
10.283	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})4s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	9 725 000		2.2 – 2	4.7+11	D	55, 56, 57°, 109*
10.157	$2s^22p^6\ ^1S_0$	$2s^22p^54d\ ^3P^o_1$	0	9 845 000		3.2 – 3	7.0+10	E	57°, 109*
10.110	$2s^22p^6\ ^1S_0$	$2s^22p^54d\ ^3D^o_1$	0	9 891 000		4.3 – 1	9.4+12	D	56, 57°, 104, 109*
9.977	$2s^22p^6\ ^1S_0$	$2s^22p^54d\ ^1P^o_1$	0	10 023 000		4.9 – 1	1.1+13	D	56, 57°, 104, 109*
9.262	$2s^22p^6\ ^1S_0$	$2s^22p^55d\ ^3P^o_1$	0	10 797 000					57
9.254	$2s^22p^6\ ^1S_0$	$2s^22p^55d\ ^3D^o_1$	0	10 806 000		1.2 – 1	3.1+12	D	55, 56, 57°, 109*
9.153	$2s^22p^6\ ^1S_0$	$2s2p^64p\ ^3P^o_1$	0	10 925 000		2.0 – 2	5.2+11	E	57°, 109*
9.140	$2s^22p^6\ ^1S_0$	$2s2p^64p\ ^1P^o_1$	0	10 941 000		1.2 – 1	3.1+12	D	55, 57°, 109*
9.139	$2s^22p^6\ ^1S_0$	$2s^22p^55d\ ^1P^o_1$	0	10 942 000					56, 57°
8.849	$2s^22p^6\ ^1S_0$	$2s^22p^56d\ ^3D^o_1$	0	11 301 000					55, 56, 57°
8.744	$2s^22p^6\ ^1S_0$	$2s^22p^56d\ ^1P^o_1$	0	11 436 000					55, 56, 57°
8.614	$2s^22p^6\ ^1S_0$	$2s^22p^57d\ ^3D^o_1$	0	11 609 000					56
8.512	$2s^22p^6\ ^1S_0$	$2s^22p^57d\ ^1P^o_1$	0	11 748 000					56
8.487	$2s^22p^6\ ^1S_0$	$2s^22p^58d\ ^3D^o_1$	0	11 783 000					56

Ni XX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
694.64	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^5\ ^2P^o_{1/2}$	0	143 959		M1	5.35+4	B	43°, 69, 70, 71, 109*
365.63	$2s^22p^4(^1D)3s\ ^2D_{3/2}$	$2s^22p^4(^1D)3p\ ^2F^o_{5/2}$	7 742 200	8 015 700					33
325.97	$5/2$	$7/2$	7 735 700	8 042 500					33
353.82	$2s^22p^4(^3P)3s\ ^4P_{3/2}$	$2s^22p^4(^3P)3p\ ^4P^o_{1/2}$	7 648 200	7 930 800					33
346.50	$2s^22p^4(^3P)3s\ ^4P_{3/2}$	$2s^22p^4(^3P)3p\ ^4D^o_{5/2}$	7 648 200	7 936 800	bl				33
312.66	$5/2$	$7/2$	7 513 700	7 833 500					33
259.47	$5/2$	$3/2$	7 513 700	7 899 100					33
322.67	$2s^22p^4(^3P)3s\ ^2P_{3/2}$	$2s^22p^4(^3P)3p\ ^2D^o_{5/2}$	7 543 800	7 853 700					33
297.23	$2s^22p^4(^1D)3s\ ^2D_{5/2}$	$2s^22p^4(^1D)3p\ ^2D^o_{5/2}$	7 735 700	8 072 100					33
277.38	$2s^22p^4(^3P)3p\ ^2D^o_{5/2}$	$2s^22p^4(^3P)3d\ ^2F_{7/2}$	7 853 700	8 214 200					33
275.55	$2s^22p^4(^3P)3p\ ^4D^o_{7/2}$	$2s^22p^4(^3P)3d\ ^4F_{9/2}$	7 833 500	8 196 400					33
271.11	$3/2$	$5/2$	7 899 100	8 268 000					33
266.19	$5/2$	$7/2$	7 936 800	8 312 500	bl				33
273.10	$2s^22p^4(^1D)3p\ ^2D^o_{5/2}$	$2s^22p^4(^1D)3d\ ^2F_{7/2}$	8 072 100	8 438 300					33
265.36^L	$2s^22p^4(^3P)3p\ ^4P^o_{5/2}$	$2s^22p^4(^3P)3d\ ^4D_{7/2}$							33
260.52	$2s^22p^4(^1D)3p\ ^2F^o_{5/2}$	$2s^22p^4(^1D)3d\ ^2G_{7/2}$	8 015 700	8 399 500					33
94.492	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^6\ ^2S_{1/2}$	143 959	1 202 200		9.86 − 2	3.68+10	C+	12°, 50△, 67, 68, 109*
83.185	$3/2$	$1/2$	0	1 202 200		2.28 − 1	1.1+11	C+	12°, 50△, 67, 68, 109*
13.309	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3s\ ^4P_{5/2}$	0	7 513 700		2.7 − 2	1.7+11	E	55, 57°, 63, 109*
13.135	$3/2$	$1/2$	0	7 613 200		3.1 − 2	6.0+11	E	57°, 109*
13.075	$3/2$	$3/2$	0	7 648 200					55, 57°, 63, 64, 65, 66
13.282	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3s\ ^2P_{1/2}$	143 959	7 673 200		1.1 − 1	2.0+12	D	57°, 64, 65, 66, 109*
13.256	$3/2$	$3/2$	0	7 543 800					55, 57°, 63, 64, 65, 66
13.032	$3/2$	$1/2$	0	7 673 200		9.2 − 2	1.8+12	D	57°, 64, 65, 66, 109*
13.161	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3s\ ^2D_{3/2}$	143 959	7 742 200		2.0 − 1	1.9+12	D	57°, 64, 65, 66, 109*
12.927	$3/2$	$5/2$	0	7 735 700		2.4 − 1	1.6+12	D	55, 57°, 63, 64, 65, 66, 109*
12.916^C	$3/2$	$3/2$	0	7 742 200		1.0 − 2	1.0+11	E	109*
12.812	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1S)3s\ ^2S_{1/2}$	143 959	7 949 000		8.4 − 2	1.7+12	D	57°, 109*
12.580^C	$3/2$	$1/2$	0	7 949 000		1.3 − 2	2.8+11	E	109*
12.181	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3d\ ^2P_{3/2}$	143 959	8 353 000					57°, 63, 64, 65, 66
11.972^C	$3/2$	$3/2$	0	8 353 000					55,63
12.157	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^4P_{1/2}$	0	8 226 000					57°, 64, 65, 66
12.130	$3/2$	$3/2$	0	8 244 000					57°, 64, 65, 66
12.112	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^2F_{5/2}$	0	8 256 000					57°, 66
12.079	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2S_{1/2}$	143 959	8 423 000		1.5 − 1	3.4+12	D	57°, 63, 64, 65, 66, 109*
11.874	$3/2$	$1/2$	0	8 423 000		9.6 − 1	2.3+13	D	57°, 64, 65, 66, 109*
12.042	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^4D_{1/2}$	0	8 304 000					57
12.006	$3/2$	$3/2$	0	8 329 000					55, 57°, 63
12.042	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2P_{3/2}$	143 959	8 445 000					57°, 64, 65, 66
11.974	$1/2$	$1/2$	143 959	8 495 000					57°, 64, 65, 66
11.846	$3/2$	$3/2$	0	8 445 000					55, 57°, 63, 64, 65, 66
11.991	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2D_{3/2}$	143 959	8 484 000					57°, 64, 65, 66
11.832	$3/2$	$5/2$	0	8 452 000					55, 57°, 63, 64, 65, 66
11.787	$3/2$	$3/2$	0	8 484 000					57°, 64, 65, 66
11.961	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^2D_{5/2}$	0	8 360 000					55, 57°, 63, 64, 65, 66
11.779	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1S)3d\ ^2D_{3/2}$	143 959	8 634 000					55, 57°, 63, 64, 65, 66

Ni XX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
11.282	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^3P^o)3p\ ^4P_{3/2}$	143 959	9 008 000					57
11.226	$2s^22p^5\ ^2P^o_{3/2}$	$2s2p^5(^3P^o)3p\ ^2D_{5/2}$	0	8 908 000					57
11.226	$_{1/2}$	$_{3/2}$	143 959	9 052 000					57
11.226	$2s^22p^5\ ^2P^o_{3/2}$	$2s2p^5(^3P^o)3p\ ^4D_{3/2}$	0	8 908 000					57
11.176	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^3P^o)3p\ ^2S_{1/2}$	143 959	9 092 000					57
11.158	$2s^22p^5\ ^2P^o_{3/2}$	$2s2p^5(^3P^o)3p\ ^2P_{3/2}$	0	8 962 000					57
11.138	$_{3/2}$	$_{1/2}$	0	8 978 000					57
10.982	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^1P^o)3p\ ^2D_{3/2}$	143 959	9 250 000					57
10.772	$_{3/2}$	$_{5/2}$	0	9 283 000					57
10.936	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^1P^o)3p\ ^2P_{1/2}$	143 959	9 288 000					57
10.918	$_{1/2}$	$_{3/2}$	143 959	9 303 000					57
9.821	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)4s\ ^2P_{3/2}$	0	10 182 000					57
9.693	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)4s\ ^4P_{3/2}$	0	10 317 000					57
9.581	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)4d\ ^2P_{3/2}$	143 959	10 581 000					57
9.558	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)4d\ ^2D_{3/2,5/2}$	0	10 462 000					57
9.497	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)4d\ ^2P_{1/2}$	143 959	10 674 000					57
9.385	$_{3/2}$	$_{3/2}$	0	10 655 000					57
9.497	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)4d\ ^2D_{3/2}$	143 959	10 674 000					57
9.385	$_{3/2}$	$_{5/2}$	0	10 655 000					57
9.497	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)4d\ ^4F_{3/2,5/2}$	0	10 530 000					57
9.455	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)4d\ ^4P_{5/2}$	0	10 576 000					57
9.385	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^1D)4d\ ^2S_{1/2}$	0	10 655 000					57
9.366	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^1D)4d\ ^2F_{5/2}$	0	10 677 000					57
9.338	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1S)4d\ ^2D_{3/2}$	143 959	10 853 000					57

Ni XXI

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
2818.52	$2s^22p^4\ ^3P_0$	$2s^22p^4\ ^3P_1$	92 821	128 290		M1	5.6+2	D	70, 76°, 109*
779.5	2	1	0	128 290		M1	4.14+4	C	70°, 71, 109*
1191.1	$2s^22p^4\ ^3P_1$	$2s^22p^4\ ^1D_2$	128 290	212 250		M1	1.0+3	D	71°, 109*
471.15	2	2	0	212 250		M1	4.2+4	D	70, 75°, 109*
139.07^{C}	$2s^22p^4\ ^1S_0$	$2s2p^5\ ^3P^o_1$	406 800	1 125 850		9.3 − 3	1.1+9	E	105*
120.33	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^3P^o_2$	212 250	1 043 150		3.5 − 2	3.2+9	E	50°, 109*
109.44	2	1	212 250	1 125 850		5.5 − 4	1.0+8	E	50°, 109*
109.303	$2s^22p^4\ ^3P_1$	$2s2p^5\ ^3P^o_2$	128 290	1 043 150		1.03 − 1	1.15+10	C	12°, 50, 67, 68, 109*
100.241	1	1	128 290	1 125 850		6.45 − 2	1.43+10	C	12°, 50, 67, 68, 109*
96.803	0	1	92 821	1 125 850		7.9 − 2	1.9+10	C	12°, 50, 67, 68, 109*
95.866	2	2	0	1 043 150		3.2 − 1	4.6+10	C	12°, 50, 67, 68, 109*
93.926	1	0	128 290	1 192 960		9.75 − 2	7.4+10	C	12°, 50, 67, 68, 109*
88.826	2	1	0	1 125 850		1.49 − 1	4.19+10	C	12°, 50, 67, 68, 109*
103.40	$2s2p^5\ ^1P^o_1$	$2p^6\ ^1S_0$	1 436 400	2 403 500	bl	2.9 − 1	1.8+11	C	50°, 74, 109*, 110
97.13	$2s^22p^4\ ^1S_0$	$2s2p^5\ ^1P^o_1$	406 800	1 436 400	bl	5.0 − 2	1.2+10	C	49, 50°, 67, 109*
81.69	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^1P^o_1$	212 250	1 436 400		5.10 − 1	1.7+11	C	50°, 67, 68, 109*
78.28	$2s2p^5\ ^3P^o_1$	$2p^6\ ^1S_0$	1 125 850	2 403 500	bl	2.1 − 2	2.3+10	E	50°, 109*
76.45	$2s^22p^4\ ^3P_1$	$2s2p^5\ ^1P^o_1$	128 290	1 436 400		4.8 − 3	1.8+9	E	50°, 109*
74.43	0	1	92 821	1 436 400	bl	5.7 − 3	2.3+9	E	50°, 109*
69.62	2	1	0	1 436 400		3.8 − 2	1.7+10	E	49, 50°, 108, 109*
12.656	$2s^22p^4\ ^3P_1$	$2s^22p^3(^4S^o)3s\ ^3S^o_1$	128 290	8 035 000		4.8 − 2	6.7+11	D	55, 57°, 109*
12.592	0	1	92 821	8 035 000		5.3 − 2	7.4+11	D	55, 57°, 109*
12.435	2	1	0	8 035 000		2.3 − 1	3.3+12	D	55, 57°, 109*
12.592	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3s\ ^3D^o_2$	212 250	8 146 000					57
12.533^{C}	2	3	212 250	8 191 000		3.0 − 2	1.8+11	E	109*
12.502	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3s\ ^1D^o_2$	212 250	8 212 000		3.3 − 1	2.8+12	D−	57°, 109*
12.502	$2s^22p^4\ ^1S_0$	$2s^22p^3(^2P^o)3s\ ^1P^o_1$	406 800	8 422 000					57
12.472	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2D^o)3s\ ^3D^o_{1,2}$	128 290	8 146 000		1.3 − 1	1.8+12	D−	57°, 109*
12.277	2	1,2	0	8 146 000					57
12.208	2	3	0	8 191 000		2.21 − 1	1.41+12	C	57°, 109*
12.370	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2D^o)3s\ ^1D^o_2$	128 290	8 212 000		4.2 − 2	3.7+11	E	57°, 109*
12.177^{C}	2	2	0	8 212 000		2.3 − 2	2.1+11	E	109*
12.345	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3s\ ^3P^o_1$	212 250	8 313 000		5.5 − 2	8.0+11	E	57°, 109*
12.209	2	2	212 250	8 405 000		1.0 − 1	8.9+11	E	57°, 109*
12.245	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2P^o)3s\ ^3P^o_0$	128 290	8 295 000		3.3 − 2	1.5+12	C	57°, 109*
12.165^{C}	0	1	92 821	8 313 000		6.7 − 2	1.0+12	D−	109*
12.079	1	2	128 290	8 405 000		9.9 − 2	9.1+11	E	57°, 109*
12.181	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3s\ ^1P^o_1$	212 250	8 422 000					57
11.597^{C}	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3d\ ^3D^o_3$	212 250	8 835 000		9.0 − 2	6.4+11	E	109*
11.539	$2s^22p^4\ ^3P_2$	$2s^22p^3(^4S^o)3d\ ^3D^o_3$	0	8 666 000		1.7	1.2+13	D−	57°, 109*
11.517	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2D^o)3d\ ^3P^o_2$	128 290	8 848 000					57
11.302	2	2	0	8 848 000					57
11.517	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3d\ ^3F^o_3$	212 250	8 895 000					57
11.517	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2D^o)3d\ ^1F^o_3$	212 250	8 896 000		2.0	1.4+13	D−	57°, 109*
11.517	$2s^22p^4\ ^1S_0$	$2s^22p^3(^2P^o)3d\ ^1P^o_1$	406 800	9 090 000		2.4	4.0+13	E	57°, 109*
11.478	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3d\ ^3P^o_2$	212 250	8 924 000					57
11.318	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3d\ ^1D^o_2$	212 250	9 048 000					57
11.318	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3d\ ^1F^o_3$	212 250	9 048 000					57

Ni XXI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
11.318	$2s^22p^4\ ^3P_2$	$2s^22p^3(^2D^o)3d\ ^3D^o_3$	0	8 835 000		3.8	2.8+13	D−	57°, 109*
11.272	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2P^o)3d\ ^3P^o_1$	128 290	9 000 000					57
11.264[C]	$2s^22p^4\ ^1D_2$	$2s^22p^3(^2P^o)3d\ ^1P^o_1$	212 250	9 090 000		9.5 − 2	1.7+12	D	109*
11.239	$2s^22p^4\ ^3P_2$	$2s^22p^3(^2D^o)3d\ ^1F^o_3$	0	8 896 000		7.5 − 1	5.7+12	E	57°, 109*
11.229	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2P^o)3d\ ^3D^o_2$	128 290	9 034 000					57
11.159[C]	$2s^22p^4\ ^3P_1$	$2s^22p^3(^2P^o)3d\ ^1P^o_1$	128 290	9 090 000		9.3 − 2	1.7+12	E	109*

Ni XXII

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1928.88	$2s^22p^3\ ^2D^o_{3/2}$	$2s^22p^3\ ^2D^o_{5/2}$	157 536	209 380		M1	1.04+3	C	76°, 109*
634.8	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^3\ ^2D^o_{3/2}$	0	157 536		M1	4.2+4	D	70°, 109*
477.6	3/2	5/2	0	209 380		M1	4.5+3	D	70°, 109*
223.294^{C}	$2s^22p^3\ ^2P^o_{3/2}$	$2s(^2S)2p^4(^3P)\ ^4P_{5/2}$	400 100	847 940		1.3 − 3	2.9+7	E	109*
184.255^{C}	3/2	3/2	400 100	942 827		5.6 − 3	2.8+8	E	109*
150.328^{C}	1/2	1/2	302 600	967 811		3.6 − 3	5.3+8	E	109*
156.602^{C}	$2s^22p^3\ ^2D^o_{5/2}$	$2s(^2S)2p^4(^3P)\ ^4P_{5/2}$	209 380	847 940		9.6 − 3	4.4+8	E	109*
144.843^{C}	3/2	5/2	157 536	847 940		2.5 − 2	1.3+9	E	109*
136.343^{C}	5/2	3/2	209 380	942 827		1.3 − 3	1.1+8	E	109*
127.341^{C}	3/2	3/2	157 536	942 827		2.8 − 3	2.9+8	E	109*
123.415^{C}	3/2	1/2	157 536	967 811		3.4 − 3	7.4+8	E	109*
153.0^{C}	$2s(^2S)2p^4(^3P)\ ^2P_{1/2}$	$2p^5\ ^2P^o_{3/2}$	1 536 500	2 190 300		2.12 − 2	1.51+9	C	109*
126.32	3/2	3/2	1 398 800	2 190 300		3.2 − 1	3.3+10	C	50°, 109*
124.31	1/2	1/2	1 536 500	2 340 900		1.7 − 1	3.7+10	C	50°, 109*
106.16	3/2	1/2	1 398 800	2 340 900		1.74 − 1	5.1+10	C	50°, 109*
128.879^{C}	$2s^22p^3\ ^2P^o_{3/2}$	$2s(^2S)2p^4(^1D)\ ^2D_{3/2}$	400 100	1 176 022		6.4 − 3	6.4+8	D	109*
124.48	3/2	5/2	400 100	1 203 298		9.32 − 2	6.7+9	C	50°, 109*
114.45	1/2	3/2	302 600	1 176 022	bl	2.38 − 2	3.03+9	C	50°, 109*
118.21	$2s(^2S)2p^4(^1S)\ ^2S_{1/2}$	$2p^5\ ^2P^o_{3/2}$	1 344 300	2 190 300		9.26 − 2	1.11+10	C	50°, 109*
100.3^{C}	1/2	1/2	1 344 300	2 340 900		1.5 − 2	4.9+9	D	109*
117.933	$2s^22p^3\ ^4S^o_{3/2}$	$2s(^2S)2p^4(^3P)\ ^4P_{5/2}$	0	847 940	bl	1.83 − 1	1.46+10	C	12°, 50△, 67, 68, 109*
106.064	3/2	3/2	0	942 827	bl	1.59 − 1	2.36+10	C	12°, 50△, 67, 68, 109*
103.326	3/2	1/2	0	967 811	bl	8.52 − 2	2.66+10	C	12°, 50△, 68, 109*
105.88	$2s^22p^3\ ^2P^o_{3/2}$	$2s(^2S)2p^4(^1S)\ ^2S_{1/2}$	400 100	1 344 300		4.8 − 3	1.4+9	D	50°, 109*
95.995	1/2	1/2	302 600	1 344 300	bl	1.2 − 1	4.4+10	C	12°, 50△, 109*
103.451^{C}	$2s^22p^3\ ^2D^o_{5/2}$	$2s(^2S)2p^4(^1D)\ ^2D_{3/2}$	209 380	1 176 022		3.1 − 4	4.8+7	E	109*
100.612	5/2	5/2	209 380	1 203 298		3.5 − 1	3.9+10	C	12°, 50△, 67, 68, 109*
98.185	3/2	3/2	157 536	1 176 022		3.0 − 1	5.2+10	C	12°, 50△, 67, 68, 109*
95.624^{C}	3/2	5/2	157 536	1 203 298		9.6 − 4	1.2+8	E	109*
101.31	$2s(^2S)2p^4(^1D)\ ^2D_{5/2}$	$2p^5\ ^2P^o_{3/2}$	1 203 298	2 190 300		2.97 − 1	4.83+10	C	50°, 109*
98.58	3/2	3/2	1 176 022	2 190 300		1.43 − 1	2.45+10	C	50°, 109*
85.86	3/2	1/2	1 176 022	2 340 900		1.08 − 1	4.9+10	C	50°, 109*
100.12	$2s^22p^3\ ^2P^o_{3/2}$	$2s(^2S)2p^4(^3P)\ ^2P_{3/2}$	400 100	1 398 800	bl	6.12 − 2	1.02+10	C	50°, 109*
91.20	1/2	3/2	302 600	1 398 800		5.94 − 2	1.19+10	C	50°, 109*
88.00	3/2	1/2	400 100	1 536 500	bl	2.7 − 1	1.2+11	C	50°, 67, 109*
81.04	1/2	1/2	302 600	1 536 500		7.8 − 3	4.0+9	D	50°, 109*
85.02	$2s^22p^3\ ^4S^o_{3/2}$	$2s(^2S)2p^4(^1D)\ ^2D_{3/2}$	0	1 176 022		2.0 − 2	4.7+9	E	50°, 109*
84.24	$2s^22p^3\ ^2D^o_{3/2}$	$2s(^2S)2p^4(^1S)\ ^2S_{1/2}$	157 536	1 344 300		1.2 − 1	5.6+10	D	50°, 109*
84.06	$2s^22p^3\ ^2D^o_{5/2}$	$2s(^2S)2p^4(^3P)\ ^2P_{3/2}$	209 380	1 398 800		5.0 − 1	1.2+11	C	50°, 67, 68, 109*
80.55	3/2	3/2	157 536	1 398 800		4.84 − 2	1.24+10	C	50°, 67, 68, 109*
72.52	3/2	1/2	157 536	1 536 500		4.48 − 2	2.84+10	C	50°, 109*
81.8^{C}	$2s(^2S)2p^4(^3P)\ ^4P_{1/2}$	$2p^5\ ^2P^o_{3/2}$	967 811	2 190 300		4.6 − 3	1.1+9	E	109*
80.16	3/2	3/2	942 827	2 190 300		1.3 − 2	3.4+9	E	50°, 109*
74.49	5/2	3/2	847 940	2 190 300	bl	1.7 − 2	5.2+9	E	50°, 109*
72.8^{C}	1/2	1/2	967 811	2 340 900		2.4 − 3	1.5+9	E	109*
71.54	3/2	1/2	942 827	2 340 900		9.2 − 4	6.0+8	E	50°, 109*
74.37	$2s^22p^3\ ^4S^o_{3/2}$	$2s(^2S)2p^4(^1S)\ ^2S_{1/2}$	0	1 344 300		6.4 − 3	3.9+9	E	50°, 109*
71.48	$2s^22p^3\ ^4S^o_{3/2}$	$2s(^2S)2p^4(^3P)\ ^2P_{3/2}$	0	1 398 800		2.3 − 2	7.6+9	E	50°, 109*

Ni XXIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1917.47	$2s^22p^2\ ^3P_1$	$2s^22p^2\ ^3P_2$	109 770	161 922		M1	1.32+3	C	70, 76°, 109*
911.0	0	1	0	109 770		M1	2.07+4	C	69, 70°, 71, 109*
614.8	$2s^22p^2\ ^3P_2$	$2s^22p^2\ ^1D_2$	161 922	324 640		M1	3.7+4	C	70°, 109*
465.4	1	2	109 770	324 640		M1	4.1+4	D	70°, 109*
246.91^C	$2s(^2S)2p^3(^2P°)\ ^1P°_1$	$2p^4\ ^3P_2$	1 459 700	1 864 700		5.4 − 3	1.2+8	E	109*
185.29^C	1	1	1 459 700	1 999 400		1.7 − 2	1.1+9	E	109*
235.3^C	$2s^22p^2\ ^3P_2$	$2s(^2S)2p^3(^4S°)\ ^5S°_2$	161 922	[586 890]		2.8 − 3	6.6+7	E	109*
209.6^C	1	2	109 770	[586 890]		2.8 − 3	8.5+7	E	109*
232.5^C	$2s^22p^2\ ^1S_0$	$2s(^2S)2p^3(^2D°)\ ^3D°_1$	463 900	894 100		1.6 − 3	6.6+7	E	109*
178.6^C	$2s(^2S)2p^3(^2D°)\ ^1D°_2$	$2p^4\ ^3P_2$	1 304 640	1 864 700		2.4 − 2	9.8+8	E	109*
143.9^C	2	1	1 304 640	1 999 400		7.5 − 3	8.1+8	E	109*
175.6^C	$2s^22p^2\ ^1D_2$	$2s(^2S)2p^3(^2D°)\ ^3D°_1$	324 640	894 100		3.9 − 3	2.8+8	E	109*
173.8^C	2	2	324 640	900 000		9.0 − 4	4.0+7	E	109*
162.1^C	2	3	324 640	941 400		4.3 − 2	1.6+9	E	109*
162.8^C	$2s(^2S)2p^3(^4S°)\ ^3S°_1$	$2p^4\ ^3P_2$	1 250 470	1 864 700		1.42 − 1	7.2+9	C	109*
137.55	1	0	1 250 470	1 977 400		7.17 − 2	2.53+10	C	50°, 109*
133.54	1	1	1 250 470	1 999 400		1.49 − 1	1.86+10	C	50°, 109*
162.7^C	$2s^22p^2\ ^1S_0$	$2s(^2S)2p^3(^2P°)\ ^3P°_1$	463 900	1 078 350		2.8 − 3	2.4+8	E	109*
161.1^C	$2s(^2S)2p^3(^2P°)\ ^1P°_1$	$2p^4\ ^1D_2$	1 459 700	2 080 600		1.13 − 1	5.8+9	C	109*
136.6^C	$2s^22p^2\ ^3P_2$	$2s(^2S)2p^3(^2D°)\ ^3D°_1$	161 922	894 100		1.7 − 3	2.0+8	E	109*
135.5^C	2	2	161 922	900 000		1.4 − 3	1.0+8	E	109*
128.30	2	3	161 922	941 400		1.29 − 1	7.4+9	C	50°, 68, 109*
127.46	1	1	109 770	894 100		3.6 − 3	4.9+8	D	50°, 109*
126.54	1	2	109 770	900 000		1.45 − 1	1.2+10	C	50°, 68, 109*
111.86	0	1	0	894 100	bl	9.8 − 2	1.7+10	C	50°, 68, 109*
132.677^C	$2s^22p^2\ ^1D_2$	$2s(^2S)2p^3(^2P°)\ ^3P°_1$	324 640	1 078 350		2.0 − 3	2.5+8	E	109*
128.187^C	2	2	324 640	1 104 750		2.4 − 3	1.9+8	E	109*
131.60	$2s(^2S)2p^3(^2P°)\ ^3P°_2$	$2p^4\ ^3P_2$	1 104 750	1 864 700		5.15 − 2	3.97+9	C	50°, 109*
127.21	1	2	1 078 350	1 864 700		5.34 − 2	4.40+9	C	50°, 109*
111.78	2	1	1 104 750	1 999 400	bl	1.23 − 1	2.19+10	C	50°, 109*
111.23	1	0	1 078 350	1 977 400	bl	4.20 − 2	2.26+10	C	50°, 109*
108.57^C	1	1	1 078 350	1 999 400		4.5 − 3	8.5+8	D	109*
107.00	0	1	1 064 900	1 999 400		3.29 − 2	6.4+9	C	50°, 109*
128.87	$2s(^2S)2p^3(^2D°)\ ^1D°_2$	$2p^4\ ^1D_2$	1 304 640	2 080 600	bl	5.00 − 1	4.02+10	C	50°, 109*
127.13^C	$2s^22p^2\ ^1S_0$	$2s(^2S)2p^3(^4S°)\ ^3S°_1$	463 900	1 250 470		7.5 − 3	1.0+9	E	109*
120.46^C	$2s(^2S)2p^3(^4S°)\ ^3S°_1$	$2p^4\ ^1D_2$	1 250 470	2 080 600		4.2 − 4	3.9+7	E	109*
112.55	$2s(^2S)2p^3(^2P°)\ ^1P°_1$	$2p^4\ ^1S_0$	1 459 700	2 348 200		1.9 − 1	1.0+11	C	50°, 109*
109.06	$2s^22p^2\ ^3P_2$	$2s(^2S)2p^3(^2P°)\ ^3P°_1$	161 922	1 078 350	bl	1.6 − 2	2.9+9	D	50°, 109*
106.064	2	2	161 922	1 104 750	bl	2.42 − 1	2.87+10	C	12°, 50$^{\triangle}$, 68, 109*
104.70	1	0	109 770	1 064 900	bl	4.83 − 2	2.94+10	C	50°, 109*
103.244	1	1	109 770	1 078 350	bl	1.15 − 1	2.40+10	C	12°, 50$^{\triangle}$, 109*
100.50	1	2	109 770	1 104 750	bl	8.7 − 4	1.1+8	E	50°, 109*
92.75	0	1	0	1 078 350		1.75 − 2	4.52+9	C	50°, 109*
108.27	$2s(^2S)2p^3(^2D°)\ ^3D°_3$	$2p^4\ ^3P_2$	941 400	1 864 700		2.92 − 1	3.32+10	C	50°, 109*
103.67	2	2	900 000	1 864 700	bl	1.43 − 1	1.78+10	C	50°, 109*
103.07	1	2	894 100	1 864 700		4.74 − 2	6.0+9	C	50°, 109*
92.32	1	0	894 100	1 977 400		5.61 − 2	4.39+10	C	50°, 109*
90.96	2	1	900 000	1 999 400		9.30 − 2	2.50+10	C	50°, 109*
90.49	1	1	894 100	1 999 400		6.51 − 2	1.77+10	C	50°, 109*
108.01^C	$2s^22p^2\ ^1D_2$	$2s(^2S)2p^3(^4S°)\ ^3S°_1$	324 640	1 250 470		3.7 − 3	7.0+8	E	109*
102.50	$2s(^2S)2p^3(^2P°)\ ^3P°_2$	$2p^4\ ^1D_2$	1 104 750	2 080 600		4.5 − 2	5.7+9	E	50°, 109*
99.776^C	1	2	1 078 350	2 080 600		1.7 − 2	2.3+9	E	109*
102.041	$2s^22p^2\ ^1D_2$	$2s(^2S)2p^3(^2D°)\ ^1D°_2$	324 640	1 304 640	bl	4.2 − 1	5.3+10	C	12°, 50$^{\triangle}$, 68, 77, 109*

Ni XXIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
100.42	$2s^22p^2\ ^1S_0$	$2s(^2S)2p^3(^2P^o)\ ^1P^o_1$	463 900	1 459 700	bl	9.6 − 2	2.1+10	C	50°, 109*
91.865	$2s^22p^2\ ^3P_2$	$2s(^2S)2p^3(^4S^o)\ ^3S^o_1$	161 922	1 250 470		2.9 − 1	7.5+10	C	12°, 50△, 68, 77, 109*
87.66	1	1	109 770	1 250 470	bl	9.66 − 2	2.80+10	C	50°, 68, 109*
79.99	0	1	0	1 250 470		3.08 − 2	1.07+10	C	50°, 109*
91.097^C	$2s(^2S)2p^3(^4S^o)\ ^3S^o_1$	$2p^4\ ^1S_0$	1 250 470	2 348 200		8.7 − 3	7.0+9	E	109*
88.11	$2s^22p^2\ ^1D_2$	$2s(^2S)2p^3(^2P^o)\ ^1P^o_1$	324 640	1 459 700	bl	2.9 − 1	8.3+10	C	50°, 109*
87.77	$2s(^2S)2p^3(^2D^o)\ ^3D^o_3$	$2p^4\ ^1D_2$	941 400	2 080 600	bl	5.2 − 2	9.0+9	E	50°, 109*
84.703^C	2	2	900 000	2 080 600		5.0 − 3	9.3+8	E	109*
87.50	$2s^22p^2\ ^3P_2$	$2s(^2S)2p^3(^2D^o)\ ^1D^o_2$	161 922	1 304 640	bl	7.0 − 2	1.2+10	E	50°, 109*
83.691^C	1	2	109 770	1 304 640		3.6 − 3	6.9+8	E	109*
78.749^C	$2s(^2S)2p^3(^2P^o)\ ^3P^o_1$	$2p^4\ ^1S_0$	1 078 350	2 348 200		6.9 − 3	7.4+9	E	109*
78.21	$2s(^2S)2p^3(^4S^o)\ ^5S^o_2$	$2p^4\ ^3P_2$	[586 890]	1 864 700		1.4 − 2	2.9+9	E	50°, 109*
70.796^C	2	1	[586 890]	1 999 400		8.5 − 4	3.8+8	E	109*
77.055^C	$2s^22p^2\ ^3P_2$	$2s(^2S)2p^3(^2P^o)\ ^1P^o_1$	161 922	1 459 700		1.4 − 3	5.1+8	E	109*
74.07	1	1	109 770	1 459 700	bl	1.8 − 2	7.2+9	E	50°, 109*

Ni XXIV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
609.9	$2s^22p\ ^2P^o_{1/2}$	$2s^22p\ ^2P^o_{3/2}$	0	163 960		M1	3.95+4	B	70°, 71, 109*
356.3^C	$2s2p^2\ ^2P_{3/2}$	$2p^3\ ^4S^o_{3/2}$	1 143 250	1 423 900		3.2 − 3	4.2+7	E	109*
213.6^C	1/2	3/2	955 790	1 423 900		9.0 − 3	3.3+8	E	109*
340.7^C	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^4P_{1/2}$	163 960	457 440		6.4 − 4	1.9+7	E	109*
266.1^C	3/2	3/2	163 960	539 715		5.6 − 4	1.3+7	E	109*
224.712	3/2	5/2	163 960	608 975		6.4 − 3	1.4+8	E	79°, 109*
218.608	1/2	1/2	0	457 440		2.4 − 3	1.7+8	E	79°, 109*
185.283	1/2	3/2	0	539 715	bl				79
339.9^C	$2s2p^2\ ^2S_{1/2}$	$2p^3\ ^4S^o_{3/2}$	1 129 710	1 423 900		1.2 − 3	1.8+7	E	109*
228.0^C	$2s2p^2\ ^2P_{3/2}$	$2p^3\ ^2D^o_{3/2}$	1 143 250	1 581 900		1.5 − 3	4.9+7	E	109*
207.1^C	3/2	5/2	1 143 250	1 626 200		1.44 − 1	3.74+9	C	109*
159.69	1/2	3/2	955 790	1 581 900		1.4 − 1	8.9+9	C	50°, 109*
221.1^C	$2s2p^2\ ^2S_{1/2}$	$2p^3\ ^2D^o_{3/2}$	1 129 710	1 581 900		1.9 − 2	6.3+8	D	109*
185.3^C	$2s2p^2\ ^2D_{5/2}$	$2p^3\ ^4S^o_{3/2}$	884 100	1 423 900		7.8 − 4	3.8+7	E	109*
172.3^C	3/2	3/2	843 500	1 423 900		6.0 − 3	3.4+8	E	109*
156.8^C	$2s2p^2\ ^2P_{3/2}$	$2p^3\ ^2P^o_{1/2}$	1 143 250	1 781 100		1.5 − 2	2.1+9	D	109*
137.01	3/2	3/2	1 143 250	1 873 000		2.9 − 1	2.6+10	C	50°, 109*
121.15	1/2	1/2	955 790	1 781 100		1.9 − 2	4.4+9	D	50°, 109*
109.03	1/2	3/2	955 790	1 873 000	bl	2.62 − 2	3.68+9	C	50°, 109*
153.5^C	$2s2p^2\ ^2S_{1/2}$	$2p^3\ ^2P^o_{1/2}$	1 129 710	1 781 100		8.94 − 2	1.27+10	C	109*
134.53	1/2	3/2	1 129 710	1 873 000		3.08 − 2	2.84+9	C	50°, 109*
143.30	$2s2p^2\ ^2D_{5/2}$	$2p^3\ ^2D^o_{3/2}$	884 100	1 581 900		7.44 − 2	6.0+9	C	50°, 109*
135.47	3/2	3/2	843 500	1 581 900		8.84 − 2	8.0+9	C	50°, 109*
134.73	5/2	5/2	884 100	1 626 200		2.36 − 1	1.44+10	C	50°, 109*
127.78	3/2	5/2	843 500	1 626 200		7.60 − 2	5.2+9	C	50°, 109*
138.80	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^2D_{5/2}$	163 960	884 100		1.26 − 1	7.2+9	C	50°, 68, 109*
118.553	1/2	3/2	0	843 500		1.3 − 1	1.5+10	C	12°, 50△, 68, 109*
126.29^C	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^2P_{1/2}$	163 960	955 790		8.8 − 4	1.8+8	E	109*
104.626	1/2	1/2	0	955 790	bl	1.5 − 1	4.7+10	C	12°, 50△, 68, 109*
102.115	3/2	3/2	163 960	1 143 250	bl	3.4 − 1	5.4+10	C	12°, 50△, 68, 78, 109*
87.50	1/2	3/2	0	1 143 250	bl	3.06 − 2	6.7+9	C	50°, 109*
122.72	$2s2p^2\ ^4P_{5/2}$	$2p^3\ ^4S^o_{3/2}$	608 975	1 423 900		1.96 − 1	2.17+10	C	50°, 109*
113.14	3/2	3/2	539 715	1 423 900		1.26 − 1	1.65+10	C	50°, 109*
103.43	1/2	3/2	457 440	1 423 900	bl	8.36 − 2	1.30+10	C	50°, 109*
106.68	$2s2p^2\ ^2D_{3/2}$	$2p^3\ ^2P^o_{1/2}$	843 500	1 781 100		1.25 − 1	3.67+10	C	50°, 109*
101.13	5/2	3/2	884 100	1 873 000		1.00 − 1	1.63+10	C	50°, 109*
97.17	3/2	3/2	843 500	1 873 000	bl	3.4 − 2	5.9+9	D	50°, 109*
103.546	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^2S_{1/2}$	163 960	1 129 710	bl	1.34 − 1	4.17+10	C	12°, 50△, 109*
88.54	1/2	1/2	0	1 129 710		4.8 − 3	2.0+9	D	50°, 109*
102.78^C	$2s2p^2\ ^4P_{5/2}$	$2p^3\ ^2D^o_{3/2}$	608 975	1 581 900		4.2 − 3	6.6+8	E	109*
98.39	5/2	5/2	608 975	1 626 200		3.2 − 2	3.7+9	E	50°, 109*
95.952^C	3/2	3/2	539 715	1 581 900		2.7 − 2	4.9+9	E	109*
92.040^C	3/2	5/2	539 715	1 626 200		6.4 − 4	8.4+7	E	109*
88.932^C	1/2	3/2	457 440	1 581 900		7.2 − 4	1.5+8	E	109*
79.112^C	$2s2p^2\ ^4P_{5/2}$	$2p^3\ ^2P^o_{3/2}$	608 975	1 873 000		6.6 − 4	1.8+8	E	109*
75.548^C	1/2	1/2	457 440	1 781 100		5.8 − 4	3.4+8	E	109*
75.003^C	3/2	3/2	539 715	1 873 000		1.4 − 3	4.1+8	E	109*

Ni XXV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
498.2^C	$2s2p\ ^1P^o_1$	$2p^2\ ^3P_0$	847 558	1 048 300		9.0 − 4	2.4+7	E	109*
326.0^C	1	1	847 558	1 154 300		6.3 − 4	1.3+7	E	109*
277.6^C	1	2	847 558	1 207 800		3.3 − 2	5.4+8	D	109*
238.82	$2s^2\ ^1S_0$	$2s2p\ ^3P^o_1$	0	418 720		2.1 − 3	8.2+7	D	47°, 109*, 113
188.13	$2s2p\ ^1P^o_1$	$2p^2\ ^1D_2$	847 558	1 379 100		1.57 − 1	5.91+9	B	50°, 109*
165.36	$2s2p\ ^3P^o_2$	$2p^2\ ^3P_1$	549 500	1 154 300	bl	6.00 − 2	4.88+9	B	50°, 109*
158.84	1	0	418 720	1 048 300		5.22 − 2	1.38+10	B	50°, 109*
151.90	2	2	549 500	1 207 800		1.33 − 1	7.66+9	B	50°, 109*
135.95	1	1	418 720	1 154 300		4.26 − 2	5.12+9	B	50°, 109*
128.85	0	1	378 190	1 154 300	bl	6.25 − 2	8.37+9	B	50°, 109*
126.73	1	2	418 720	1 207 800		8.43 − 2	7.00+9	B	50°, 109*
130.99	$2s2p\ ^1P^o_1$	$2p^2\ ^1S_0$	847 558	1 611 000		1.03 − 1	3.99+10	B	50°, 109*
120.53	$2s2p\ ^3P^o_2$	$2p^2\ ^1D_2$	549 500	1 379 100		8.35 − 2	7.7+9	C	50°, 109*
104.13^C	1	2	418 720	1 379 100		6.0 − 3	7.4+8	D	109*
117.986	$2s^2\ ^1S_0$	$2s2p\ ^1P^o_1$	0	847 558	bl	1.49 − 1	2.38+10	B	12°, 50△, 68, 82, 109*, 113
9.9712^C	$2p^2\ ^1D_2$	$2p3d\ ^1D^o_2$	1 379 100	11 408 000		2.1 − 1	2.8+12	C−	109*
9.97	$2s2p\ ^1P^o_1$	$2s3d\ ^1D_2$	847 558	10 880 000		1.8	2.5+13	D	83°, 109*
9.938	$2p^2\ ^3P_2$	$2p3d\ ^3F^o_3$	1 207 800	11 271 000		1.34	1.29+13	D	83°, 109*
9.9254^C	$2p^2\ ^3P_2$	$2p3d\ ^3D^o_2$	1 207 800	11 283 000		1.6 − 1	2.2+12	D	109*
9.9126^C	2	1	1 207 800	11 296 000		1.7 − 2	3.8+11	D	109*
9.873	1	2	1 154 300	11 283 000		1.48	2.03+13	C−	83°, 109*
9.8603^C	1	1	1 154 300	11 296 000		2.5 − 1	5.7+12	C−	109*
9.776	2	3	1 207 800	11 437 000		3.0	2.9+13	C−	83°, 109*
9.759	0	1	1 048 300	11 296 000		1.3	3.03+13	C−	83°, 109*
9.9237^C	$2p^2\ ^1D_2$	$2p3d\ ^3P^o_2$	1 379 100	11 456 000		9.5 − 1	1.3+13	C−	109*
9.860	$2p^2\ ^1D_2$	$2p3d\ ^1F^o_3$	1 379 100	11 525 000		4.9	4.8+13	C−	83°, 109*
9.8037^C	$2p^2\ ^3P_2$	$2p3d\ ^1D^o_2$	1 207 800	11 408 000		3.2 − 1	4.4+12	C−	109*
9.753	1	2	1 154 300	11 408 000		9.0 − 1	1.3+13	D	83°, 109*
9.7613^C	$2s2p\ ^3P^o_2$	$2s3d\ ^3D_1$	549 500	10 794 000		3.6 − 2	8.4+11	C−	109*
9.75	2	2	549 500	10 800 000		5.5 − 1	7.7+12	C−	83°, 109*
9.744	2	3	549 500	10 813 000		3.0	3.0+13	C−	83°, 109*
9.633	1	2	418 720	10 800 000		1.7	2.4+13	C−	83°, 109*
9.63	1	1	418 720	10 794 000		5.4 − 1	1.3+13	C−	83°, 109*
9.601	0	1	378 190	10 794 000		7.5 − 1	1.8+13	C−	83°, 109*
9.759	$2p^2\ ^3P_2$	$2p3d\ ^3P^o_{1,2}$	1 207 800	11 456 000		9.5 − 1	2.3+13	C−	83°, 109*
9.707	1	1,2	1 154 300	11 456 000		7.5 − 1	1.8+13	D	83°, 109*
9.707	1	0	1 154 300	11 456 000		3.3 − 1	2.3+13	C−	83°, 109*
9.691	$2p^2\ ^3P_2$	$2p3d\ ^1F^o_3$	1 207 800	11 525 000					83
9.5617^C	$2s2p\ ^1P^o_1$	$2p3p\ ^3P_2$	847 558	11 306 000		2.3 − 1	3.4+12	D	109*
9.4308^C	$2s2p\ ^3P^o_2$	$2p3p\ ^3D_2$	549 500	11 153 000		1.0 − 2	1.5+11	D	109*
9.316	1	2	418 720	11 153 000		5.1 − 1	7.8+12	C−	83°, 109*
9.306	2	3	549 500	11 296 000		7.5 − 1	8.2+12	C−	83°, 109*
9.39	$2s^2\ ^1S_0$	$2s3p\ ^3P^o_1$	0	10 650 000		2.6 − 1	6.6+12	C−	83°, 109*
9.340	$2s^2\ ^1S_0$	$2s3p\ ^1P^o_1$	0	10 707 000		4.5 − 1	1.1+13	C−	83°, 109*
9.297	$2s2p\ ^3P^o_2$	$2p3p\ ^3P_2$	549 500	11 306 000		4.5 − 1	6.9+12	C−	83°, 109*
9.1850^C	1	2	418 720	11 306 000		9.9 − 3	1.6+11	D	109*
9.297	$2s2p\ ^3P^o_2$	$2p3p\ ^3S_1$	549 500	11 306 000					83

Ni XXVI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
563.383^C	$1s^22p\ ^2P^o_{1/2}$	$1s^22p\ ^2P^o_{3/2}$	427 073	604 572		M1	5.02+4	B	109*
234.152^S	$1s^22s\ ^2S_{1/2}$	$1s^22p\ ^2P^o_{1/2}$	0	427 073		3.28 − 2	1.99+9	B+	12, 47, 82, 85, 86, 87°, 109*
165.406^S	1/2	3/2	0	604 572		9.44 − 2	5.75+9	B+	12, 82, 85, 86, 87°, 109*
59.032^C	$1s^24p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	[14 681 920]	[16 375 920]					
58.907^C	3/2	5/2	[14 681 920]	[16 379 510]					
58.270^C	1/2	3/2	[14 659 760]	[16 375 920]					
27.9888^C	$1s^23p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	[11 037 190]	[14 610 050]					
27.5830^C	1/2	1/2	[10 984 630]	[14 610 050]					
27.2956^C	$1s^23p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	[11 037 190]	[14 700 790]					
27.2434^C	3/2	5/2	[11 037 190]	[14 707 800]					
26.9095^C	1/2	3/2	[10 984 630]	[14 700 790]					
26.3605^C	$1s^23s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	[10 866 210]	[14 659 760]					
26.2074^C	1/2	3/2	[10 866 210]	[14 681 920]					
18.8951^C	$1s^23p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	[11 037 190]	[16 329 570]					
18.7093^C	1/2	1/2	[10 984 630]	[16 329 570]					
18.7310^C	$1s^23p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	[11 037 190]	[16 375 920]					
18.7185^C	3/2	5/2	[11 037 190]	[16 379 510]					
18.5484^C	1/2	3/2	[10 984 630]	[16 375 920]					
9.74503^C	$1s^22p\ ^2P^o_{3/2}$	$1s^23s\ ^2S_{1/2}$	604 572	[10 866 210]		7.2 − 2	2.5+12	C	83, 89, 109*
9.57934^C	1/2	1/2	427 073	[10 866 210]		3.6 − 2	1.3+12	C	89, 109*
9.54432^C	$1s^22p\ ^2P^o_{3/2}$	$1s^23d\ ^2D_{3/2}$	604 572	[11 082 010]		2.7 − 1	5.0+12	C	83, 89, 109*
9.52922^C	3/2	5/2	604 572	[11 098 610]		2.42	2.96+13	C+	83, 89, 109*
9.38532^C	1/2	3/2	427 073	[11 082 010]		1.37	2.59+13	C+	83, 89, 109*
9.10363^C	$1s^22s\ ^2S_{1/2}$	$1s^23p\ ^2P^o_{1/2}$	0	[10 984 630]		2.58 − 1	1.04+13	B+	83, 89, 109*
9.06028^C	1/2	3/2	0	[11 037 190]		4.92 − 1	9.99+12	B+	83, 89, 109*
7.14006^C	$1s^22p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	604 572	[14 610 050]					89
7.05071^C	1/2	1/2	427 073	[14 610 050]					89
7.09410^C	$1s^22p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	604 572	[14 700 790]					89
7.09058^C	3/2	5/2	604 572	[14 707 800]					89
7.00588^C	1/2	3/2	427 073	[14 700 790]					89
6.82139^C	$1s^22s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	0	[14 659 760]					89
6.81110^C	1/2	3/2	0	[14 681 920]					89
6.35930^C	$1s^22p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	604 572	[16 329 570]					89
6.28832^C	1/2	1/2	427 073	[16 329 570]					89
6.34061^C	$1s^22p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	604 572	[16 375 920]					89
6.33917^C	3/2	5/2	604 572	[16 379 510]					89
6.27005^C	1/2	3/2	427 073	[16 375 920]					89
6.11436^C	$1s^22s\ ^2S_{1/2}$	$1s^25p\ ^2P^o_{1/2}$	0	[16 354 940]					89
6.11012^C	1/2	3/2	0	[16 366 280]					89
1.6274^C	$1s^22p\ ^2P^o_{3/2}$	$1s2s^2\ ^2S_{1/2}$	604 572	[62 051 000]					89
1.6228^C	1/2	1/2	427 073	[62 051 000]					89
1.6108^C	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^4P_{1/2}$	604 572	[62 684 000]					89
1.6083^C	3/2	3/2	604 572	[62 779 000]					89
1.6068^C	3/2	5/2	604 572	[62 837 000]					89
1.6063^C	1/2	1/2	427 073	[62 684 000]					89
1.6039^C	1/2	3/2	427 073	[62 779 000]					89
1.6087^C	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^4P^o_{1/2}$	0	[62 162 000]					89
1.6077^C	1/2	3/2	0	[62 201 000]					89

Ni XXVI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1.6029[C]	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^2P_{1/2}$	604 572	[62 991 000]		1.6 – 1	2.1+14	C	89, 109*
1.5984[C]	$_{1/2}$	$_{1/2}$	427 073	[62 991 000]		5.6 – 1	7.3+14	C	89, 109*
1.5977[C]	$_{3/2}$	$_{3/2}$	604 572	[63 192 000]		1.2	8.1+14	C	89, 109*
1.5933[C]	$_{1/2}$	$_{3/2}$	427 073	[63 192 000]					89
1.6029[C]	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1D)\ ^2D_{3/2}$	604 572	[62 991 000]					89
1.6009[C]	$_{3/2}$	$_{5/2}$	604 572	[63 067 000]		6.4 – 1	2.7+14	C	89, 109*
1.5984[C]	$_{1/2}$	$_{3/2}$	427 073	[62 991 000]		6.8 – 1	4.4+14	C	89, 109*
1.5997[C]	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^2P^o_{1/2}$	0	[62 512 000]		2.0 – 1	2.7+14	C	89, 109*
1.5970[C]	$_{1/2}$	$_{3/2}$	0	[62 617 000]					89
1.5938[C]	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^1P^o)\ ^2P^o_{1/2}$	0	[62 743 000]		3.0 – 1	4.0+14	C	89, 109*
1.5931[C]	$_{1/2}$	$_{3/2}$	0	[62 771 000]					89
1.5936[C]	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1S)\ ^2S_{1/2}$	604 572	[63 354 000]		2.6 – 1	3.4+14	C	89, 109*
1.5892[C]	$_{1/2}$	$_{1/2}$	427 073	[63 354 000]					89
1.367	$1s^22p\ ^2P^o_{3/2}$	$1s2p3p\ ^2D_{5/2}$	604 572	73 760 000					88
1.303	$1s^22p\ ^2P^o_{3/2}$	$1s2p4p\ ^2D_{5/2}$	604 572	77 350 000					88

Ni XXVII

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
6400^C	$1s4p\ ^3P^o_2$	$1s4d\ ^3D_2$	[77 953 500]	[77 969 200]					
4240^C	2	3	[77 953 500]	[77 977 100]					
2720^C	1	2	[77 932 500]	[77 969 200]					
2690^C	1	1	[77 932 500]	[77 969 600]					
2540^C	0	1	[77 930 200]	[77 969 600]					
6100^C	$1s5s\ ^3S_1$	$1s5p\ ^3P^o_1$	[79 741 000]	[79 757 300]		7.8 − 2	4.7+6	E	109*
3690^C	1	2	[79 741 000]	[79 768 100]					
4900^C	$1s5s\ ^1S_0$	$1s5p\ ^1P^o_1$	[79 756 700]	[79 777 100]		1.0 − 1	9.3+6	E	109*
3140^C	$1s4s\ ^3S_1$	$1s4p\ ^3P^o_1$	[77 900 700]	[77 932 500]		7.8 − 2	1.8+7	E	109*
1890^C	1	2	[77 900 700]	[77 953 500]					
2510^C	$1s4s\ ^1S_0$	$1s4p\ ^1P^o_1$	[77 931 400]	[77 971 200]		6.2 − 2	2.2+7	D	109*
1320^C	$1s3s\ ^3S_1$	$1s3p\ ^3P^o_1$	[73 903 000]	[73 978 900]		4.5 − 2	5.7+7	C	109*
1060^C	$1s3s\ ^1S_0$	$1s3p\ ^1P^o_1$	[73 976 800]	[74 070 700]		5.7 − 2	1.1+8	C	109*
390.44^C	$1s2s\ ^3S_1$	$1s2p\ ^3P^o_0$	[62 359 670]	[62 615 790]		9.84 − 3	4.31+8	B	109*
363.78^C	1	1	[62 359 670]	[62 634 560]		2.84 − 2	4.77+8	B	109*
226.23^C	1	2	[62 359 670]	[62 801 690]		8.46 − 2	2.21+9	B	109*
313.22^C	$1s2s\ ^1S_0$	$1s2p\ ^1P^o_1$	[62 637 030]	[62 956 290]		3.37 − 2	7.64+8	B	109*
167.61^C	$1s2s\ ^3S_1$	$1s2p\ ^1P^o_1$	[62 359 670]	[62 956 290]		7.59 − 3	6.01+8	B	109*
56.01^C	$1s4p\ ^1P^o_1$	$1s5s\ ^1S_0$	[77 971 200]	[79 756 700]		1.6 − 1	3.4+11	B	109*
55.94^C	$1s4p\ ^3P^o_2$	$1s5s\ ^3S_1$	[77 953 500]	[79 741 000]					
55.29^C	1	1	[77 932 500]	[79 741 000]		1.5 − 1	1.1+11	B	109*
54.18^C	$1s4s\ ^1S_0$	$1s5p\ ^1P^o_1$	[77 931 400]	[79 777 100]		4.31 − 1	3.26+11	B	109*
53.86^C	$1s4s\ ^3S_1$	$1s5p\ ^3P^o_1$	[77 900 700]	[79 757 300]		4.41 − 1	3.38+11	B	109*
25.902^C	$1s3p\ ^1P^o_1$	$1s4s\ ^1S_0$	[74 070 700]	[77 931 400]		9.9 − 2	9.8+11	B	109*
25.885^C	$1s3d\ ^3D_1$	$1s4p\ ^3P^o_0$	[74 066 900]	[77 930 200]					
25.869^C	1	1	[74 066 900]	[77 932 500]					
25.863^C	2	1	[74 066 000]	[77 932 500]					
25.847^C	3	2	[74 084 600]	[77 953 500]					
25.723^C	2	2	[74 066 000]	[77 953 500]					
25.827^C	$1s3p\ ^3P^o_2$	$1s4s\ ^3S_1$	[74 028 800]	[77 900 700]					
25.498^C	1	1	[73 978 900]	[77 900 700]		9.3 − 2	3.2+11	B	109*
25.747^C	$1s3d\ ^1D_2$	$1s4p\ ^1P^o_1$	[74 087 200]	[77 971 200]		5.5 − 2	1.8+11	C	109*
25.592^C	$1s3p\ ^1P^o_1$	$1s4d\ ^1D_2$	[74 070 700]	[77 978 200]		1.9	3.9+12	C	109*
25.378^C	$1s3p\ ^3P^o_2$	$1s4d\ ^3D_2$	[74 028 800]	[77 969 200]					
25.327^C	2	3	[74 028 800]	[77 977 100]					
25.061^C	1	2	[73 978 900]	[77 969 200]					
25.058^C	1	1	[73 978 900]	[77 969 600]					
25.025^C	0	1	[73 973 600]	[77 969 600]					
25.035^C	$1s3s\ ^1S_0$	$1s4p\ ^1P^o_1$	[73 976 800]	[77 971 200]		3.87 − 1	1.37+12	B	109*
24.817^C	$1s3s\ ^3S_1$	$1s4p\ ^3P^o_1$	[73 903 000]	[77 932 500]		3.93 − 1	1.42+12	B	109*
24.688^C	1	2	[73 903 000]	[77 953 500]					
17.587^C	$1s3p\ ^1P^o_1$	$1s5s\ ^1S_0$	[74 070 700]	[79 756 700]		2.2 − 2	4.7+11	C	109*
17.506^C	$1s3p\ ^3P^o_2$	$1s5s\ ^3S_1$	[74 028 800]	[79 741 000]					
17.355^C	1	1	[73 978 900]	[79 741 000]		2.1 − 2	1.6+11	C	109*
17.240^C	$1s3s\ ^1S_0$	$1s5p\ ^1P^o_1$	[73 976 800]	[79 777 100]		9.9 − 2	7.4+11	B	109*
17.081^C	$1s3s\ ^3S_1$	$1s5p\ ^3P^o_1$	[73 903 000]	[79 757 300]		9.9 − 2	7.5+11	B	109*
17.050^C	1	2	[73 903 000]	[79 768 100]					

Ni XXVII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
9.0740^{C}	$1s2p\ ^1P^o_1$	$1s3s\ ^1S_0$	[62 956 290]	[73 976 800]		4.2 − 2	3.4+12	B	109*
9.0079^{C}	$1s2p\ ^3P^o_2$	$1s3s\ ^3S_1$	[62 801 690]	[73 903 000]					
8.8743^{C}	1	1	[62 634 560]	[73 903 000]		3.9 − 2	1.1+12	B	109*
8.9840^{C}	$1s2p\ ^1P^o_1$	$1s3d\ ^1D_2$	[62 956 290]	[74 087 200]		2.1	3.5+13	C+	109*
8.8776^{C}	$1s2p\ ^3P^o_2$	$1s3d\ ^3D_2$	[62 801 690]	[74 066 000]					
8.8630^{C}	2	3	[62 801 690]	[74 084 600]					
8.7478^{C}	1	2	[62 634 560]	[74 066 000]					
8.7471^{C}	1	1	[62 634 560]	[74 066 900]					
8.7328^{C}	0	1	[62 615 790]	[74 066 900]					
8.7461^{C}	$1s2s\ ^1S_0$	$1s3p\ ^1P^o_1$	[62 637 030]	[74 070 700]		3.53 − 1	1.03+13	B	109*
8.6064^{C}	$1s2s\ ^3S_1$	$1s3p\ ^3P^o_1$	[62 359 670]	[73 978 900]		3.57 − 1	1.07+13	B	109*
6.6777^{C}	$1s2p\ ^1P^o_1$	$1s4s\ ^1S_0$	[62 956 290]	[77 931 400]		9.0 − 3	1.3+12	C	109*
6.6569^{C}	$1s2p\ ^1P^o_1$	$1s4d\ ^1D_2$	[62 956 290]	[77 978 200]		3.6 − 1	1.1+13	C	109*
6.6230^{C}	$1s2p\ ^3P^o_2$	$1s4s\ ^3S_1$	[62 801 690]	[77 900 700]					
6.5504^{C}	1	1	[62 634 560]	[77 900 700]		9.0 − 3	4.7+11	C	109*
6.5930^{C}	$1s2p\ ^3P^o_2$	$1s4d\ ^3D_2$	[62 801 690]	[77 969 200]					
6.5896^{C}	2	3	[62 801 690]	[77 977 100]					
6.5212^{C}	1	2	[62 634 560]	[77 969 200]					
6.5210^{C}	1	1	[62 634 560]	[77 969 600]					
6.5130^{C}	0	1	[62 615 790]	[77 969 600]					
6.5214^{C}	$1s2s\ ^1S_0$	$1s4p\ ^1P^o_1$	[62 637 030]	[77 971 200]		8.5 − 2	4.4+12	B	109*
6.4214^{C}	$1s2s\ ^3S_1$	$1s4p\ ^3P^o_1$	[62 359 670]	[77 932 500]		9.6 − 2	5.2+12	B	109*
6.4128^{C}	1	2	[62 359 670]	[77 953 500]					
5.9522^{C}	$1s2p\ ^1P^o_1$	$1s5s\ ^1S_0$	[62 956 290]	[79 756 700]		3.6 − 3	6.8+11	C	109*
5.9034^{C}	$1s2p\ ^3P^o_2$	$1s5s\ ^3S_1$	[62 801 690]	[79 741 000]					
5.8458^{C}	1	1	[62 634 560]	[79 741 000]		3.6 − 3	2.3+11	C	109*
5.8343^{C}	$1s2s\ ^1S_0$	$1s5p\ ^1P^o_1$	[62 637 030]	[79 777 100]		3.5 − 2	2.3+12	B	109*
5.7479^{C}	$1s2s\ ^3S_1$	$1s5p\ ^3P^o_1$	[62 359 670]	[79 757 300]		3.6 − 2	2.4+12	B	109*
5.7443^{C}	1	2	[62 359 670]	[79 768 100]					
1.603601^{C}	$1s^2\ ^1S_0$	$1s2s\ ^3S_1$	0	[62 359 670]		M1	4.52+8	B	109*
1.596563^{C}	$1s^2\ ^1S_0$	$1s2p\ ^3P^o_1$	0	[62 634 560]		8.83 − 2	7.70+13	B	109*
1.592314^{C}	0	2	0	[62 801 690]		M2	1.22+9	B	109*
1.588404^{C}	$1s^2\ ^1S_0$	$1s2p\ ^1P^o_1$	0	[62 956 290]		6.83 − 1	6.02+14	B	91, 92, 93, 109*
1.5587^{C}	$1s2p\ ^1P^o_1$	$2s^2\ ^1S_0$	[62 956 290]	[127 111 000]		2.4 − 2	6.5+13	D	89, 109*
1.5510^{C}	$1s2p\ ^3P^o_1$	$2s^2\ ^1S_0$	[62 634 560]	[127 111 000]		3.0 − 2	8.2+13	D	89, 109*
1.5508^{C}	$1s2p\ ^1P^o_1$	$2p^2\ ^3P_0$	[62 956 290]	[127 437 000]		4.2 − 3	1.2+13	D	89, 109*
1.5480^{C}	1	1	[62 956 290]	[127 554 000]		2.3 − 2	2.1+13	D	89, 109*
1.5466^{C}	1	2	[62 956 290]	[127 614 000]		2.9 − 1	1.6+14	C	89, 109*
1.5491^{C}	$1s2s\ ^1S_0$	$2s2p\ ^3P^o_1$	[62 637 030]	[127 190 000]		2.2 − 2	2.0+13	D	89, 109*
1.5443^{C}	$1s2p\ ^3P^o_2$	$2p^2\ ^3P_1$	[62 801 690]	[127 554 000]		3.5 − 1	3.2+14	C	89, 109*
1.5432^{C}	1	0	[62 634 560]	[127 437 000]		2.5 − 1	6.9+14	C	89, 109*
1.5429^{C}	2	2	[62 801 690]	[127 614 000]		6.0 − 1	3.5+14	C	89, 109*
1.5404^{C}	1	1	[62 634 560]	[127 554 000]		1.8 − 1	1.7+14	C	89, 109*
1.5400^{C}	0	1	[62 615 790]	[127 554 000]		2.8 − 1	2.6+14	C	89, 109*
1.5390^{C}	1	2	[62 634 560]	[127 614 000]		4.5 − 1	2.6+14	C	89, 109*
1.5436^{C}	$1s2s\ ^3S_1$	$2s2p\ ^3P^o_0$	[62 359 670]	[127 143 000]		1.4 − 1	3.8+14	C	89, 109*
1.5425^{C}	1	1	[62 359 670]	[127 190 000]		3.9 − 1	3.6+14	C	89, 109*
1.5384^{C}	1	2	[62 359 670]	[127 362 000]		6.9 − 1	3.9+14	C	89, 109*
1.5415^{C}	$1s2p\ ^1P^o_1$	$2p^2\ ^1D_2$	[62 956 290]	[127 827 000]		9.9 − 1	5.5+14	C	89, 109*

Ni XXVII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1.5379^C	$1s2s\ ^1S_0$	$2s2p\ ^1P^o_1$	[62 637 030]	[127 662 000]		3.9 − 1	3.7+14	C	89, 109*
1.5378^C	$1s2p\ ^3P^o_2$	$2p^2\ ^1D_2$	[62 801 690]	[127 827 000]		4.1 − 1	2.3+14	C	89, 109*
1.5340^C	$_1$	$_2$	[62 634 560]	[127 827 000]					89
1.5346^C	$1s2p\ ^1P^o_1$	$2p^2\ ^1S_0$	[62 956 290]	[128 117 000]		2.4 − 1	6.9+14	C	89, 109*
1.5313^C	$1s2s\ ^3S_1$	$2s2p\ ^1P^o_1$	[62 359 670]	[127 662 000]		2.1 − 2	2.0+13	D	89, 109*
1.5272^C	$1s2p\ ^3P^o_1$	$2p^2\ ^1S_0$	[62 634 560]	[128 117 000]					89
1.35173^C	$1s^2\ ^1S_0$	$1s3p\ ^3P^o_1$	0	[73 978 900]		2.0 − 2	2.4+13	E	88, 109*
1.35006^C	$1s^2\ ^1S_0$	$1s3p\ ^1P^o_1$	0	[74 070 700]		1.34 − 1	1.63+14	B	88, 91, 109*
1.28316^C	$1s^2\ ^1S_0$	$1s4p\ ^3P^o_1$	0	[77 932 500]		7.4 − 3	1.0+13	E	88, 109*
1.28252^C	$1s^2\ ^1S_0$	$1s4p\ ^1P^o_1$	0	[77 971 200]		4.72 − 2	6.38+13	B	88, 109*
1.25380^C	$1s^2\ ^1S_0$	$1s5p\ ^3P^o_1$	0	[79 757 300]		3.7 − 3	5.2+12	E	88, 109*
1.25349^C	$1s^2\ ^1S_0$	$1s5p\ ^1P^o_1$	0	[79 777 100]		2.37 − 2	3.35+13	B	88, 109*

Ni XXVIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1500^{C}	$3s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[77 250 100]	[77 316 750]		5.58 − 2	4.13+7	A	101*
1463^{C}	$3p\ ^2P^o_{1/2}$	$3d\ ^2D_{3/2}$	[77 248 260]	[77 316 630]		3.58 − 2	2.79+7	A	101*
444.19^{C}	$2s\ ^2S_{1/2}$	$2p\ ^2P^o_{3/2}$	[65 119 820]	[65 344 950]		3.14 − 2	2.65+8	A	101*
23.8677^{C}	$3d\ ^2D_{5/2}$	$4f\ ^2F^o_{7/2}$	[77 339 010]	[81 528 770]		5.83	8.53+12	A	101*
23.7680^{C}	$3p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[77 316 750]	[81 524 080]		2.24	4.40+12	A	101*
23.4490^{C}	$3s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[77 250 100]	[81 514 680]		6.60 − 1	2.00+12	A	101*
16.3235^{C}	$3d\ ^2D_{5/2}$	$5f\ ^2F^o_{7/2}$	[77 339 010]	[83 465 150]		8.94 − 1	2.80+12	A	101*
16.2707^{C}	$3p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[77 316 750]	[83 462 750]		5.04 − 1	2.11+12	A	101*
16.1087^{C}	$3s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[77 250 100]	[83 457 930]		1.64 − 1	1.05+12	A	101*
8.337460^{C}	$2p\ ^2P^o_{3/2}$	$3d\ ^2D_{5/2}$	[65 344 950]	[77 339 010]		2.51	4.02+13	A	101*
8.198784^{C}	$2s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[65 119 820]	[77 316 750]		5.92 − 1	1.47+13	A	101*
6.180802^{C}	$2p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[65 344 950]	[81 524 080]		4.40 − 1	1.28+13	A	101*
6.099473^{C}	$2s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[65 119 820]	[81 514 680]		1.39 − 1	6.24+12	A	101*
5.519434^{C}	$2p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[65 344 950]	[83 462 750]		1.60 − 1	5.85+12	A	101*
5.453125^{C}	$2s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[65 119 820]	[83 457 930]		5.68 − 2	3.18+12	A	101*
1.535769^{C}	$1s\ ^2S_{1/2}$	$2p\ ^2P^o_{1/2}$	0	[65 113 960]		2.80 − 1	3.96+14	A	101*
1.530340^{C}	$_{1/2}$	$_{3/2}$	0	[65 344 950]		5.62 − 1	4.00+14	A	101*
1.294528^{C}	$1s\ ^2S_{1/2}$	$3p\ ^2P^o_{1/2}$	0	[77 248 260]		5.34 − 2	1.06+14	A	101*
1.293381^{C}	$_{1/2}$	$_{3/2}$	0	[77 316 750]		1.07 − 1	1.06+14	A	101*
1.226773^{C}	$1s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	0	[81 514 680]		3.92 − 2	4.33+13	A	101*
1.198208^{C}	$1s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	0	[83 457 930]		1.88 − 2	2.18+13	A	101*

2.8.3. References for Comments and Tables for Ni Ions

[1] E. Alexander, U. Feldman, B. S. Fraenkel, and S. Hoory, J. Opt. Soc. Am. **56**, 651 (1966).
[2] M. Even-Zohar and B. S. Fraenkel, J. Opt. Soc. Am. **58**, 1420 (1968).
[3] B. C. Fawcett, A. Ridgeley, and J. O. Ekberg, Phys. Scr. **21**, 155 (1980).
[4] M. H. L. Pryce, Astrophys. J. **3**, 1192 (1964).
[5] W. Lotz, J. Opt. Soc. Am **57**, 873 (1967).
[6] A. Alexander, U. Feldman, and B. S. Fraenkel, J. Opt. Soc. Am. **55**, 650 (1965).
[7] U. Feldman, B. S. Fraenkel, and S. Hoory, Astrophys. J. **142**, 719 (1965).
[8] K. G. Widing and G. D. Sandlin, Astrophys. J. **152**, 545 (1968).
[9] A. H. Gabriel, B. C. Fawcett, and C. Jordan, Proc. Phys. Soc. **87**, 825 (1966).
[10] S. Goldsmith and B. S. Fraenkel, Astrophys. J. **161**, 317 (1970).
[11] A. A. Ramonas and A. N. Ryabtsev, Opt. Spectrosc. **48**, 348 (1980).
[12] J. Sugar, V. Kaufman, and W. L. Rowan, J. Opt. Soc. Am. B **9**, 344 (1992).
[13] S. Hoory, S. Goldsmith, B. S. Fraenkel, and U. Feldman, Astrophys. J. **160**, 781 (1970).
[14] M. Swartz, S. O. Kastner, L. Goldsmith, and W. M. Neupert, J. Opt. Soc. Am. **66**, 240 (1976).
[15] W. E. Behring, L. Cohen, and U. Feldman, Astrophys. J. **175**, 493 (1972).
[16] E. Alexander, U. Feldman, B. S. Fraenkel, and S. Hoory, Nature **206**, 176 (1965).
[17] L. A. Svensson, J. O. Ekberg, and B. Edlén, Solar Phys. **34**, 173 (1974).
[18] W. E. Behring, L. Cohen, U. Feldman, and G. A. Doschek, Astrophys. J. **203**, 521 (1976).
[19] B. Edlén and R. Smitt, Solar Phys. **57**, 329 (1978).
[20] J. T. Jefferies, F. Q. Orrall, and J. B. Zirker, Solar Phys. **16**, 103 (1971).
[21] G. D. Sandlin, G. E. Brueckner, and R. Tousey, Astrophys. J. **214**, 898 (1977).
[22] G. D. Sandlin and R. Tousey, Astrophys. J. **227**, L107 (1979).
[23] B. C. Fawcett, R. D. Cowan, and R. W. Hayes, J. Phys. B **5**, 2143 (1972).
[24] B. C. Fawcett and R. W. Hayes, J. Phys. B **5**, 366 (1972).
[25] M. Malinovsky and L. Heroux, Astrophys. J. **181**, 1009 (1973).
[26] A. N. Ryabtsev, Sov. Astron. **23**, 732 (1979).
[27] B. C. Fawcett and A. T. Hatter, Astron. Astrophys. **84**, 78 (1980).
[28] E. Träbert, J. H. Blanke, P. H. Heckmann, H. M. Hellmann, and R. Hucke, Z. Phys. A **321**, 359 (1985).
[29] E. Träbert, R. Hutton, and I. Martinson, Z. Phys. D **5**, 125 (1987).
[30] S. O. Kastner, M. Swartz, A. K. Bhatia, and J. Lapides, J. Opt. Soc. Am. **68**, 1558 (1978).
[31] A. Redfors and U. Litzén, J. Opt. Soc. Am. B **6**, 1447 (1989).
[32] E. H. Pinnington, W. Ansbacher, A. Tauheed, E. Träbert, P. H. Heckmann, G. Möller, and J. H. Blanke, Z. Phys. D **17**, 5 (1990).
[33] M. C. Buchet-Poulizac and J. P. Buchet, Nucl. Instrum. Meth. B **31**, 182 (1988).
[34] S. S. Churilov and V. E. Levashov, Phys. Scr. **48**, 425 (1993).
[35] B. C. Fawcett, A. H. Gabriel, F. E. Irons, N. J. Peacock, and P. A. H. Saunders, Proc. Phys. Soc. **88**, 1051 (1966).
[36] U. Feldman, L. Katz, W. Behring, and L. Cohen, J. Opt. Soc. Am. **61**, 91 (1971).
[37] S. S. Churilov, E. Ya. Kononov, A. N. Ryabtsev, and Yu. F. Zayikin, Phys. Scr. **32**, 501 (1985).
[38] U. Litzén and A. Redfors, Phys. Scr. **36**, 895 (1987).
[39] A. Redfors, Phys. Scr. **38**, 702 (1988).
[40] V. E. Levashov and S. S. Churilov, Opt. Spectrosc. **65**, 143 (1988).
[41] S. S. Churilov, V. E. Levashov, and J. F. Wyart, Phys. Scr. **40**, 625 (1989).
[42] M. Finkenthal, E. Hinnov, S. Cohen, and S. Suckewer, Phys. Lett. **91**, 284 (1982).
[43] N. J. Peacock, M. F. Stamp, and J. D. Silver, Phys. Scr. **T8**, 10 (1984).
[44] K. P. Dere, Astrophys. J. **221**, 1062 (1978).
[45] J. Sugar and C. Corliss, J. Phys. Chem. Ref. Data **14**, Suppl. 2 (1985).
[46] U. Feldman, L. Cohen, and M. Swartz, J. Opt. Soc. Am. **57**, 535 (1967).
[47] G. D. Sandlin, G. E. Brueckner, V. E. Scherrer, and R. Tousey, Astrophys. J. **205**, L47 (1976).
[48] J. Reader, V. Kaufman, J. Sugar, J. O. Ekberg, U. Feldman, C. M. Brown, J. F. Seely, and W. L. Rowan, J. Opt. Soc. Am. B **4**, 1821 (1987).
[49] E. Ya. Kononov, V. I. Kovalev, A. N. Ryabtsev, and S. S. Churilov, Sov. J. Quantum Electron. **7**, 111 (1977).
[50] K. D. Lawson and N. J. Peacock, J. Phys. B **13**, 3313 (1980).
[51] U. Feldman and L. Cohen, J. Opt. Soc. Am. **57**, 1128 (1967).
[52] C. Jupén, L. Engström, R. Hutton, and E. Träbert, J. Phys. B **21**, L347 (1988).
[53] B. Edlén, Phys. Scr. **17**, 565 (1978).
[54] U. Feldman, L. Cohen, and M. Swartz, Astrophys. J. **148**, 585 (1967).
[55] M. Swartz, S. Kastner, E. Rothe, and W. Neupart, J. Phys. B **4**, 1747 (1971).
[56] V. A. Boiko, A. Ya. Faenov, and S. A. Pikuz, J. Quant. Spectrosc. Radiat. Transfer **19**, 11 (1978).
[57] H. Gordon, M. G. Hobby, and N. J. Peacock, J. Phys. B **13**, 1985 (1980).
[58] M. Klapisch, A. Bar Shalom, J. L. Schwob, B. S. Fraenkel, C. Breton, C. De Michelis, M. Finkenthal, and M. Mattioli, Phys. Lett. **69A**, 34 (1978).
[59] S. O. Kastner, W. E. Behring, and L. Cohen, Astrophys. J. **199**, 777 (1975).
[60] C. Jupén, Mon. Not. Roy. Astron. Soc. **208**, 1P (1984).
[61] J. P. Buchet, M. C. Buchet-Poulizac, A. Denis, J. Desesquelles, M. Druetta, S. Martin, and J. F. Wyart, J. Phys. B **20**, 1709 (1987).
[62] M. Finkenthal, P. Mandelbaum, A. Bar-Shalom, M. Klapisch, J. L. Schwob, C. Breton, C. De Michelis, and M. Mattioli, J. Phys. B **18**, L331 (1985).
[63] L. Cohen, U. Feldman, and S. O. Kastner, J. Opt. Soc. Am. **58**, 331 (1968).
[64] V. A. Boiko, S. A. Pikuz, A. S. Safronova, and A. Ya. Faenov, Opt. Spectrosc. **44**, 498 (1978).
[65] V. A. Boiko, S. A. Pikuz, A. S. Safronova, and A. Ya. Faenov, Phys. Scr. **20**, 138 (1979).
[66] V. A. Boiko, S. A. Pikuz, A. S. Safronova, A. Ya. Faenov, P. O. Bogdanovich, G. V. Merkelis, Z. B. Rudzikas, and R. D. Sadziuviene, J. Phys. B **12**, 1927 (1979).
[67] G. A. Doschek, U. Feldman, R. D. Cowan, and L. Cohen, Astrophys. J. **188**, 417 (1974).
[68] C. Breton, C. De Michelis, M. Finkenthal, and M. Mattioli, J. Opt. Soc. Am. **69**, 1652 (1979).
[69] E. Hinnov and S. Suckewer, Phys. Lett. **79A**, 298 (1980).
[70] E. Hinnov, S. Suckewer, S. Cohen, and K. Sato, Phys. Rev. A **25**, 2293 (1982).
[71] M. Finkenthal, R. E. Bell, H. W. Moos, and TFR Group, J. Appl. Phys. **56**, 2012 (1984).
[72] K. T. Cheng, unpublished material (1981).
[73] W. C. Martin, unpublished material (1982).
[74] G. A. Doschek, U. Feldman, J. Davis, and R. D. Cowan, Phys. Rev. A **12**, 980 (1975).
[75] K. G. Widing, Astrophys. J. **222**, 735 (1978).
[76] E. Hinnov, B. Denne, A. Ramsey, B. Stratton, and J. Timberlake, J. Opt. Soc. Am. B **7**, 2002 (1990).

[77] U. Feldman, G. A. Doschek, R. D. Cowan, and L. Cohen, Astrophys. J. **196**, 613 (1975).
[78] G. A. Doschek, U. Feldman, and L. Cohen, J. Opt. Soc. Am. **65**, 463 (1975).
[79] R. Myrnäs, C. Jupén, G. Miecznik, I. Martinson, and B. Denne-Hinnov, Phys. Scr. **49**, 429 (1994).
[80] B. Edlén, Phys. Scr. **28**, 483 (1983).
[81] J. Sugar and C. Corliss, J. Phys. Chem. Ref. Data **14**, Suppl. 2 (1985).
[82] E. Hinnov, Astrophys. J. **230**, L197 (1979).
[83] B. C. Fawcett, A. Ridgeley, and T. P. Hughes, Mon. Not. Roy. Astron. Soc. **188**, 365 (1979).
[84] V. A. Boiko, S. A. Pikuz, U. I. Safronova, and A. Ya. Faenov, J. Phys. B **10**, 1253 (1977).
[85] K. G. Widing and J. D. Purcell, Astrophys. J. **204**, L151 (1976).
[86] E. Hinnov, the TFTR Operating Team, B. Denne, and the JET Operating Team, Phys. Rev. A **40**, 4357 (1989).
[87] Y. -K. Kim, D. H. Baik, P. Indelicato, and J. P. Desclaux, Phys. Rev. A **44**, 148 (1991).
[88] E. V. Aglitskii and A. M. Panin, Opt. Spectrosc. **58**, 453 (1985).
[89] L. A. Vainshtein and U. I. Safronova, Reprint No. 2, Acad. Nauk USSR, Inst. Spectrosc. Moscow (1985).
[90] B. Edlén, Phys. Scr. **19**, 255 (1979).
[91] L. Cohen, U. Feldman, M. Swartz, and J. H. Underwood, J. Opt. Soc. Am. **58**, 843 (1968).
[92] S. Morita, J. Phys. Soc. Jpn. **52**, 2673 (1983).
[93] E. V. Aglitsky, P. S. Antsiferov, S. L. Mandelstam, A. M. Panin, U. I. Safronova, S. A. Ulitin, and L. A. Vainshtein, Phys. Scr. **38**, 136 (1988).
[94] K. T. Cheng, M. H. Chen, W. R. Johnson, and J. Sapirstein, Phys. Rev. A **50**, 247 (1994).
[95] K. T. Cheng, private communication (1996).
[96] W. R. Johnson and G. Soff, Atom. Data Nucl. Data Tables **33**, 405 (1985).
[97] G. W. F. Drake, *Calculated transition frequencies for helium-like ions*, unpublished (1985).
[98] P. Beiersdorfer, M. Bitter, S. von Goeler, and K. W. Hill, Phys. Rev. A **40**, 150 (1989).
[99] P. J. Mohr, Atom. Data Nucl. Data Tables **3**, 453 (1983).
[100] G. W. Erickson, J. Phys. Chem. Ref. Data **6**, 831 (1977).
[101] W. L. Wiese, M. W. Smith, and B. M. Glennon, Natl. Stand. Ref. Data Ser. **4**, Vol. I (1966).
[102] S. M. Younger and A. W. Weiss, J. Res. Natl. Bur. Stand. Sec. **79A**, 629 (1975).
[103] B. C. Fawcett, N. J. Peacock, and R. D. Cowan, J. Phys. B **1**, 295 (1968).
[104] U. Feldman and L. Cohen, Astrophys. J. **149**, 265 (1967).
[105] J. R. Fuhr, G. A. Martin, W. L. Wiese, and S. M. Younger, J. Phys. Chem. Ref. Data **10**, 305 (1981).
[106] A. H. Gabriel, W. R. S. Garton, L. Goldberg, T. J. L. Jones, C. Jordan, F. J. Morgan, R. W. Nicholls, W. H. Parkinson, H. J. B. Paxton, E. M. Reeves, D. B. Shenton, R. J. Speer, and R. Wilson, Astrophys. J. **169**, 595 (1971).
[107] C. Jordan, Space Sci. Rev. **13**, 595 (1972).
[108] E. Ya. Kononov, A. N. Ryabtsev, U. I. Safronova, and S. S. Churilov, J. Phys. B **9**, L477 (1976).
[109] J. R. Fuhr, G. A. Martin, and W. L. Wiese, J. Phys. Chem. Ref. Data **17**, Suppl. 4. (1988).
[110] G. V. Peregudov, E. N. Ragozine, I. Yu Skobelev, A. V. Vinogradov, and E. A. Yukov, J. Phys. D **11**, 2305 (1978).
[111] J. E. Vernazza and E. M. Reeves, Astrophys. J., Suppl. Series **37**, 485 (1978).
[112] K. G. Widing, G. D. Sandlin, and R. D. Cowan, Astrophys. J. **169**, 405 (1971).
[113] K. G. Widing, Astrophys. J. **197**, L33 (1975).
[114] U. Litzén and A. Redfors, Phys. Lett. A **127**, 88 (1988).

2.9. Copper

2.9.1. Brief Comments on Each Copper Ion

Cu X

Ca I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^6 3d^2\ {}^3F_2$

Ionization energy 1 871 000 cm^{-1} (232 eV)

The lines of the $3p^6 3d^2 - 3p^5 3d^3$ transition array in the range of 132 – 155 Å were classified by Fawcett *et al.* [1]. They used vacuum spark observations and obtained a wavelength uncertainty of ±0.007 Å.

Alexander *et al.* [2] identified $3p^6 3d^2 - 3p^6 3d4f$ transitions in the wavelength range of 86.1 – 88.0 Å using vacuum spark observations. They identified the transitions ${}^1D_2 - {}^1D^\circ_2, {}^1F^\circ_3$ and ${}^3F - {}^3F^\circ, {}^3G^\circ$. Tabulated wavelengths are from improved measurements by Even-Zohar and Fraenkel [3], who classified five new lines due to the ${}^3P - {}^3D^\circ$, ${}^1D_2 - {}^3D^\circ_3$ and ${}^3F_4 - {}^3F^\circ_3$ transitions. Their wavelength uncertainty is ±0.005 Å.

The value for the ionization energy was obtained by Lotz [4] by extrapolation.

Cu XI

K I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^6 3d\ {}^2D_{3/2}$

Ionization energy 2 140 000 ± 2000 cm^{-1}
(265.3 ± 0.2 eV)

The transition arrays $3p^6 3d\ {}^2D - 3p^5 3d^2\ {}^2P^\circ, {}^2D^\circ, {}^2F^\circ$ in the range of 134.9 – 150.4 Å were first identified and measured by Goldsmith and Fraenkel [5] with an uncertainty of ±0.005 Å in a vacuum spark. Ramonas and Ryabtsev [6] remeasured the spectrum in a wider range with a wavelength uncertainty of ±0.003 Å using low-inductance vacuum sparks. They classified 16 lines in the range of 108 – 185 Å, and improved and extended the earlier analysis. Observing with a laser-produced plasma, Kaufman *et al.* [7] remeasured seven lines in the range of 134.9 – 149.5 Å with an uncertainty of ±0.005 Å, in agreement with those of Ref. [6]. The wavelengths are adopted from Ref. [6]. The line at 147.742 Å is classified as the $3p^6 3d\ {}^2D_{5/2} - 3p^5({}^2P^\circ)3d^2({}^3F)\ {}^2F^\circ_{7/2}$ transition in Ref. [6], but in Ref. [7] it is given as $3p^6 3d\ {}^2D_{5/2} - 3p^5({}^2P^\circ)3d^2({}^1G)\ {}^2F^\circ_{7/2}$. We have adopted the designations of Ref. [7].

The $3p^6 3d\ {}^2D - 3p^6 4f\ {}^2F^\circ$ doublet was first identified by Alexander *et al.* [8] in a vacuum spark. Even-Zohar and Fraenkel [3] extended the identifications to include $3p^6 3d\ {}^2D - 3p^6 nf\ {}^2F^\circ$ (n = 4 to 6) at 78 Å, 63 Å, and 57 Å. These wavelengths have an uncertainty of ±0.01 Å.

Hoory *et al.* [9] observed 15 lines in the range 72.3 – 76.3 Å with a vacuum spark and identified them as transitions from the $3p^5 3d4s\ {}^2P^\circ, {}^{2,4}D^\circ$, and ${}^{2,4}F^\circ$ levels to the ground $3p^6 3d\ {}^2D$ levels. The uncertainty of the wavelengths is ±0.005 Å.

The value for the ionization energy was derived from the three-member nf series by Sugar and Musgrove [10].

Cu XII

Ar I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^6\ {}^1S_0$

Ionization energy 2 975 000 cm^{-1} (368.8 eV)

Sugar *et al.* [11] observed the resonance transitions $3p^6\ {}^1S_0 - 3p^5 3d\ {}^3D^\circ_1$ at 174.739±0.005 Å and $3p^6\ {}^1S_0 - 3p^5 3d\ {}^1P^\circ_1$ at 139.175±0.005 Å. Earlier measurements of the allowed transition were made by Even-Zohar and Fraenkel [3] and Goldsmith and Fraenkel [5] from vacuum spark observations. Even-Zohar and Fraenkel also identified the $3p^6\ {}^1S_0 - 3p^5 4s\ (\frac{3}{2},\frac{1}{2})^\circ_1$, $(\frac{1}{2},\frac{1}{2})^\circ_1$ and $3p^5 4d\ (\frac{3}{2},\frac{5}{2})^\circ_1$, $(\frac{1}{2},\frac{3}{2})^\circ_1$ transitions in the range of 55 – 69 Å. The uncertainty of the wavelengths is ±0.01 Å.

Swartz *et al.* [12] identified 13 lines as $3p^5 3d - 3p^5 4f$ transitions in the range of 70 – 81 Å with a high-voltage vacuum spark.

The value for the ionization energy was obtained by Lotz [4] by extrapolation.

Cu XIII

Cl I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^5\ {}^2P^\circ_{3/2}$

Ionization energy 3 234 000 cm^{-1} (401 eV)

The magnetic-dipole transition within the ground configuration, $3s^2 3p^5\ {}^2P^\circ_{3/2} - {}^2P^\circ_{1/2}$ at 3500.4±0.3 Å, was identified by Hinnov *et al.* [13] and Denne *et al.* [14] utilizing tokamak plasmas.

Goldsmith and Fraenkel [5] first identified the $3p^5\ {}^2P^\circ - 3p^4({}^3P)3d\ {}^2D$ multiplet and the $3p^5\ {}^2P^\circ_{3/2} - 3p^4({}^3P)3d\ {}^2P_{3/2}$ transitions in the range of 138 – 145 Å with a three-electrode vacuum spark. New measurements of the $3p^5 - 3p^4 3d$ transitions in the range of 138 – 151 Å were provided by Kaufman *et al.* [15] with a laser-produced plasma. The uncertainty of the wavelengths is ±0.005 Å. The authors have communicated to us that the line at 148.318 Å should be removed from Ref. [15].

Fawcett and Hayes [16] observed two lines due to the transitions $3s^2 3p^4({}^3P)3d\ {}^4F_{9/2} - 3s^2 3p^4({}^3P)4f\ {}^4G^\circ_{11/2}$ at 66.18±0.05 Å and $({}^3P)\ {}^4D_{7/2} - ({}^3P)\ {}^4F^\circ_{9/2}$ at 65.24±0.05 Å in a laser-produced plasma.

The value for the ionization energy was obtained by Lotz [4] by extrapolation.

Cu XIV

S I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^4$ $^3P_2$

Ionization energy 3 508 000 cm^{-1} (435 eV)

The magnetic-dipole line $3s^23p^4$ $^3P_2 - {}^3P_1$ at 4183.4±0.3 Å was identified by Denne *et al.* [14], and the intercombination transition $^3P_1 - {}^1S_0$ transition at 1190.4±0.5 Å was identified by Roberts *et al.* [17]. Both lines were observed in tokamak discharges.

Fawcett and Hayes [16] first identified the $3s^23p^4$ $^3P_2 - 3s^23p^3(^4S^\circ)3d$ $^3D^\circ_3$ transition at 148.30±0.03 Å in a laser-produced plasma. Recently, Sugar and Kaufman [18] reported measurements of the $3s^23p^4 - 3s3p^5$ transitions in the range of 250 – 302 Å and of the $3s^23p^4 - 3s^23p^33d$ transitions in the range of 140 – 189 Å. From an isoelectronic study of this sequence Kaufman *et al.* [19] revised some of the classifications and gave improved wavelengths with an uncertainty of ±0.007 Å.

Fawcett and Hayes [16] also identified the transitions $3s^23p^33d$ $^3G^\circ_5 - 3s^23p^34f$ $^3H_6$ at 61.70±0.05 Å and $^5D^\circ_4 - {}^5F_5$ at 61.08±0.05 Å.

The value for the ionization energy was obtained by Lotz [4] by extrapolation.

Cu XV

P I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^3$ $^4S^\circ_{3/2}$

Ionization energy 3 903 000 cm^{-1} (484 eV)

Denne *et al.* [14,20] identified the two magnetic-dipole lines $3s^23p^3$ $^4S^\circ_{3/2} - {}^2D^\circ_{3/2}$ and $^4S^\circ_{3/2} - {}^2P^\circ_{3/2}$ in tokamak discharges. Their wavelengths of 2085.3±0.2 Å and 944.6±0.2 Å are from the latter article.

The first measurement of $3p^3 - 3p^23d$ transitions was reported by Fawcett and Hayes [16], who identified the $^4S^\circ_{3/2}$ – (^{3}P) $^4P_{5/2}$ and $^2D^\circ_{5/2}$ – (^{3}P) $^2F_{7/2}$ lines at 161.34±0.03 Å and 154.67±0.03 Å. New measurements and classifications by Sugar and Kaufman [18] included seven lines in the range of 154.7 – 172.8 Å. Wavelengths were measured in a laser-produced plasma with an uncertainty of ±0.01 Å. All the wavelengths tabulated have been reduced by 0.02 Å, as suggested by them [21]. Hutton *et al.* [22] reported observations in a beam-foil spectrum of the $3s^23p^3 - 3s3p^4$, $3s^23p^23d$ lines in the range of 154 – 297 Å. We use their classifications and the more accurate measurements by Sugar *et al.* [23], except for the lines at 157.9 Å and 155.1 Å. It should be noted that the classifications of the lines at 172.821 Å, 169.923 Å and 158.944 Å in Ref. [18] have been revised.

The transitions $3s^23p^23d$ $^2G_{9/2} - 3s^23p^24f$ $^2H^\circ_{11/2}$ at 57.52±0.01 Å and $^4F_{9/2} - {}^4G^\circ_{11/2}$ at 57.44±0.01 Å were observed by Fawcett and Hayes [16] in a laser-produced plasma.

The value for the ionization energy was obtained by Lotz [4] by extrapolation.

Cu XVI

Si I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^2$ $^3P_0$

Ionization energy 4 194 000 cm^{-1} (520 eV)

The magnetic-dipole transitions within the ground configuration $3s^23p^2$ $^3P_0 - {}^3P_1$ at 5375.8±0.3 Å, $^3P_2 - {}^1D_2$ at 2539.7±0.3 Å, and $^3P_1 - {}^1S_0$ at 952.8±0.3 Å were observed by Denne *et al.* [14] and $^3P_1 - {}^1D_2$ at 1871.3±0.2 Å by Roberts *et al.* [17] in tokamak discharges. Datla *et al.* [24] assigned a new wavelength of 2544.7 Å for the $^3P_2 - {}^1D_2$ line.

Fawcett and Hayes [16] identified only the $3s^23p^2$ $^3P_2 - 3s^23p3d$ $^3D^\circ_3$ transition at 168.80±0.03 Å with a laser-produced plasma. Sugar and Kaufman [18] provided identifications for 10 lines of the $3s^23p^2 - 3s3p^3$ array and for 11 lines of $3s^23p^2 - 3s^23p3d$ in the ranges of 195 – 298 Å and 164 – 185 Å, respectively. With a laser-produced plasma wavelengths were obtained with an uncertainty of ±0.005 Å. Sugar *et al.* [25] have revised the analysis in a study of the isoelectronic sequence. In a series of beam-foil measurements by Träbert [26] and Träbert *et al.* [27,28], the $3s^23p^2$ $^3P_{2,1} - 3s3p^3$ $^5S^\circ_2$ intercombination transitions were observed at 410.46±0.4 Å and 387.56±0.4 Å. The latter line is blended.

Observations in the range of 44 – 56 Å were performed by Khan [29] with a laser-produced plasma and by Kastner *et al.* [30] with a vacuum spark. The $3s^23p3d - 3s^23p4f$ and $3s^23p^2 - 3s^23p4d$ lines were classified in both cases, but with wavelength differences of about 0.2 Å. For these transitions, wavelengths are taken from Ref. [30]. In addition, we have tabulated the wavelengths of the $3s^23p^2 - 3s^23p4s$ transitions from Ref. [29] and those of the $3s3p^3 - 3s^23p4f$ transitions tentatively identified in Ref. [30]. However, the wavelengths of 52.85 Å and 52.18 Å for the $3s^23p^2$ $^3P_{2,1} - 3s^23p4s$ $^3P^\circ_2$ transitions in Ref. [29] lead to an incorrect ^{3}P ground term splitting.

The value for the ionization energy was obtained by Lotz [4] by extrapolation.

Cu XVII

Al I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p\ ^2P^\circ_{1/2}$

Ionization energy 4 493 000 cm^{-1} (557 eV)

Hinnov *et al.* [13] and Denne *et al.* [14] observed the $3s^23p\ ^2P^\circ_{1/2} - {}^2P^\circ_{3/2}$ magnetic-dipole transition in tokamak plasmas. The wavelength value of 3007.6±0.2 Å is from Ref. [14].

Träbert *et al.* [27,28] identified the $3s^23p\ ^2P^\circ - 3s3p^2\ ^4P$ intercombination transitions with five lines in the range of 342 – 411 Å in a beam-foil spectrum. Wavelengths are taken from the latter article. The line at 387.0±0.5 Å is blended.

Fawcett and Hayes [16] classified three lines at 218.76 Å, 183.47 Å, and 174.12 Å observed in a laser-produced plasma as the $3s^23p\ ^2P^\circ_{3/2} - 3s3p^2\ ^2P_{3/2}$ and $3s^23p - 3s^23d$ ($^2P^\circ_{3/2} - {}^2D_{5/2}$, $^2P^\circ_{1/2} - {}^2D_{3/2}$) transitions. An extended analysis of the $3s^23p - 3s3p^2$, $3s3p^2 - 3p^3$, and $3s^23p - 3s^23d$ transitions was carried out by Sugar and Kaufman [18] with a laser-produced plasma and subsequently by Buchet-Poulizac and Buchet [31] in a beam-foil source. Sugar *et al.* [32] reobserved these transitions of Cu^{16+} to Mo^{29+} in a tokamak discharge and made revisions and additions to the previous work. We adopted their wavelengths, which were smoothed by utilizing multiconfiguration Dirac-Fock calculations along the isoelectronic sequence. The wavelength of the $3s3p^2\ ^4P_{1/2} - 3p^3\ ^4S^\circ_{3/2}$ transition was given as 223.170±0.01 Å in Ref. [32] and as 223.181±0.01 Å by Litzén and Redfors [33]. Buchet-Poulizac and Buchet identified the $3s3p^2 - 3s3p3d$ transitions with five lines in the range of 176 – 201 Å. Their wavelengths have an uncertainty of ±0.05 Å except the blended lines at 188.19±0.2 Å and 180.70±0.2 Å.

Khan [29] observed 11 lines in the wavelength range of 42 – 53 Å with a laser-produced plasma, and classified the $3s^23d - 3s^24f$, $3s3p^2 - 3s3p4s$, $3s3p3d - 3s3p4f$, and $3s^23p - 3s^24s$,$3s^24d$ transitions. The wavelength uncertainties are ±0.02 Å.

The value for the ionization energy was obtained by Lotz [4] by extrapolation.

Cu XVIII

Mg I isoelectronic sequence

Ground state: $1s^22s^22p^63s^2\ ^1S_0$

Ionization energy 5 105 000 cm^{-1} (632.9 eV)

The magnetic-dipole transition $3s3p\ ^3P^\circ_1 - {}^3P^\circ_2$ at 3941.6±0.3 Å was observed in a tokamak plasma by Denne *et al.* [14].

The singlet and triplet transitions $3s3p - 3s3d$ in addition to the $3s^2\ ^1S_0 - 3s3p\ ^1P^\circ_1$ resonance transition were classified by Fawcett and Hayes [16]. Finkenthal *et al.* [34] identified the $3s^2\ ^1S_0 - 3s3p\ ^3P^\circ_1$ intercombination transition with a line at 345.6±0.5 Å in a tokamak discharge. Sugar and Kaufman [18] classified a large number of lines of the arrays $3s3p - 3p^2$, $3s^2 - 3s3p$, and $3s3p - 3s3d$ in the range of 185 – 270 Å. In a subsequent paper of Sugar and Kaufman [35] the arrays $3p^2 - 3p3d$ and $3s3d - 3p3d$ were added. Sugar and Kaufman [21] made some additions and revisions and suggested that the wavelengths given in Refs. [18] and [35] should be reduced by 0.02 Å. In this compilation, we give their results as summarized in a paper by Sugar *et al.* [36] on the Mg I isoelectronic sequences. The uncertainty of the wavelengths is ±0.005 Å. Additional identifications were made by Litzén and Redfors [37], from which five new lines, including the spin-forbidden lines $3s3p\ ^1P^\circ_1 - 3p^2\ ^3P_2$ at 346.44 Å, $3s3p\ ^3P^\circ_2 - 3p^2\ ^1D_2$ at 274.01 Å, and $3p^2\ ^1D_2 - 3p3d\ ^3F^\circ_2$ at 228.16 Å, are taken. These wavelengths have an uncertainty of ±0.02 Å. In an analysis of a beam-foil spectrum by Buchet-Poulizac and Buchet [31], $n = 3 - 3$ lines were reported which include two new lines at 272.30±0.2 Å and 198.56±0.05 Å, corresponding to the $3s3d\ ^3D_2 - 3p3d\ ^3D^\circ_2$ and $3s3p\ ^3P^\circ_2 - 3s3d\ ^3D_1$ transitions, respectively. The latter one is 0.1 Å longer than the wavelength recalculated from the level values. Redfors [38] identified two lines of the array $3p3d - 3d^2$ at 219.410 Å and 240.028 Å. These observations were extended to seven lines by Sugar *et al.* [36].

Feldman *et al.* [39] measured wavelengths in the range of 30 – 50 Å and identified the arrays $3s^2 - 3s4p$, $3s3p - 3s4s$, $3s3p - 3snd$ ($n = 4,5$), and $3s3d - 3snf$ ($n = 4,5$). The measurements were made in a low-inductance vacuum spark, and the wavelengths have an uncertainty of ±0.01 Å. The identifications were extended by Kastner *et al.* [30] to include the $3p3d - 3p4f$ transitions in the range of 48.8 – 51.5 Å with a similar light source. The $3p3d\ ^3F^\circ_3 - 3p4f\ ^3F_4$ line at 48.783 Å has been omitted because it is inconsistent with the $^3F_4$ level obtained from the line at 50.067 Å. In addition, the line at 50.306 Å given as questionable by Kastner *et al.* has been excluded. The wavelength of 49.885 Å for the $^3F^\circ_2 - {}^3G_3$ transition identified as a blended line is apparently a misprint and should be 48.885 Å. Khan [29] proposed four new classifications of these arrays, but they do not fit with the level scheme of Kastner *et al.*

Swartz *et al.* [40] identified the $2p^63s^2\ ^1S_0 - 2p^53s^23d\ ^1P^\circ_1$ inner-shell transition at 11.774 Å. This observation was made with a low-inductance vacuum spark with an uncertainty of ±0.001 Å.

The value for the ionization energy was obtained by Lotz [4] by extrapolation.

Cu XIX

Na I isoelectronic sequence

Ground state $1s^22s^22p^63s\ ^2S_{1/2}$

Ionization energy 5 408 660 ± 250 cm^{-1}
(670.588 ± 0.003 eV)

The $n = 3 - 3$ transitions were first observed by Feldman *et al.* [39] in a low-inductance vacuum spark. They identified the $3s\ ^2S_{1/2} - 3p\ ^2P^\circ_{3/2}$ resonance transition at 273.34 Å and the $3p\ ^2P^\circ - 3d\ ^2D$ transition array in the range of 207 – 224 Å. Improved and extended measurements were made by Kononov *et al.* [41] and Sugar and Kaufman [18] with laser-produced plasmas. From an isoelectronic comparison of the measured wavelengths of the $3s - 3p$ and the $3d - 4f$ doublets with Dirac-Fock calculations, Reader *et al.* [42] derived least squares adjusted wavelength values for these transitions with an uncertainty of ±0.007 Å, which are adopted in the present compilation.

Jupén *et al.* [43] identified the line at 210.70±0.05 Å measured by Buchet-Poulizac and Buchet [31] in a beam-foil spectrum to the core-excited $2p^53s3p\ ^4D_{7/2} - 2p^53s3d\ ^4F^\circ_{9/2}$ transition.

Kononov *et al.* [44] identified the $4f\ ^2F^\circ - 5g\ ^2G$ doublet at 111 Å and Kononov *et al.* [41] reported the $4d\ ^2D - 5f\ ^2F^\circ$ doublet and the $4p\ ^2P^\circ_{3/2} - 5d\ ^2D_{5/2}$ and $4s\ ^2S_{1/2} - 5p\ ^2P^\circ_{3/2}$ transitions in the range of 85 – 103 Å with an uncertainty of ±0.005 Å. The $4f\ ^2F^\circ - 5g\ ^2G$ and $4d\ ^2D - 5f\ ^2F^\circ$ doublets were remeasured by Sugar and Kaufman [18] in a laser-produced plasma with an uncertainty of ±0.01 Å. We give the wavelengths of Kononov *et al.*

Feldman *et al.* [39] also reported measurements for the $3s-np\ (n = 4-6), 3p-nd\ (n = 4-8), 3d-nf\ (n = 5-8)$ transitions in the range of 22 – 46 Å. Their wavelengths were measured with an uncertainty of ±0.01 Å. Fawcett and Hayes [16] and Khan [29] identified the $3d\ ^2D - 4p\ ^2P^\circ$ doublet at ~53 Å. Improved measurements of the wavelengths were reported by Kononov *et al.* [41] for 21 lines due to the $3s - 4p$, $5p$, $3p - 4snd\ (n = 4 - 6), 3d - 4p$, and $3d - nf\ (n = 4 - 7)$ transitions. These results are adopted except for the blended doublet $3d\ ^2D - 7f\ ^2F^\circ$ at 26.44 Å. For $3s - 6p$, $3p - 7d$, $8d$, and $3d - 7f$, $8f$ the wavelengths of Ref. [39] are taken. The identification of the $3d\ ^2D - 8f\ ^2F^\circ$ doublet at 25.175 Å and 25.142 Å in Ref. [39] is tentative.

Feldman and Cohen [45] identified the resonance line $2p^63s\ ^2S_{1/2} - 2p^53s^2\ ^2P^\circ_{3/2}$ at 13.11±0.01 Å using a low-inductance vacuum spark.

The value for the ionization energy was derived by Kononov *et al.* [41] from core-polarization theory applied to the $5g$ term.

Cu XX

Ne I isoelectronic sequence

Ground state $1s^22s^22p^6\ ^1S_0$

Ionization energy 13 630 000 cm^{-1} (1697 eV)

Twelve lines of the $2s^22p^53s - 2s^22p^53p$ array in the range of 163 – 341 Å and 12 lines of the $2s^22p^53p - 2s^22p^53d$ array in the range of 212 – 272 Å were observed by Buchet *et al.* [46] in a beam-foil study. The uncertainty of the wavelengths is ±0.05 Å. For the weak line at 163.6 Å it is ±0.1 Å.

Feldman *et al.* [47] classified seven resonance transitions from the $2s^22p^53s$, $2s^22p^53d$, and $2s2p^63p\ J = 1$ levels to the ground $2s^22p^6\ ^1S_0$ level in the range of 10.6 – 12.8 Å using a low-inductance vacuum spark. Further classifications were given by Feldman and Cohen [48] for the $2p^6 - 2p^54d$ transitions and by Swartz *et al.* [40] for the $2p^6 - 2p^54s$, $2p^55d$ and $2p^56d$ transitions. Boiko *et al.* [49] measured these transitions again in their extensive investigation. We give the wavelengths for these transitions from the comprehensive observations of Gordon *et al.* [50] with a laser-produced plasma, including three new lines: $2s^22p^6\ ^1S_0 - 2s^22p^54d\ (\frac{3}{2},\frac{3}{2})^\circ_1$ at 9.274 Å, $2s^22p^6\ ^1S_0 - 2s2p^64p\ (\frac{1}{2},\frac{1}{2})^\circ_1$ at 8.400 Å, and $2s^22p^6\ ^1S_0 - 2s2p^64p\ (\frac{1}{2},\frac{3}{2})^\circ_1$ at 8.385 Å. The uncertainty of the wavelengths is ±0.005 Å. The $2s^22p^6 - 2s2p^64p$ transitions are also identified by Hutcheon *et al.* [51].

The value for the ionization energy was obtained by Lotz [4] by extrapolation.

Cu XXI

F I isoelectronic sequence

Ground state $1s^22s^22p^5\ ^2P^\circ_{3/2}$

Ionization energy 14 508 400 cm^{-1} (1798.82 eV)

The magnetic-dipole transition within the ground $2s^22p^5$ configuration, $^2P^\circ_{3/2} - {}^2P^\circ_{1/2}$ at 592.3±0.3 Å, was observed in a tokamak discharge by Hinnov *et al.* [13].

Buchet-Poulizac and Buchet [31] identified eight lines of the $2s^22p^43s - 2s^22p^43p$ array in the range of 279 – 346 Å and seven lines of the $2s^22p^43p - 2s^22p^43d$ array in the range of 245 – 264 Å in beam-foil spectra. The uncertainty of the wavelengths is ±0.05 Å except for blended lines at 279.40 Å and 257.50 Å, for which it is ±0.2 Å.

Kononov *et al.* [44] first identified the $2s^22p^5\ ^2P^\circ - 2s2p^6\ ^2S$ transitions at 90.353±0.01 Å and 78.388±0.01 Å in a laser-produced plasma. These lines were remeasured in laser-produced plasmas by Behring *et al.* [52] and Sugar and Kaufman [18] with uncertainties of ±0.02 Å and ±0.01 Å, respectively. Tabulated wavelengths are taken from Ref. [18]. The values have been reduced by 0.02 Å, as suggested by Sugar and Kaufman [21].

The $2p^5 - 2p^43s$ and $2p^43d$ transition arrays in the ranges of 11.7 – 12.2 Å and 10.8 – 11.4 Å were identified by Boiko *et al.* [53,54,55], and remeasured by Hutcheon *et al.* [51] and Gordon *et al.* [50] in laser-produced plasmas. Wavelengths adopted in this compilation are mainly from Ref. [50]. Ref. [51] includes additional classifications for two lines at 12.029 Å and 11.352 Å. Wavelengths in Refs. [50] and [51] have uncertainties of ±0.005 Å and ±0.002 Å, respectively.

Gordon *et al.* [50] also identified the $2s^22p^5 - 2s2p^53p$ transitions in the range of 9.9 – 10.4 Å.

The $2p^5 - 2p^44s$ and $2p^44d$ lines were observed by Gordon *et al.* [50] and Hutcheon *et al.* [56] in the ranges of 8.6 – 9 Å and 8.5 – 8.8 Å. They are mostly blends and are not suitable for classification.

For the ionization energy we use a value calculated by Cheng [57] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [58].

Cu XXII

O I isoelectronic sequence

Ground state $1s^22s^22p^4\ ^3P_2$

Ionization energy 15 462 700 cm^{-1} (1917.13 eV)

Two magnetic-dipole transitions within the ground $2s^22p^4$ configuration, $^3P_2 - {}^3P_1$ at 657.7±0.3 Å and $^3P_2 - {}^1D_2$ at 420.0±0.3 Å, were observed by Hinnov *et al.* [13] in a tokamak discharge.

The $2s^22p^4 - 2s2p^5$ transitions were identified and measured by Kononov *et al.* [44] and Behring *et al.* [52], and the $2s2p^5\ ^1P^\circ_1 - 2p^6\ ^1S_0$ line by Peregudov *et al.* [59]. These transitions were remeasured by Ekberg *et al.* [60] in a laser-produced plasma. They identified two intercombination transitions: $2s^22p^4\ ^1D_2 - 2s2p^5\ ^3P^\circ_2$ at 114.974±0.015 Å and $2s2p^5\ ^3P^\circ_1 - 2p^6\ ^1S_0$ at 74.383±0.015 Å, in addition to the earlier identifications. For the $2s^22p^4\ ^3P_2 - 2s2p^5\ ^1P^\circ_1$ intercombination transition the wavelength of 65.43±0.01 Å is adopted from Kononov *et al.*, because it gives a consistent value of the $^1P^\circ_1$ term with the lines at 93.302 Å and 77.512 Å.

The $2p^4 - 2p^33s$, $2p^33d$ and $2p^34d$ transitions were classified by Gordon *et al.* [50] in the ranges of 11 – 12 Å, 10.3 – 10.6 Å, and 8.0 – 8.4 Å. The uncertainty of the wavelengths is ±0.005 Å. Many of the lines are multiply classified and are not suitable for deriving energy levels.

For the ionization energy we use a value calculated by Cheng [57] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [58].

Cu XXIII

N I isoelectronic sequence

Ground state $1s^22s^22p^3\ ^4S^\circ_{3/2}$

Ionization energy 16 476 000 cm^{-1} (2042.76 eV)

Hinnov *et al.* [13] observed two magnetic-dipole transitions between the ground $2s^22p^3$ levels, $^4S^\circ_{3/2} - {}^2D^\circ_{3/2}$ at 585.0±0.3 Å and $^4S^\circ_{3/2} - {}^2D^\circ_{5/2}$ at 434.8±0.3 Å, in a tokamak plasma.

The $2s^22p^3 - 2s2p^4$ transitions were identified by Kononov *et al.* [44] and also by Behring *et al.* [52] with laser-produced plasmas. For the $2s2p^4 - 2p^5$ transitions, only the $^2D_{5/2} - {}^2P^\circ_{3/2}$ line at 96.762 Å was reported in Ref. [52]. With stronger laser excitation Ekberg *et al.* [60] identified two lines at 80.057 Å and 70.073 Å as the $2s^22p^3\ ^4S^\circ_{3/2} - 2s2p^4\ ^2D_{3/2},{}^2S_{1/2}$ spin-forbidden transitions in addition to 12 lines of the $2s^22p^3 - 2s2p^4$ array and four lines of the $2s2p^4 - 2p^5$ array. The wavelengths adopted from Ref. [60] have an uncertainty of ±0.015 Å.

For the ionization energy we use a value calculated by Cheng [57] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [58].

Cu XXIV

C I isoelectronic sequence

Ground state $1s^22s^22p^2\ ^3P_0$

Ionization energy 17 603 400 cm^{-1} (2182.54 eV)

Hinnov *et al.* [13] identified the magnetic-dipole transitions between the ground $2s^22p^2$ levels, $^3P_1 - {}^3P_2$ at 1776.0 Å, $^3P_0 - {}^3P_1$ at 756.9 Å, and $^3P_{2,1} - {}^1D_2$ at 540.0 Å and 414.1 Å, in a tokamak plasma. The wavelengths have an uncertainty of ±0.3 Å.

Ekberg *et al.* [60] reported lines of the $2s^22p^2 - 2s2p^3$ and $2s2p^3 - 2p^4$ arrays, including the $2s^22p^2\ ^3P_2 - 2s2p^3\ ^1D^\circ_2$ spin-forbidden transition at 82.195 Å. The uncertainty of the wavelengths is ±0.015 Å.

For the ionization energy we use a value calculated by Cheng [57] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [58].

Cu XXV

B I isoelectronic sequence

Ground state $1s^22s^22p\ ^2P^\circ_{1/2}$

Ionization energy 18 614 400 cm^{-1} (2307.89 eV)

The magnetic-dipole transition $2s^22p\ ^2P^\circ_{1/2} - {}^3P^\circ_{3/2}$ at 522.8±0.3 Å was observed in a tokamak plasma by Hinnov *et al.* [13].

Ekberg *et al.* [60] identified the $2s2p^2\ ^4P - 2p^3\ ^4S^\circ$ array at 117.507 Å, 107.659 Å, and 97.272 Å in a laser-produced plasma. The wavelength uncertainty is ±0.015 Å. We use the estimated value for the $2p^3\ ^4S^\circ$ level given by Edlén [61] and denote the error by "x".

For the ionization energy we use a value calculated by Cheng [57] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [58].

Cu XXVI

Be I isoelectronic sequence

Ground state $1s^22s^2\ ^1S_0$

Ionization energy 20 003 000 cm^{-1} (2480.06 eV)

In a tokamak plasma, Hinnov *et al.* [13] identified the $2s2p\ ^3P^\circ_1 - {}^3P^\circ_2$ magnetic-dipole transition at 648.0±0.3 Å and also two lines at 227.8±0.3 Å and 111.2±0.3 Å as transitions from the $2s2p\ ^{3,1}P^\circ_1$ levels to the ground level, respectively. The more accurate wavelength of 227.808±0.010 Å and 111.186±0.010 Å measured by Hinnov and reported by Denne *et al.* [62] are adopted here.

New identifications in a beam-foil spectrum were made by Buchet *et al.* [63] of the $2s2p - 2p^2$ transitions in the range of 113 – 173 Å, including the spin-forbidden transition $^3P^\circ_2 - {}^1D_2$ at 113.14±0.10 Å.

Brown *et al.* [64] classified the $2p3d - 2p4f$ and $2s3d - 2s4f$ transitions at about 27 Å, in addition to the $n = 2 - 3$ transitions in the range of 8.5 – 9.8 Å, which were previously observed by Boiko *et al.* [49,65]. The wavelengths are taken from Ref. [64], except for 9.520 Å and 9.233 Å from Ref. [65]. The uncertainty of the wavelengths is ±0.010 Å for lines longer than 12 Å and ±0.005 Å for shorter wavelengths. Many of the lines in the range of 8.5 Å to 9.8 Å have multiple classifications. We omit these lines pending further confirmation.

For the ionization energy we use a value calculated by Cheng [57] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [58].

Cu XXVII

Li I isoelectronic sequence

Ground state $1s^22s\ ^2S_{1/2}$

Ionization energy 20 870 000 ± 10 000 cm^{-1}
(2587.5 ± 1 eV)

The two resonance transitions $1s^22s\ ^2S_{1/2}$-$1s^22p\ ^2P^\circ_{1/2,3/2}$ at 224.8± 0.3 Å and 153.6± 0.3 Å were observed in a tokamak plasma by Hinnov *et al.* [13]. More accurate wavelengths were obtained by Knize *et al.* [66] with a similar source. They were then reobserved by Hinnov *et al.* [67] and Knize [68]. Kim *et al.* [69] have smoothed the energies of these transitions for Li-like ions with respect to calculated values. We use their smoothed values.

Brown *et al.* [64] using a laser-produced plasma classified the $3d\ ^2D_{5/2} - 4p\ ^2P^\circ_{3/2}$, $3d\ ^2D - 4f\ ^2F^\circ$, $3p\ ^2P^\circ - 4d\ ^2D$, and $3s\ ^2S_{1/2} - 4p\ ^2P^\circ_{3/2}$ transitions in the wavelength range of 24.2 – 25.9 Å with an uncertainty of ±0.010 Å and the $2p\ ^2P^\circ - 3s\ ^2S$, $2p\ ^2P^\circ - 3d\ ^2D$, and $2s\ ^2S - 3p\ ^2P^\circ$ arrays in the range of 8.4 – 9.0 Å with an uncertainty of ±0.005 Å.

Vainshtein and Safronova [70] calculated energy levels of the $1s^2nl$ configurations with $n = 2 - 5$, and $l = s, p$, and d. We use their energy levels adjusted to the $1s^22p\ ^2P^\circ_{1/2,3/2}$ levels of Kim *et al.* by adding 340 cm^{-1}. They also calculated wavelengths of the $1s^22s - 1s2s2p$, $1s^22p - 1s2p^2$, and $1s^22p - 1s2s^2$ transitions. We use their results to derive these autoionizing levels.

Aglitskii and Panin [71] identified the inner-shell transitions $1s^22p\ ^2P^\circ_{3/2} - 1s2pnp\ ^2D_{5/2} (n = 3, 4)$ at 1.272± 0.002 Å and 1.213±0.002 Å in a low-inductance vacuum spark.

The value for the ionization energy was obtained by Brown *et al.* [64] using core-polarization.

Cu XXVIII

He I isoelectronic sequence

Ground state $1s^2\ ^1S_0$

Ionization energy 89 224 700 ± 4000 cm^{-1}
(11 062.48 ± 0.5 eV)

The $1s^2\ ^1S_0 - 1s2p\ ^1P^\circ_1$ resonance line was observed at 1.47758±0.00007 Å by Aglitsky *et al.* [72]. The earlier measurements are less accurate. The $1s^2\ ^1S_0 - 1snp\ ^{3,1}P^\circ_1$ $(n = 3 - 5)$ transitions were reported by Aglitskii and

Panin [71], but the singlets and triplets were not resolved. Turechek and Kunze [73] identified the forbidden transitions $1s^2\ ^1S_0 - 1s2p\ ^3P^{\circ}_{2,1}$ at 1.4805±0.001 Å and 1.4840±0.0005 Å and also the transitions $1s2p\ ^1P^{\circ}_1 - 2p^2\ ^1S_0, ^1D_2$ at 1.430 Å and 1.435 Å.

Cheng *et al.* [74] give calculated binding energies for the ground and n=2 singlet states of selected He-like ions. We use a later calculation of both singlet and triplet states by Cheng [75] for all elements from Ti through Cu and Kr for the n = 1 and 2 configurations. With these data and the binding energy of the H-like ions [76] we obtain the value for the ionization energy of the He-like ions. For the $1s3l$ states we use the level values from Drake [77].

The levels $1s4l$ and $5l$ calculated by Vainshtein and Safronova [70] have been tabulated after increasing them by 1600 cm^{-1} to correspond with corrected values of lower n by Drake. All wavelengths have been derived from differences of the adopted energy levels.

For the $1s2s - 2s2p$, $1s2p - 2s^2$, and $1s2p - 2p^2$ transitions we have adopted the calculated wavelengths of Vainshtein and Safronova [70] without correction.

Cu XXIX

H I isoelectronic sequence

Ground state $1s\ ^2S_{1/2}$

Ionization energy 93 299 090 ± 30 cm^{-1}
(11 567.617 ± 0.004 eV)

We have tabulated the wavelengths calculated from the theoretical level energies by Johnson and Soff [76] for the n = 2 shell, which are in close agreement with those by Mohr [79]. All levels with $n = 3 - 5$ are available from the work of Erickson [80]. For the ns and np ($n = 3 - 5$) levels, Erickson's values for the binding energies were subtracted from the ground state binding energy given by Johnson and Soff to obtain the predicted wavelengths. The error in the $1s$ binding energy is given in Ref. [76] as ±30 cm^{-1}.

The value for the ionization energy is from Johnson and Soff [76].

2.9.2. Spectroscopic Data for Cu X through Cu XXIX

Cu X

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
154.591	$3p^6 3d^2\ ^3F_2$	$3p^5(^2P^o)3d^3(^2H)\ ^3G^o_3$	0	646 870	4				1
154.363	3	4	2 486	650 310	3				1
153.767	4	5	5 487	655 820	6				1
153.711[L]	$3p^6 3d^2\ ^1G_4$	$3p^5(^2P^o)3d^3(^2G)\ ^1H^o_5$			4				1
140.071	$3p^6 3d^2\ ^3F_2$	$3p^5(^2P^o)3d^3(^4F)\ ^3F^o_2$	0	713 920	7				1
139.868	3	3	2 486	717 450	6				1
139.771	4	4	5 487	720 940	7				1
137.036[L]	$3p^6 3d^2\ ^1G_4$	$3p^5(^2P^o)3d^3(^2H)\ ^1G^o_4$			6				1
133.034	$3p^6 3d^2\ ^3F_4$	$3p^5(^2P^o)3d^3(^4F)\ ^3D^o_3$	5 487	757 170	7				1
132.478	3	2	2 486	757 330	5				1
132.240	2	1	0	756 200	3				1
88.032	$3p^6 3d^2\ ^3P_2$	$3p^6 3d4f\ ^3D^o_3$	30 600+x	1 166 550+x	12				3
88.020[L]	1	2			6				3
87.983[L]	0	1			4				3
87.932	$3p^6 3d^2\ ^1D_2$	$3p^6 3d4f\ ^1D^o_2$	23 900+x	1 161 140+x	10				2, 3°
87.703	$3p^6 3d^2\ ^1D_2$	$3p^6 3d4f\ ^1F^o_3$	23 900+x	1 164 110+x	10				2, 3°
87.516	$3p^6 3d^2\ ^1D_2$	$3p^6 3d4f\ ^3D^o_3$	23 900+x	1 166 550+x	5				3
87.135	$3p^6 3d^2\ ^3F_4$	$3p^6 3d4f\ ^3F^o_3$	5 487	1 153 140					3
87.018	4	4	5 487	1 154 670	9				2, 3°
86.964	3	2	2 486	1 152 390					2, 3°
86.907	3	3	2 486	1 153 140	9				2, 3°
86.792	3	4	2 486	1 154 670	1				2, 3°
86.776	2	2	0	1 152 390	9				2, 3°
86.720	2	3	0	1 153 140	1				2, 3°
86.422	$3p^6 3d^2\ ^3F_4$	$3p^6 3d4f\ ^3G^o_4$	5 487	1 162 520	1				2, 3°
86.336	4	5	5 487	1 163 750	14				2, 3°
86.204	3	4	2 486	1 162 520	10				2, 3°
86.160	2	3	0	1 160 630	10				2, 3°

Cu XI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
184.320	$3p^6 3d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1G)\ ^2F^o_{7/2}$	4 060	546 595	40				6
180.001	$3p^6 3d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1D)\ ^2F^o_{7/2}$	4 060	559 612	100				6
171.875	$_{3/2}$	$_{5/2}$	0	581 818	50				6
150.369	$3p^6 3d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2F^o_{5/2}$	4 060	669 100	30				5,6°
149.455	$_{3/2}$	$_{5/2}$	0	669 100	320				5,6°,7
147.742	$_{5/2}$	$_{7/2}$	4 060	680 940	350				5,6°,7
136.386	$3p^6 3d\ ^2D_{3/2}$	$3p^5(^2P^o)3d^2(^3P)\ ^2P^o_{1/2}$	0	733 240	250				5,6°,7
136.034	$_{5/2}$	$_{3/2}$	4 060	739 200	350				5,6°,7
135.286	$_{3/2}$	$_{3/2}$	0	739 200	100				5,6°,7
135.734	$3p^6 3d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2D^o_{5/2}$	4 060	740 770	500				5,6°,7
135.655	$_{5/2}$	$_{3/2}$	4 060	741 240	90				5,6°
134.989	$_{3/2}$	$_{5/2}$	0	740 770	120				5,6°
134.914	$_{3/2}$	$_{3/2}$	0	741 240	400				5,6°,7
108.878	$3p^6 3d\ ^2D_{3/2}$	$3p^6 4p\ ^2P^o_{1/2}$	0	918 459	70				6
108.479	$_{5/2}$	$_{3/2}$	4 060	925 897	100				6
108.002	$_{3/2}$	$_{3/2}$	0	925 897	5				6
78.786	$3p^6 3d\ ^2D_{5/2}$	$3p^6 4f\ ^2F^o_{7/2}$	4 060	1 273 300	13				3°,8
78.542	$_{3/2}$	$_{5/2}$	0	1 273 200	12				3°,8
76.256	$3p^6 3d\ ^2D_{5/2}$	$3p^5 3d(^3P^o)4s\ ^2P^o_{3/2}$	4 060	1 315 420	2				9
76.022	$_{3/2}$	$_{3/2}$	0	1 315 420					9
75.866	$3p^6 3d\ ^2D_{5/2}$	$3p^5 3d(^3F^o)4s\ ^4F^o_{7/2}$	4 060	1 322 170	1				9
75.472	$_{3/2}$	$_{5/2}$	0	1 324 990	1				9
75.325	$3p^6 3d\ ^2D_{5/2}$	$3p^5 3d(^3F^o)4s\ ^2F^o_{7/2}$	4 060	1 331 640	5				9
74.856	$_{5/2}$	$_{5/2}$	4 060	1 339 930					9
74.633	$_{3/2}$	$_{5/2}$	0	1 339 930	4				9
73.982	$3p^6 3d\ ^2D_{5/2}$	$3p^5 3d(^3D^o)4s\ ^4D^o_{7/2}$	4 060	1 355 740	1				9
73.735	$_{5/2}$	$_{5/2}$	4 060	1 360 260	2				9
73.516	$_{3/2}$	$_{5/2}$	0	1 360 260					9
72.956	$3p^6 3d\ ^2D_{5/2}$	$3p^5 3d(^1F^o)4s\ ^2F^o_{7/2}$	4 060	1 374 750	2				9
72.792	$3p^6 3d\ ^2D_{5/2}$	$3p^5 3d(^3D^o)4s\ ^2D^o_{3/2}$	4 060	1 377 810	2				9
72.580	$_{5/2}$	$_{5/2}$	4 060	1 381 830	4				9
72.580	$_{3/2}$	$_{3/2}$	0	1 377 810	4				9
72.369	$_{3/2}$	$_{5/2}$	0	1 381 830	1				9
63.192	$3p^6 3d\ ^2D_{5/2}$	$3p^6 5f\ ^2F^o_{7/2}$	4 060	1 586 400	4				3
63.038	$_{3/2}$	$_{5/2}$	0	1 586 300	4				3
57.047	$3p^6 3d\ ^2D_{5/2}$	$3p^6 6f\ ^2F^o_{7/2}$	4 060	1 757 000					3
56.915	$_{3/2}$	$_{5/2}$	0	1 757 000					3

Cu XII

Wavelength (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
174.739^S	$3p^6\ ^1S_0$	$3p^53d\ ^3D^o_1$	0	572 280					11
139.175^S	$3p^6\ ^1S_0$	$3p^53d\ ^1P^o_1$	0	718 520					3, 5, 11°
80.666	$3p^53d\ ^1P^o_1$	$3p^5(^2P^o_{1/2})4f\ ^2[\frac{5}{2}]_2$	718 520	1 958 200?	2				12
73.734^L	$3p^53d\ ^1F^o_3$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_4$			3				12
72.821^L	$3p^53d\ ^3D^o_3$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_4$			7				12
72.572^L	$3p^53d\ ^1F^o_3$	$3p^5(^2P^o_{1/2})4f\ ^2[\frac{7}{2}]_4$			10				12
72.373^L	$3p^53d\ ^3D^o_2$	$3p^5(^2P^o_{1/2})4f\ ^2[\frac{7}{2}]_3$			6				12
71.948^L	$3p^53d\ ^1D^o_2$	$3p^5(^2P^o_{1/2})4f\ ^2[\frac{5}{2}]_3$			6				12
71.700^L	$3p^53d\ ^3F^o_2$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{7}{2}]_3$			4				12
71.609^L	$3p^53d\ ^3F^o_3$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{9}{2}]_4$			7				12
71.530^L	4	5			8				12
71.033^L	$3p^53d\ ^3P^o_2$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{3}{2}]_2$			4				12
70.656^L	1	1			5				12
70.551^L	1	2			6				12
70.804^L	$3p^53d\ ^3P^o_2$	$3p^5(^2P^o_{3/2})4f\ ^2[\frac{5}{2}]_3$			4				12
69.128	$3p^6\ ^1S_0$	$3p^54s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	1 446 600	3				3
67.882	$3p^6\ ^1S_0$	$3p^54s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	1 473 100	3				3
56.333	$3p^6\ ^1S_0$	$3p^54d\ (\frac{3}{2},\frac{5}{2})^o_1$	0	1 775 200					3
55.466	$3p^6\ ^1S_0$	$3p^54d\ (\frac{1}{2},\frac{3}{2})^o_1$	0	1 802 900					3

Cu XIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3500.4	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^5\ ^2P^o_{1/2}$	0	28 560		M1	4.19+2	B	13, 14°, 88*
150.638	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^1D)3d\ ^2S_{1/2}$	0	663 840	10				15
144.720	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^3P)3d\ ^2P_{3/2}$	0	690 990	20				5, 15°
143.756	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)3d\ ^2D_{3/2}$	28 560	724 240	200bl				5, 15°
142.963	3/2	5/2	0	699 480	200				5, 15°
138.065	3/2	3/2	0	724 240	20				5, 15°
66.18[L]	$3s^23p^4(^3P)3d\ ^4F_{9/2}$	$3s^23p^4(^3P)4f\ ^4G^o_{11/2}$			1				16
65.24[L]	$3s^23p^4(^3P)3d\ ^4D_{7/2}$	$3s^23p^4(^3P)4f\ ^4F^o_{9/2}$			1				16

Cu XIV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4183.4	$3s^23p^4\ ^3P_2$	$3s^23p^4\ ^3P_1$	0	23 897		M1	2.83+2	C	14, 17°, 88*
1190.4	$3s^23p^4\ ^3P_1$	$3s^23p^4\ ^1S_0$	23 897	107 902		M1	4.01+3	D	17°, 88*
302.406	$3s^23p^4\ ^3P_1$	$3s3p^5\ ^3P^\circ_2$	23 897	354 570	1				18, 19°
282.038	2	2	0	354 570	1				18, 19°
250.429	$3s^23p^4\ ^1D_2$	$3s3p^5\ ^1P^\circ_1$	52 540	451 850	1				18, 19°
159.997	$3s^23p^4\ ^3P_1$	$3s^23p^3(^2D^\circ)3d\ ^3P^\circ_2$	23 897	648 960	10				19
154.080	2	2	0	648 960	50				18, 19°
152.466	$3s^23p^4\ ^1S_0$	$3s^23p^3(^2P^\circ)3d\ ^1P^\circ_1$	107 902	763 830	20				18, 19°
151.938	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^\circ)3d\ ^1D^\circ_2$	52 540	710 700	5				18, 19°
150.836	$3s^23p^4\ ^3P_1$	$3s^23p^3(^4S^\circ)3d\ ^3D^\circ_2$	23 897	686 870	20				18, 19°
148.318	2	3	0	674 230	200bl				16, 18, 19°
148.318	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^\circ)3d\ ^1F^\circ_3$	52 540	726 770	200bl				19
140.580	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2P^\circ)3d\ ^1P^\circ_1$	52 540	763 830	10				18, 19°
61.70[L]	$3s^23p^3(^2D^\circ)3d\ ^3G^\circ_5$	$3s^23p^3(^2D^\circ)4f\ ^3H_6$							16
61.08[L]	$3s^23p^33d\ ^5D^\circ_4$	$3s^23p^34f\ ^5F_5$			1				16

Cu XV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2085.3	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^3\ ^2D^o_{3/2}$	0	47 940		M1	2.81+2	D	14, 20°, 88*
944.6	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^3\ ^2P^o_{3/2}$	0	105 962		M1	1.03+3	D	14, 20°, 88*
296.6	$3s^23p^3\ ^4S^o_{3/2}$	$3s3p^4\ ^4P_{5/2}$	0	337 100					22
238.1	$3s^23p^3\ ^2D^o_{5/2}$	$3s3p^4\ ^2P_{3/2}$	57 803	477 800					22
163.274	$3s^23p^3\ ^2P^o_{1/2}$	$3s^23p^2(^1D)3d\ ^2P_{3/2}$	[91 106]	703 573	2				22, 23°
161.852	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)3d\ ^2D_{5/2}$	57 803	675 651	5				22, 23°
160.143	$3/2$	$3/2$	47 940	672 380	10				22, 23°
161.381	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)3d\ ^4P_{5/2}$	0	619 652	40				16, 22, 23°
159.677	$3/2$	$3/2$	0	626 264	1				22, 23°
157.9	$3/2$	$1/2$	0	633 300					22
158.944	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^3P)3d\ ^2D_{5/2}$	105 962	735 114	10				22, 23°
155.1	$1/2$	$3/2$	[91 106]	735 639					22
154.713	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^2F_{7/2}$	57 803	704 207	200				16, 22, 23°
57.52^L	$3s^23p^2(^1D)3d\ ^2G_{9/2}$	$3s^23p^2(^1D)4f\ ^2H^o_{11/2}$			1				16
57.44^L	$3s^23p^23d\ ^4F_{9/2}$	$3s^23p^24f\ ^4G^o_{11/2}$			1				16

Cu XVI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	A (s^{-1})	Acc.	References
5375.8	$3s^23p^2\ ^3P_0$	$3s^23p^2\ ^3P_1$	0.0	18 596.7		M1	1.07+2	B	14°, 88*
2544.7	$3s^23p^2\ ^3P_2$	$3s^23p^2\ ^1D_2$	32 730	72 016		M1	3.28+2	D	14, 24°, 88*
1871.3	1	2	18 596.7	72 016		M1	3.32+2	D	17°, 88*
952.8	$3s^23p^2\ ^3P_1$	$3s^23p^2\ ^1S_0$	18 596.7	123 550		M1	3.81+3	D	14°, 88*
410.46	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^5S^o_2$	32 730	276 430					26, 27, 28°
387.56	1	2	18 596.7	276 430	bl				26, 27, 28°
298.162	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3D^o_3$	32 730	368 118	1				18, 25°
291.705	1	2	18 596.7	361 409	2				18, 25°
276.821	0	1	0.0	361 244	2				18, 25°
261.247	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3P^o_1$	32 730	415 501	1				18, 25°
259.857	2	2	32 730	417 557	3				18, 25°
251.954	1	1	18 596.7	415 501	1				18, 25°
210.385	$3s^23p^2\ ^1D_2$	$3s3p^3\ ^1P^o_1$	72 016	547 335	10				18, 25°
209.160	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3S^o_1$	32 730	510 826	10				18, 25°
203.155	1	1	18 596.7	510 826	10				18, 25°
195.766	0	1	0.0	510 826	5				18, 25°
192.461	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^3P^o_2$	72 016	591 646	1				25
184.613	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^1D^o_2$	72 016	613 690	20				18, 25°
178.959	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^3P^o_2$	32 730	591 646	5bl				18, 25°
174.505	1	2	18 596.7	591 646	20				25
166.887	1	0	18 596.7	617 805	3				18, 25°
165.504	1	1	18 596.7	622 812	2				18, 25°
173.921	$3s^23p^2\ ^1S_0$	$3s^23p3d\ ^1P^o_1$	123 550	698 524	2				18, 25°
168.879	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^3D^o_3$	32 730	624 870	20				16, 18, 25°
168.295	2	2	32 730	626 925	10				18, 25°
166.025	0	1	0.0	602 319	2				18, 25°
168.019	$3s^23p^2\ ^3P_1$	$3s^23p3d\ ^1D^o_2$	18 596.7	613 690	1				18, 25°
164.228	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^1F^o_3$	72 016	680 933	10				18, 25°
154.271	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^1F^o_3$	32 730	680 933	5				25
56.06T	$3s^23p3d\ ^3D^o_3$	$3s^23p4f\ ^3F_4$	624 870	2 409 000?					30
55.46T	$3s^23p3d\ ^3P^o_0$	$3s^23p4f\ ^3D_1$	617 805	2 421 000?					30
54.48	$3s^23p3d\ ^3F^o_3$	$3s^23p4f\ ^3G_4$	534 500?	2 370 000	200				29△, 30°
54.24	4	5	553 300?	2 397 000	100				29△, 30°
53.52	$3s^23p^2\ ^1D_2$	$3s^23p4s\ ^1P^o_1$	72 016	1 940 000	300				29
52.85	$3s^23p^2\ ^3P_2$	$3s^23p4s\ ^3P^o_2$	32 730	1 930 000	350				29
52.18	1	2	18 596.7	1 930 000	350				29
52.41T	$3s3p^3\ ^1D^o_2$	$3s^23p4f\ ^3G_3$	464 200?	2 372 000?					30
52.08T	$3s3p^3\ ^1D^o_2$	$3s^23p4f\ ^1F_3$	464 200?	2 384 000?					30
45.90	$3s^23p^2\ ^1S_0$	$3s^23p4d\ ^1P^o_1$	123 550	2 302 000					30
45.24	$3s^23p^2\ ^1D_2$	$3s^23p4d\ ^1F^o_3$	72 016	2 282 000	300				29△, 30°
45.21	$3s^23p^2\ ^3P_2$	$3s^23p4d\ ^3D^o_3$	32 730	2 244 000	350				29△, 30°
44.98	1	2	18 596.7	2 242 000	350				29△, 30°
44.63T	0	1	0.0	2 241 000?					30
44.67	$3s^23p^2\ ^3P_2$	$3s^23p4d\ ^3F^o_3$	32 730	2 271 000					30
44.47T	$3s^23p^2\ ^3P_1$	$3s^23p4d\ ^3P^o_0$	18 596.7	2 267 000?					30

Cu XVII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
3007.6	$3s^23p\ ^2P^o_{1/2}$	$3s^23p\ ^2P^o_{3/2}$	0	33 239		M1	3.30+2	B	13, 14°, 88*
410.6	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^4P_{1/2}$	33 239	277 231					27, 28°
387.0	3/2	3/2	33 239	291 810	bl				27, 28°
364.45	3/2	5/2	33 239	307 708					27, 28°
361.16	1/2	1/2	0	277 231					27, 28°
342.7	1/2	3/2	0	291 810					27, 28°
290.239	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2D_{5/2}$	33 239	377 783	2				18, 31, 32°
268.647	1/2	3/2	0	372 236	1				32
239.462	$3s3p^2\ ^4P_{5/2}$	$3p^3\ ^4S^o_{3/2}$	307 708	725 320	5				18
230.675	3/2	3/2	291 810	725 320	2				18°, 31
223.170	1/2	3/2	277 231	725 320	1				18, 32°, 33
224.841	$3s^23p\ ^2P^o_{1/2}$	$3s3p^2\ ^2S_{1/2}$	0	444 759	10				18, 31, 32°
223.823	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2P_{1/2}$	33 239	480 016	10				18, 31, 32°
218.716^S	3/2	3/2	33 239	490 467	100				16, 18, 31, 32°
208.328	1/2	1/2	0	480 016	3				18
203.881^S	1/2	3/2	0	490 467	5				18, 31, 32°
200.40	$3s3p^2\ ^2D_{5/2}$	$3s3p3d\ ^2D^o_{5/2}$	377 783	876 785?					31
188.19	$3s3p^2\ ^2D_{5/2}$	$3s3p3d\ ^2F^o_{5/2}$	377 783	909 161?	bl				31
180.70	5/2	7/2	377 783	931 186?	bl				31
184.855^S	$3s^23p\ ^2P^o_{3/2}$	$3s^23d\ ^2D_{3/2}$	33 239	574 180	5				18, 32°
183.485^S	3/2	5/2	33 239	578 243	100				16, 18, 31, 32°
174.168^S	1/2	3/2	0	574 180	50				16, 18, 31, 32°
180.70	$3s3p^2\ ^4P_{5/2}$	$3s3p3d\ ^4D^o_{7/2}$	307 708	861 003?	bl				31
176.98	3/2	5/2	291 810	856 728?					31
52.76	$3s^23d\ ^2D_{5/2}$	$3s^24f\ ^2F^o_{7/2}$	578 243	2 474 000	350				29
52.59	3/2	5/2	574 180	2 476 000	450				29
51.16	$3s3p^2\ ^2D_{5/2}$	$3s3p4s\ ^2P^o_{3/2}$	377 783	2 332 000	600				29
51.16^L	$3s3p3d\ ^4F^o_{7/2}$	$3s3p4f\ ^4G_{9/2}$			600				29
50.98^L	5/2	7/2			550				29
50.81^L	9/2	11/2			450				29
50.17	$3s^23p\ ^2P^o_{3/2}$	$3s^24s\ ^2S_{1/2}$	33 239	2 026 000	450				29
49.90	$3s3p^2\ ^4P_{5/2}$	$3s3p4s\ ^4P^o_{3/2}$	307 708	2 312 000	350				29
48.89	3/2	5/2	291 810	2 337 000	350				29
43.31	$3s^23p\ ^2P^o_{3/2}$	$3s^24d\ ^2D_{5/2}$	33 239	2 342 000	500				29
42.81	1/2	3/2	0	2 336 000	400				29

Cu XVIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3941.6	$3s3p\ ^3P^o_1$	$3s3p\ ^3P^o_2$	289 401	314 753		M1	2.16+2	C	14°, 88*
430.44	$3s3d\ ^1D_2$	$3p3d\ ^1D^o_2$	917 020	1 149 319	2				37
395.67	$3s3p\ ^1P^o_1$	$3p^2\ ^1D_2$	426 987	679 710	4				37
346.44	$3s3p\ ^1P^o_1$	$3p^2\ ^3P_2$	426 987	715 608	2				37
345.542	$3s^2\ ^1S_0$	$3s3p\ ^3P^o_1$	0	289 401					31, 34, 36°
334.002	$3s3d\ ^3D_1$	$3p3d\ ^3F^o_2$	818 630	1 118 029	1				31, 35°
317.563	2	3	820 704	1 135 602	5				31, 35°
300.417	3	4	823 970	1 156 841	10				31, 35°
302.406	$3s3d\ ^3D_1$	$3p3d\ ^1D^o_2$	818 630	1 149 319	1				35
275.813	$3s3d\ ^3D_2$	$3p3d\ ^3D^o_1$	820 704	1 183 252	3				35
274.779	3	2	823 970	1 187 907	1				35
272.30	2	2	820 704	1 187 907	bl				31
262.087	3	3	823 970	1 205 542	5				31, 35°
259.857	2	3	820 704	1 205 542	2				31, 35°
274.01	$3s3p\ ^3P^o_2$	$3p^2\ ^1D_2$	314 753	679 710	5				37
256.202	1	2	289 401	679 710	3				35
272.120	$3s3d\ ^1D_2$	$3p3d\ ^1F^o_3$	917 020	1 284 495	30				21°, 31, 35, 37
270.316	$3s3p\ ^3P^o_2$	$3p^2\ ^3P_1$	314 753	684 689	10				18°, 31
266.258	1	0	289 401	664 977	20				18°, 31
252.981	1	1	289 401	684 689	10				18°, 31
249.467	2	2	314 753	715 608	100				18°, 31
246.991	0	1	279 816	684 689	10				18°, 31
234.610	1	2	289 401	715 608	10				18
265.145	$3s3p\ ^1P^o_1$	$3p^2\ ^1S_0$	426 987	804 139	10				21°, 37
261.820	$3s3d\ ^1D_2$	$3p3d\ ^1P^o_1$	917 020	1 298 970	3				21°, 37
257.464	$3s3d\ ^3D_2$	$3p3d\ ^3P^o_2$	820 704	1 209 104	2				35
256.612	1	1	818 630	1 208 326	2				35
240.028	$3p3d\ ^1F^o_3$	$3d^2\ ^1G_4$	1 284 495	1 701 113	10				36°, 38
234.199	$3s^2\ ^1S_0$	$3s3p\ ^1P^o_1$	0	426 987	500				16, 18°, 31
228.16	$3p^2\ ^1D_2$	$3p3d\ ^3F^o_2$	679 710	1 118 029	2				37
223.170	$3p3d\ ^3P^o_2$	$3d^2\ ^3F_3$	1 209 104	1 657 191	20				36
219.410	$3p3d\ ^3D^o_3$	$3d^2\ ^3F_4$	1 205 542	1 661 315	10				36°, 38
213.087	2	3	1 187 907	1 657 191	5				36
212.551	1	2	1 183 252	1 653 727	2				36
212.939	$3p^2\ ^1D_2$	$3p3d\ ^1D^o_2$	679 710	1 149 319	10				31, 35°
204.110	$3p^2\ ^3P_2$	$3p3d\ ^3D^o_3$	715 608	1 205 542	200bl				35
198.718	1	2	684 689	1 187 907	100				35
192.954	0	1	664 977	1 183 252	50				31, 35°
204.072	$3s3p\ ^1P^o_1$	$3s3d\ ^1D_2$	426 987	917 020	30				16, 18°, 31
202.962	$3p^2\ ^3P_2$	$3p3d\ ^3P^o_1$	715 608	1 208 326	5				35
202.635	2	2	715 608	1 209 104	50				35
191.083	1	0	684 689	1 208 022	3				$35^{\triangle}$, 36°
190.965	1	1	684 689	1 208 326	10				31, 35°
190.689	1	2	684 689	1 209 104	2				31, 35°
202.086	$3p^2\ ^1S_0$	$3p3d\ ^1P^o_1$	804 139	1 298 970	30				21°, 37
198.56	$3s3p\ ^3P^o_2$	$3s3d\ ^3D_1$	314 753	818 630					31
197.647	2	2	314 753	820 704	10				$18^{\triangle}$, 31, 36°
196.379	2	3	314 753	823 970	200				16, 18°, 31
188.953	1	1	289 401	818 630	20				18
188.215	1	2	289 401	820 704	200				16, 18°, 31
185.594	0	1	279 816	818 630	50				16, 18°, 31

Cu XVIII – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
198.224	$3p3d\ ^3F^o_4$	$3d^2\ ^3F_4$	1 156 841	1 661 315	10				36
191.723	3	3	1 135 602	1 657 191	30				36
190.174	$3p^2\ ^1D_2$	$3p3d\ ^3D^o_3$	679 710	1 205 542	20				35
175.785	$3p^2\ ^3P_2$	$3p3d\ ^1F^o_3$	715 608	1 284 495	5				21°, 35
165.349	$3p^2\ ^1D_2$	$3p3d\ ^1F^o_3$	679 710	1 284 495	10				21°, 31, 35
51.496^T	$3p3d\ ^1P^o_1$	$3p4f\ ^1D_2$	1 298 970	3 240 900?					30
51.287	$3p3d\ ^1F^o_3$	$3p4f\ ^1G_4$	1 284 495	3 234 300?					30
50.118	$3p3d\ ^3D^o_1$	$3p4f\ ^3F_2$	1 183 252	3 178 500?					30
50.067	3	4	1 205 542	3 202 900					29, 30°
49.862	$3p3d\ ^3D^o_2$	$3p4f\ ^3D_3$	1 187 907	3 193 400					30
49.769	$3p3d\ ^3P^o_1$	$3p4f\ ^3D_2$	1 208 326	3 217 600					30
49.639	1	1	1 208 326	3 222 900	bl				30
49.639	0	1	1 208 022	3 222 900	bl				29, 30°
49.558	$3s3d\ ^3D_3$	$3s4f\ ^3F^o_4$	823 970	2 841 800	4				30, 39°
49.490	2	3	820 704	2 841 300	4				30°, 39$^\Delta$
49.452	1	2	818 630	2 840 800	3				30, 39°
49.395	$3p3d\ ^1D^o_2$	$3p4f\ ^1F_3$	1 149 319	3 173 800					30
49.010	$3p3d\ ^3F^o_3$	$3p4f\ ^3G_4$	1 135 602	3 176 000					29, 30°
48.885	2	3	1 118 029	3 163 600	bl				30
48.885	4	5	1 156 841	3 202 500	bl				29, 30°
47.585	$3s3p\ ^3P^o_2$	$3s4s\ ^3S_1$	314 753	2 416 400	3				39
47.012	1	1	289 401	2 416 400	2				39
46.781	0	1	279 816	2 416 400	1				39
41.173	$3s3p\ ^3P^o_2$	$3s4d\ ^3D_2$	314 753	2 743 500	3				39
41.134	2	3	314 753	2 745 800	6				39
40.769	1	1	289 401	2 742 100	3				39
40.749	1	2	289 401	2 743 500	5				39
40.613	0	1	279 816	2 742 100	2				39
38.876	$3s^2\ ^1S_0$	$3s4p\ ^1P^o_1$	0	2 572 300	5				39
35.294	$3s3d\ ^3D_3$	$3s5f\ ^3F^o_4$	823 970	3 657 300	3				39
35.256	2	3	820 704	3 657 100	2				39
35.238	1	2	818 630	3 656 500	2				39
30.325	$3s3p\ ^3P^o_2$	$3s5d\ ^3D_3$	314 753	3 612 400	5				39
30.104	1	2	289 401	3 611 200	4				39
30.019	0	1	279 816	3 611 000	3				39
11.774	$2p^63s^2\ ^1S_0$	$2p^53s^23d\ ^1P^o_1$	0	8 493 000	2				40

Cu XIX

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
303.549^{S}	$2p^6 3s\ ^2S_{1/2}$	$2p^6 3p\ ^2P^o_{1/2}$	0	329 436	200				$18^{\triangle}$, 31, 42°
273.354^{S}	1/2	3/2	0	365 826	150				18, 31, 39, $41^{\triangle}$, 42°
224.237^{S}	$2p^6 3p\ ^2P^o_{3/2}$	$2p^6 3d\ ^2D_{3/2}$	365 826	811 791	100				18, 31, 39, $41^{\triangle}$, 42°
221.369^{S}	3/2	5/2	365 826	817 560	450				18, 31, 39, $41^{\triangle}$, 42°
207.312^{S}	1/2	3/2	329 436	811 791	350				18, 31, 39, $41^{\triangle}$, 42°
210.70^{L}	$2p^5 3s3p\ ^4D_{7/2}$	$2p^5 3s3d\ ^4F^o_{9/2}$							31, 43°
111.353	$2p^6 4f\ ^2F^o_{7/2}$	$2p^6 5g\ ^2G_{9/2}$	2 925 400	3 823 400	350				18, 31, 41°, 44
111.274	5/2	7/2	2 924 400	3 823 100	250				18, 41°, 44
103.179	$2p^6 4d\ ^2D_{5/2}$	$2p^6 5f\ ^2F^o_{7/2}$	2 849 500	3 818 700	150				18, 41°
102.960	3/2	5/2	2 847 000	3 818 100	100				18, 41°
90.990	$2p^6 4p\ ^2P^o_{3/2}$	$2p^6 5d\ ^2D_{5/2}$	2 681 600	3 780 600	50				41
85.90	$2p^6 4s\ ^2S_{1/2}$	$2p^6 5p\ ^2P^o_{3/2}$	2 535 440	3 699 300	20				41
53.889	$2p^6 3d\ ^2D_{3/2}$	$2p^6 4p\ ^2P^o_{1/2}$	811 791	2 667 490	100				16, 29, 41°
53.643	5/2	3/2	817 560	2 681 600	200				16, 29, 41°
47.442^{S}	$2p^6 3d\ ^2D_{5/2}$	$2p^6 4f\ ^2F^o_{7/2}$	817 560	2 925 400	1000				18, $41^{\triangle}$, 42°, 81
47.335^{S}	3/2	5/2	811 791	2 924 400	850				18, $41^{\triangle}$, 42°, 81
46.090	$2p^6 3p\ ^2P^o_{3/2}$	$2p^6 4s\ ^2S_{1/2}$	365 826	2 535 440	300				18, 39, 41°, 82
45.332	1/2	1/2	329 436	2 535 440	200				39, 41°
40.298	$2p^6 3p\ ^2P^o_{3/2}$	$2p^6 4d\ ^2D_{3/2}$	365 826	2 847 000	200				39, 41°
40.263	3/2	5/2	365 826	2 849 500	650				39, 41°, 82
39.725	1/2	3/2	329 436	2 847 000	550				39, 41°, 82
37.488	$2p^6 3s\ ^2S_{1/2}$	$2p^6 4p\ ^2P^o_{1/2}$	0	2 667 490	350				39, 41°, 82
37.293	1/2	3/2	0	2 681 600	450				39, 41°, 82
33.317	$2p^6 3d\ ^2D_{5/2}$	$2p^6 5f\ ^2F^o_{7/2}$	817 560	3 818 700	6				39°, 82
33.266	3/2	5/2	811 791	3 818 100	300				39, 41°, 82
29.277	$2p^6 3p\ ^2P^o_{3/2}$	$2p^6 5d\ ^2D_{5/2}$	365 826	3 780 600	9				39°, 82
28.987	1/2	3/2	329 436	3 779 300	180				39, 41°, 82
28.674	$2p^6 3d\ ^2D_{5/2}$	$2p^6 6f\ ^2F^o_{7/2}$	817 560	4 305 000	150				39, 41°, 82
28.631	3/2	5/2	811 791	4 304 500	100				39, 41°
27.075	$2p^6 3s\ ^2S_{1/2}$	$2p^6 5p\ ^2P^o_{1/2}$	0	3 693 400	100				39, 41°
27.032	1/2	3/2	0	3 699 300	150				39, 41°
26.452	$2p^6 3d\ ^2D_{5/2}$	$2p^6 7f\ ^2F^o_{7/2}$	817 560	4 598 000	70				39°, $41^{\triangle}$
26.416	3/2	5/2	811 791	4 597 400	70				39°, $41^{\triangle}$
25.526	$2p^6 3p\ ^2P^o_{3/2}$	$2p^6 6d\ ^2D_{5/2}$	365 826	4 283 400	150				39, 41°
25.297	1/2	3/2	329 436	4 282 500	100				39, 41°
25.175^{T}	$2p^6 3d\ ^2D_{5/2}$	$2p^6 8f\ ^2F^o_{7/2}$	817 560	4 789 800?	1				39
25.142^{T}	3/2	5/2	811 791	4 789 200?					39
23.704	$2p^6 3p\ ^2P^o_{3/2}$	$2p^6 7d\ ^2D_{5/2}$	365 826	4 584 500	10				39
23.503	1/2	3/2	329 436	4 584 200	10				39
23.621	$2p^6 3s\ ^2S_{1/2}$	$2p^6 6p\ ^2P^o_{1/2}$	0	4 233 500	1				39
23.599	1/2	3/2	0	4 237 500	10				39
22.661	$2p^6 3p\ ^2P^o_{3/2}$	$2p^6 8d\ ^2D_{5/2}$	365 826	4 778 800					39
22.475	1/2	3/2	329 436	4 778 800	1				39
13.11	$2p^6 3s\ ^2S_{1/2}$	$2p^5 3s^2\ ^2P^o_{3/2}$	0	7 627 800?					45

Cu XX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
340.77	$2s^22p^53s\ (\frac{3}{2},\frac{1}{2})^\circ_2$	$2s^22p^53p\ (\frac{3}{2},\frac{1}{2})_1$	7 777 270	8 070 680					46
330.44	$_1$	$_2$	7 795 650	8 098 270					46
311.53	$_2$	$_2$	7 777 270	8 098 270					46
328.69	$2s^22p^53s\ (\frac{1}{2},\frac{1}{2})^\circ_1$	$2s^22p^53p\ (\frac{1}{2},\frac{1}{2})_1$	7 955 050	8 259 280					46
317.63	$_0$	$_1$	7 943 950	8 259 280					46
296.07	$2s^22p^53s\ (\frac{3}{2},\frac{1}{2})^\circ_1$	$2s^22p^53p\ (\frac{3}{2},\frac{3}{2})_1$	7 795 650	8 133 410					46
287.09	$_2$	$_3$	7 777 270	8 125 590					46
279.40	$_1$	$_2$	7 795 650	8 153 580					46
265.72	$_2$	$_2$	7 777 270	8 153 580					46
288.94	$2s^22p^53s\ (\frac{1}{2},\frac{1}{2})^\circ_1$	$2s^22p^53p\ (\frac{1}{2},\frac{3}{2})_1$	7 955 050	8 301 150					46
284.70	$_1$	$_2$	7 955 050	8 306 290					46
272.30	$2s^22p^53p\ (\frac{3}{2},\frac{3}{2})_2$	$2s^22p^53d\ (\frac{3}{2},\frac{3}{2})^\circ_1$	8 153 580	8 520 820					46
232.84	$_1$	$_2$	8 133 410	8 562 820					46
258.18	$2s^22p^53p\ (\frac{3}{2},\frac{3}{2})_2$	$2s^22p^53d\ (\frac{3}{2},\frac{5}{2})^\circ_2$	8 153 580	8 540 750					46
241.25	$_3$	$_4$	8 125 590	8 540 100					46
237.57	$_2$	$_3$	8 153 580	8 574 510					46
247.00	$2s^22p^53p\ (\frac{1}{2},\frac{3}{2})_2$	$2s^22p^53d\ (\frac{1}{2},\frac{3}{2})^\circ_2$	8 306 290	8 711 110					46
238.52	$2s^22p^53p\ (\frac{1}{2},\frac{3}{2})_1$	$2s^22p^53d\ (\frac{1}{2},\frac{5}{2})^\circ_2$	8 301 150	8 720 400					46
237.57	$_2$	$_3$	8 306 290	8 727 220					46
227.85	$2s^22p^53p\ (\frac{3}{2},\frac{1}{2})_1$	$2s^22p^53d\ (\frac{3}{2},\frac{3}{2})^\circ_0$	8 070 680	8 509 560					46
223.83	$_2$	$_3$	8 098 270	8 545 040					46
215.30	$_2$	$_2$	8 098 270	8 562 820					46
212.75	$2s^22p^53p\ (\frac{3}{2},\frac{1}{2})_1$	$2s^22p^53d\ (\frac{3}{2},\frac{5}{2})^\circ_2$	8 070 680	8 540 750					46
163.6	$2s^22p^53s\ (\frac{3}{2},\frac{1}{2})^\circ_1$	$2s^22p^53p\ (\frac{1}{2},\frac{1}{2})_0$	7 795 650	8 406 900					46
12.827	$2s^22p^6\ ^1S_0$	$2s^22p^53s\ (\frac{3}{2},\frac{1}{2})^\circ_1$	0	7 795 650	9				$47, 49, 50^{\circ}$
12.570	$2s^22r^6\ ^1S_0$	$2s^22p^53s\ (\frac{1}{2},\frac{1}{2})^\circ_1$	0	7 955 050	6				$47, 49, 50^{\circ}$
11.736	$2s^22p^6\ ^1S_0$	$2s^22p^53d\ (\frac{3}{2},\frac{3}{2})^\circ_1$	0	8 520 820	7				$47, 49, 50^{\circ}$
11.594	$2s^22p^6\ ^1S_0$	$2s^22p^53d\ (\frac{3}{2},\frac{5}{2})^\circ_1$	0	8 626 510	10				$47, 49, 50^{\circ}$
11.383	$2s^22p^6\ ^1S_0$	$2s^22p^53d\ (\frac{1}{2},\frac{3}{2})^\circ_1$	0	8 787 010	8				$47, 49, 50^{\circ}$
10.653	$2s^22p^6\ ^1S_0$	$2s2p^63p\ (\frac{1}{2},\frac{1}{2})^\circ_1$	0	9 387 000	5				$40, 47, 49, 50^{\circ}$
10.597	$2s^22p^6\ ^1S_0$	$2s2p^63p\ (\frac{1}{2},\frac{3}{2})^\circ_1$	0	9 436 000	4				$40, 47, 49, 50^{\circ}$
9.521	$2s^22p^6\ ^1S_0$	$2s^22p^54s\ (\frac{3}{2},\frac{1}{2})^\circ_1$	0	10 504 000	1				$40^{\triangle}, 49, 50^{\circ}, 51$
9.375	$2s^22p^6\ ^1S_0$	$2s^22p^54s\ (\frac{1}{2},\frac{1}{2})^\circ_1$	0	10 667 000	1				$40^{\triangle}, 49, 50^{\circ}, 51$
9.274	$2s^22p^6\ ^1S_0$	$2s^22p^54d\ (\frac{3}{2},\frac{3}{2})^\circ_1$	0	10 783 000					50
9.237	$2s^22p^6\ ^1S_0$	$2s^22p^54d\ (\frac{3}{2},\frac{5}{2})^\circ_1$	0	10 828 000					$48, 49, 50^{\circ}$
9.106	$2s^22p^6\ ^1S_0$	$2s^22p^54d\ (\frac{1}{2},\frac{3}{2})^\circ_1$	0	10 984 000					$48, 49, 50^{\circ}$
8.447	$2s^22p^6\ ^1S_0$	$2s^22p^55d\ (\frac{3}{2},\frac{5}{2})^\circ_1$	0	11 840 000	1				$40^{\triangle}, 49, 50^{\circ}$
8.400	$2s^22p^6\ ^1S_0$	$2s2p^64p\ (\frac{1}{2},\frac{1}{2})^\circ_1$	0	11 905 000					$50^{\circ}, 51$
8.385	$2s^22p^6\ ^1S_0$	$2s2p^64p\ (\frac{1}{2},\frac{3}{2})^\circ_1$	0	11 926 000					$50^{\circ}, 51$
8.333	$2s^22p^6\ ^1S_0$	$2s^22p^55d\ (\frac{1}{2},\frac{3}{2})^\circ_1$	0	12 002 000	1				$40^{\triangle}, 49, 50^{\circ}$
8.073	$2s^22p^6\ ^1S_0$	$2s^22p^56d\ (\frac{3}{2},\frac{5}{2})^\circ_1$	0	12 389 000	1				$40^{\triangle}, 49, 50^{\circ}$
7.972	$2s^22p^6\ ^1S_0$	$2s^22p^56d\ (\frac{1}{2},\frac{3}{2})^\circ_1$	0	12 544 000					$49, 50^{\circ}$

Cu XXI

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
592.3	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^5\ ^2P^o_{1/2}$	0	168 830		M1	8.62+4	B	13°, 88*
346.25	$2s^22p^4(^1D)3s\ ^2D_{3/2}$	$2s^22p^4(^1D)3p\ ^2F^o_{5/2}$	8 458 000	8 747 000					31
305.44	5/2	7/2	8 452 000	8 779 000					31
332.02	$2s^22p^4(^3P)3s\ ^4P_{3/2}$	$2s^22p^4(^3P)3p\ ^4P^o_{1/2}$	8 363 000	8 664 000					31
325.97	$2s^22p^4(^3P)3s\ ^4P_{3/2}$	$2s^22p^4(^3P)3p\ ^4D^o_{5/2}$	8 363 000	8 670 000					31
293.58	5/2	7/2	8 206 000	8 547 000					31
242.30	5/2	3/2	8 206 000	8 619 000					31
302.56	$2s^22p^4(^3P)3s\ ^2P_{3/2}$	$2s^22p^4(^3P)3p\ ^2D^o_{5/2}$	8 236 000	8 566 000					31
279.40	$2s^22p^4(^1D)3s\ ^2D_{5/2}$	$2s^22p^4(^1D)3p\ ^2D^o_{5/2}$	8 452 000	8 810 000	bl				31
263.88	$2s^22p^4(^3P)3p\ ^2D^o_{5/2}$	$2s^22p^4(^3P)3d\ ^2F_{7/2}$	8 566 000	8 945 000					31
262.12	$2s^22p^4(^3P)3p\ ^4D^o_{7/2}$	$2s^22p^4(^3P)3d\ ^4F_{9/2}$	8 547 000	8 928 500?					31
257.50	3/2	5/2	8 619 000	9 007 000	bl				31
252.74	5/2	7/2	8 670 000	9 066 000					31
259.60	$2s^22p^4(^1D)3p\ ^2D^o_{5/2}$	$2s^22p^4(^1D)3d\ ^2F_{7/2}$	8 810 000	9 195 000					31
250.48^L	$2s^22p^4(^3P)3p\ ^4P^o_{5/2}$	$2s^22p^4(^3P)3d\ ^4D_{7/2}$							31
245.40	$2s^22p^4(^1D)3p\ ^2F^o_{5/2}$	$2s^22p^4(^1D)3d\ ^2G_{7/2}$	8 747 000	9 154 000					31
90.341	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^6\ ^2S_{1/2}$	168 830	1 275 750	30				18°, 44, 52
78.384	3/2	1/2	0	1 275 750	100				18°, 44, 52
12.186	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3s\ ^4P_{5/2}$	0	8 206 000					50°, 51
12.029	3/2	1/2	0	8 313 000					51
11.956	3/2	3/2	0	8 363 000	6				50°, 51, 53, $54^{\triangle}$, 55
12.165	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3s\ ^2P_{1/2}$	168 830	8 388 000	4				50°, 51, 53, $54^{\triangle}$, 55
12.140	3/2	3/2	0	8 236 000	7				50°, 51, 53, $54^{\triangle}$, 55
11.920	3/2	1/2	0	8 388 000	4				50°, 51, 53, $54^{\triangle}$, 55
12.061	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3s\ ^2D_{3/2}$	168 830	8 458 000	7				50°, 51, 53, $54^{\triangle}$, 55
11.830	3/2	5/2	0	8 452 000	8				50°, 51, 53, $54^{\triangle}$, 55
11.736	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1S)3s\ ^2S_{1/2}$	168 830	8 690 000					50
11.352	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3d\ ^4P_{3/2}$	168 830	8 979 000					51
11.162	3/2	1/2	0	8 959 000	7				50°, 51, 53, $54^{\triangle}$, 55
11.136	3/2	3/2	0	8 979 000	10				50°, 51, 53, $54^{\triangle}$, 55
11.185	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P)3d\ ^2P_{3/2}$	168 830	9 108 000	6				50°, 51, 53, $54^{\triangle}$, 55
11.114	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^2F_{5/2}$	0	8 998 000?					50°, 51
11.097	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2S_{1/2}$	168 830	9 180 000	45				50°, 53, $54^{\triangle}$, 55
10.893	3/2	1/2	0	9 180 000	14				50°, 51, 53, $54^{\triangle}$, 55
11.065	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2P_{3/2}$	168 830	9 206 000	12				50°, 51, 53, $54^{\triangle}$, 55
11.002	1/2	1/2	168 830	9 258 000	12				50°, 51, 53, $54^{\triangle}$, 55
10.863	3/2	3/2	0	9 206 000	28				50°, 51, 53, $54^{\triangle}$, 55
10.801	3/2	1/2	0	9 258 000	16				51°, 53, $54^{\triangle}$, 55
11.014	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D)3d\ ^2D_{3/2}$	168 830	9 248 000	14				50°, 51, 53, $54^{\triangle}$, 55
10.858	3/2	5/2	0	9 209 000	28				50°, 51, 53, $54^{\triangle}$, 55
10.813	3/2	3/2	0	9 248 000	16				50°, 51, 53, $54^{\triangle}$, 55
10.971	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P)3d\ ^2D_{5/2}$	0	9 115 000	14				50°, 51, 53, $54^{\triangle}$, 55
10.800	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1S)3d\ ^2D_{3/2}$	168 830	9 428 000	5				50°, 51, 53, $54^{\triangle}$, 55
10.392	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^3P^o)3p\ ^4P_{3/2}$	168 830	9 792 000					50
10.203	3/2	5/2	0	9 801 000?					50

Cu XXI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
10.354	$2s^22p^5\ ^2P^o_{3/2}$	$2s2p^5(^3P^o)3p\ ^4D_{5/2}$	0	9 658 000					50
10.316	$3/2$	$3/2$	0	9 694 000					50
10.306	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^3P^o)3p\ ^2D_{3/2}$	168 830	9 872 000					50
10.291	$3/2$	$5/2$	0	9 717 000					50
10.282	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^3P^o)3p\ ^2S_{1/2}$	168 830	9 894 000?					50
10.260	$2s^22p^5\ ^2P^o_{3/2}$	$2s2p^5(^3P^o)3p\ ^2P_{3/2}$	0	9 747 000					50
10.234	$3/2$	$1/2$	0	9 771 000					50
10.121	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^1P^o)3p\ ^2D_{3/2}$	168 830	10 049 000					50
9.912	$3/2$	$5/2$	0	10 089 000					50
10.074	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^1P^o)3p\ ^2P_{1/2}$	168 830	10 095 000					50
10.057	$1/2$	$3/2$	168 830	10 112 000					50

Cu XXII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
657.7	$2s^22p^4\ ^3P_2$	$2s^22p^4\ ^3P_1$	0	151 990		M1	6.78+4	C	13°, 88*
420.0	$2s^22p^4\ ^3P_2$	$2s^22p^4\ ^1D_2$	0	237 950		M1	6.52+4	C	13°, 88*
114.974	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^3P^o_2$	237 950	1 107 710	3				60
104.620	$2s^22p^4\ ^3P_1$	$2s2p^5\ ^3P^o_2$	151 990	1 107 710	5				44, 60°
95.222	1	1	151 990	1 202 170	5				44, 60°
90.864	0	1	101 620	1 202 170	5				44, 60°
90.276	2	2	0	1 107 710	25				44, 52, 60°
88.395	1	0	151 990	1 283 280	5				44, 60°
83.183	2	1	0	1 202 170	15				44, 52, 60°
98.180	$2s2p^5\ ^1P^o_1$	$2p^6\ ^1S_0$	1 528 080	2 546 610	10				59, 60°
93.302	$2s^22p^4\ ^1S_0$	$2s2p^5\ ^1P^o_1$	456 290	1 528 080	4				44, 60°
77.512	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^1P^o_1$	237 950	1 528 080	30				44, 52, 60°
74.383	$2s2p^5\ ^3P^o_1$	$2p^6\ ^1S_0$	1 202 170	2 546 610	1				60
65.43	$2s^22p^4\ ^3P_2$	$2s2p^5\ ^1P^o_1$	0	1 528 080	2				44°, 60△, 84

Cu XXIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1691.0	$2s^22p^3\ ^2D^o_{3/2}$	$2s^22p^3\ ^2D^o_{5/2}$	170 860	230 070		M1	1.49+3	C	83°, 88*
585.0	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^3\ ^2D^o_{3/2}$	0	170 860		M1	6.40+4	D	13°, 88*
434.8	3/2	5/2	0	230 070		M1	7.98+3	D	13°, 88*
111.071	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^4P_{5/2}$	0	900 330	4bl				60
98.848	3/2	3/2	0	1 011 650	4bl				52, 60°
96.485	3/2	1/2	0	1 036 430	70				52, 60°
108.519	$2s^22p^3\ ^2P^o_{1/2}$	$2s2p^4\ ^2D_{3/2}$	327 900	1 249 110	1				60
99.243	$2s2p^4\ ^2P_{3/2}$	$2p^5\ ^2P^o_{1/2}$	1 485 340	2 492 890	4bl				60
96.845	$2s2p^4\ ^2D_{5/2}$	$2p^5\ ^2P^o_{3/2}$	1 283 940	2 316 720	5bl				52, 60°
93.667	3/2	3/2	1 249 110	2 316 720	2				60
80.400	3/2	1/2	1 249 110	2 492 890	1				60
94.888	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^2D_{5/2}$	230 070	1 283 940	10bl				44, 52, 60°
92.728	3/2	3/2	170 860	1 249 110	5				44, 52, 60°
91.000	$2s^22p^3\ ^2P^o_{1/2}$	$2s2p^4\ ^2S_{1/2}$	327 900	1 427 080	5				52, 60°
83.340	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^2P_{1/2}$	446 780	1 646 680	15bl				44, 52, 60°
80.057	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^2D_{3/2}$	0	1 249 110	1				60
79.664	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^2P_{3/2}$	230 070	1 485 340	20				44, 52, 60°
76.076	3/2	3/2	170 860	1 485 340	1				60
67.759	3/2	1/2	170 860	1 646 680	2				60
79.615	$2s^22p^3\ ^2D^o_{3/2}$	$2s2p^4\ ^2S_{1/2}$	170 860	1 427 080	5				52, 60°
70.073	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^2S_{1/2}$	0	1 427 080	1				60

Cu XXIV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1776.0	$2s^22p^2\ ^3P_1$	$2s^22p^2\ ^3P_2$	132 120	188 430		M1	1.57+3	C	13°, 88*
756.9	0	1	0	132 120		M1	3.55+4	B	13°, 88*
540.0	$2s^22p^2\ ^3P_2$	$2s^22p^2\ ^1D_2$	188 430	373 620		M1	5.78+4	D	13°, 88*
414.1	1	2	132 120	373 620		M1	6.53+4	D	13°, 88*
120.442	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^3D^o_3$	188 430	1 018 700	2				60
119.572	1	2	132 120	968 440	3				60
104.292	0	1	0	958 850	3				60
105.859	$2s2p^3\ ^1P^o_1$	$2p^4\ ^1S_0$	1 573 500	2 518 200	2				60
105.760	$2s2p^3\ ^3P^o_2$	$2p^4\ ^3P_1$	1 196 100	2 141 600	4				60
100.637	0	1	1 147 900	2 141 600	3				60
103.702	$2s2p^3\ ^3D^o_3$	$2p^4\ ^3P_2$	1 018 700	1 983 000	7				60
98.576	2	2	968 440	1 983 000	1				60
97.639	1	2	958 850	1 983 000	3				60
87.055	1	0	958 850	2 107 500	2				60
85.226	2	1	968 440	2 141 600	4				60
99.243	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^3P^o_2$	188 430	1 196 100	4bl				52, 60°
98.444	1	0	132 120	1 147 900	1				60
96.845	1	1	132 120	1 164 700	5bl				60
96.930	$2s^22p^2\ ^1D_2$	$2s2p^3\ ^1D^o_2$	373 620	1 404 900	8				60
94.888	$2s^22p^2\ ^1S_0$	$2s2p^3\ ^1P^o_1$	519 650	1 573 500	10bl				60
87.128	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^3S^o_1$	188 430	1 335 700	7				52, 60°
83.084	1	1	132 120	1 335 700	1				52, 60°
83.340	$2s^22p^2\ ^1D_2$	$2s2p^3\ ^1P^o_1$	373 620	1 573 500	15bl				60
82.195	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^1D^o_2$	188 430	1 404 900	4				60

Cu XXV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
522.8	$2s^22p\ ^2P^o_{1/2}$	$2s^22p\ ^2P^o_{3/2}$	0	191 280		M1	6.26+4	B	13°, 88*
117.507	$2s2p^2\ ^4P_{5/2}$	$2p^3\ ^4S^o_{3/2}$	662 770+x	1 513 780+x	3				60
107.659	$_{3/2}$	$_{3/2}$	584 920+x	1 513 780+x	3				60
97.272	$_{1/2}$	$_{3/2}$	485 730+x	1 513 780+x	3				60

Cu XXVI

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
648.0	$1s^22s2p\ ^3P^o_1$	$1s^22s2p\ ^3P^o_2$	438 970	593 290		M1	4.74+4	C	13°, 88*
227.808	$1s^22s^2\ ^1S_0$	$1s^22s2p\ ^3P^o_1$	0	438 970					13, 62°
173.34	$1s^22s2p\ ^1P^o_1$	$1s^22p^2\ ^1D_2$	899 390	1 477 200					63
158.70	$1s^22s2p\ ^3P^o_2$	$1s^22p^2\ ^3P_1$	593 290	1 223 400					63
152.29	1	0	438 970	1 095 600					63
145.70	2	2	593 290	1 279 600					63
127.48	1	1	438 970	1 223 400					63
120.56	0	1	393 900	1 223 400					63
119.00	1	2	438 970	1 279 600					63
122.58	$1s^22s2p\ ^1P^o_1$	$1s^22p^2\ ^1S_0$	899 390	1 716 100					63
113.14	$1s^22s2p\ ^3P^o_2$	$1s^22p^2\ ^1D_2$	593 290	1 477 200					63
111.186	$1s^22s^2\ ^1S_0$	$1s^22s2p\ ^1P^o_1$	0	899 390	10bl				13, 62°, 63, 64
27.395	$1s^22p3d\ ^3F^o_3$	$1s^22p4f\ ^3G_4$	12 156 000	15 806 000	1				64
27.013^L	4	5			1				64
27.182	$1s^22s3d\ ^3D_3$	$1s^22s4f\ ^3F^o_4$	11 672 000	15 351 000	1				64

Cu XXVII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
484.142^{C}	$1s^22p\ ^2P^o_{1/2}$	$1s^22p\ ^2P^o_{3/2}$	444 861	651 412		M1			
224.789^{S}	$1s^22s\ ^2S_{1/2}$	$1s^22p\ ^2P^o_{1/2}$	0	444 861					13, 66, 67, 68, 69°
153.513^{S}	1/2	3/2	0	651 412	4				13, $64^{\triangle}$, 66, 67, 68, 69°
54.748^{C}	$1s^24p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	[15 829 290]	[17 655 830]					
54.624^{C}	3/2	5/2	[15 829 290]	[17 660 000]					
53.986^{C}	1/2	3/2	[15 803 510]	[17 655 830]					
25.9547^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	[11 898 880]	[15 751 740]					
25.5492^{C}	1/2	1/2	[11 837 720]	[15 751 740]					
25.8764^{C}	$1s^23d\ ^2D_{5/2}$	$1s^24p\ ^2P^o_{3/2}$	[11 964 770]	[15 829 290]	1				$64^{\triangle}$
25.646	$1s^23d\ ^2D_{5/2}$	$1s^24f\ ^2F^o_{7/2}$	[11 964 770]	15 864 000	7				64
25.543	3/2	5/2	[11 945 450]	15 860 400	6				64
25.3163^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	[11 898 880]	[15 848 900]					
25.2641^{C}	3/2	5/2	[11 898 880]	[15 857 060]	3				$64^{\triangle}$
24.9303^{C}	1/2	3/2	[11 837 720]	[15 848 900]	1				$64^{\triangle}$
24.4551^{C}	$1s^23s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	[11 714 380]	[15 803 510]					
24.3019^{C}	1/2	3/2	[11 714 380]	[15 829 290]	1				$64^{\triangle}$
17.5214^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	[11 898 880]	[17 606 200]					
17.3356^{C}	1/2	1/2	[11 837 720]	[17 606 200]					
17.3703^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	[11 898 880]	[17 655 830]					
17.3577^{C}	3/2	5/2	[11 898 880]	[17 660 000]					
17.1877^{C}	1/2	3/2	[11 837 720]	[17 655 830]					
9.03917^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^23s\ ^2S_{1/2}$	651 412	[11 714 380]	10bl				$64^{\triangle}$, 70
8.87349^{C}	1/2	1/2	444 861	[11 714 380]	2bl				$64^{\triangle}$, 70
8.85423^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^23d\ ^2D_{3/2}$	651 412	[11 945 450]	2				$64^{\triangle}$, 70
8.83911^{C}	3/2	5/2	651 412	[11 964 770]	25				$64^{\triangle}$, 70
8.69521^{C}	1/2	3/2	444 861	[11 945 450]	15				$64^{\triangle}$, 70
8.44757^{C}	$1s^22s\ ^2S_{1/2}$	$1s^23p\ ^2P^o_{1/2}$	0	[11 837 720]	10				$64^{\triangle}$, 70
8.40415^{C}	1/2	3/2	0	[11 898 880]	20				$64^{\triangle}$, 70
6.62237^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	651 412	[15 751 740]					70
6.53301^{C}	1/2	1/2	444 861	[15 751 740]					70
6.58003^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	651 412	[15 848 900]					70
6.57650^{C}	3/2	5/2	651 412	[15 857 060]					70
6.49180^{C}	1/2	3/2	444 861	[15 848 900]					70
6.32771^{C}	$1s^22s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	0	[15 803 510]					70
6.31740^{C}	1/2	3/2	0	[15 829 290]					70
5.89804^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	651 412	[17 606 200]					70
5.82705^{C}	1/2	1/2	444 861	[17 606 200]					70
5.88082^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	651 412	[17 655 830]					70
5.87938^{C}	3/2	5/2	651 412	[17 660 000]					70
5.81025^{C}	1/2	3/2	444 861	[17 655 830]					70
5.67131^{C}	$1s^22s\ ^2S_{1/2}$	$1s^25p\ ^2P^o_{1/2}$	0	[17 632 620]					70
5.66707^{C}	1/2	3/2	0	[17 645 800]					70
1.5136^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s2s^2\ ^2S_{1/2}$	651 412	[66 717 000]					70
1.5090^{C}	1/2	1/2	444 861	[66 717 000]					70
1.4985^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^4P_{1/2}$	651 412	[67 382 000]					70
1.4959^{C}	3/2	3/2	651 412	[67 498 000]					70
1.4945^{C}	3/2	5/2	651 412	[67 561 000]					70
1.4940^{C}	1/2	1/2	444 861	[67 382 000]					70
1.4914^{C}	1/2	3/2	444 861	[67 498 000]					70

Cu XXVII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1.4963[C]	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^4P^o_{1/2}$	0	[66 832 000]					70
1.4953[C]	$_{1/2}$	$_{3/2}$	0	[66 876 000]					70
1.4911[C]	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^2P_{1/2}$	651 412	[67 712 000]					70
1.4867[C]	$_{1/2}$	$_{1/2}$	444 861	[67 712 000]					70
1.4860[C]	$_{3/2}$	$_{3/2}$	651 412	[67 945 000]					70
1.4815[C]	$_{1/2}$	$_{3/2}$	444 861	[67 945 000]					70
1.4910[C]	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1D)\ ^2D_{3/2}$	651 412	[67 716 000]					70
1.4889[C]	$_{3/2}$	$_{5/2}$	651 412	[67 814 000]					70
1.4866[C]	$_{1/2}$	$_{3/2}$	444 861	[67 716 000]					70
1.4853[C]	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^2P^o_{3/2}$	0	[67 326 000]					70
1.4811[C]	$_{1/2}$	$_{1/2}$	0	[67 517 000]					70
1.4825[C]	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^1P^o)\ ^2P^o_{1/2}$	0	[67 454 000]					70
1.4817[C]	$_{1/2}$	$_{3/2}$	0	[67 490 000]					70
1.4824[C]	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1S)\ ^2S_{1/2}$	651 412	[68 109 000]					70
1.4779[C]	$_{1/2}$	$_{1/2}$	444 861	[68 109 000]					70
1.272	$1s^22p\ ^2P^o_{3/2}$	$1s2p3p\ ^2D_{5/2}$	651 412	79 260 000					71
1.213	$1s^22p\ ^2P^o_{3/2}$	$1s2p4p\ ^2D_{5/2}$	651 412	83 090 000					71

Cu XXVIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
6200^{C}	$1s4p\ ^3P^o_2$	$1s4d\ ^3D_2$	[83 812 400]	[83 828 600]					
3940^{C}	2	3	[83 812 400]	[83 837 800]					
2440^{C}	1	2	[83 787 700]	[83 828 600]					
2410^{C}	1	1	[83 787 700]	[83 829 100]					
2280^{C}	0	1	[83 785 300]	[83 829 100]					
5900^{C}	$1s5s\ ^3S_1$	$1s5p\ ^3P^o_1$	[85 734 300]	[85 751 300]					
3380^{C}	1	2	[85 734 300]	[85 763 900]					
4440^{C}	$1s5s\ ^1S_0$	$1s5p\ ^1P^o_1$	[85 750 700]	[85 773 200]					
3000^{C}	$1s4s\ ^3S_1$	$1s4p\ ^3P^o_1$	[83 754 400]	[83 787 700]					
1720^{C}	1	2	[83 754 400]	[83 812 400]					
2270^{C}	$1s4s\ ^1S_0$	$1s4p\ ^1P^o_1$	[83 786 500]	[83 830 600]					
1260^{C}	$1s3s\ ^3S_1$	$1s3p\ ^3P^o_1$	[79 453 200]	[79 532 500]					
725^{C}	1	2	[79 453 200]	[79 591 200]					
962^{C}	$1s3s\ ^1S_0$	$1s3p\ ^1P^o_1$	[79 530 300]	[79 634 300]					
373.45^{C}	$1s2s\ ^3S_1$	$1s2p\ ^3P^o_0$	[67 035 380]	[67 303 150]					
347.74^{C}	1	1	[67 035 380]	[67 322 950]					
206.70^{C}	1	2	[67 035 380]	[67 519 170]					
283.20^{C}	$1s2s\ ^1S_0$	$1s2p\ ^1P^o_1$	[67 324 970]	[67 678 080]					
155.59^{C}	$1s2s\ ^3S_1$	$1s2p\ ^1P^o_1$	[67 035 380]	[67 678 080]					
52.08^{C}	$1s4p\ ^1P^o_1$	$1s5s\ ^1S_0$	[83 830 600]	[85 750 700]					
52.03^{C}	$1s4p\ ^3P^o_2$	$1s5s\ ^3S_1$	[83 812 400]	[85 734 300]					
51.37^{C}	1	1	[83 787 700]	[85 734 300]					
50.33^{C}	$1s4s\ ^1S_0$	$1s5p\ ^1P^o_1$	[83 786 500]	[85 773 200]					
50.08^{C}	$1s4s\ ^3S_1$	$1s5p\ ^3P^o_1$	[83 754 400]	[85 751 300]					
24.084^{C}	$1s3p\ ^1P^o_1$	$1s4s\ ^1S_0$	[79 634 300]	[83 786 500]					
24.070^{C}	$1s3d\ ^3D_1$	$1s4p\ ^3P^o_0$	[79 630 800]	[83 785 300]					
24.056^{C}	1	1	[79 630 800]	[83 787 700]					
24.050^{C}	2	1	[79 629 700]	[83 787 700]					
24.033^{C}	3	2	[79 651 400]	[83 812 400]					
23.908^{C}	2	2	[79 629 700]	[83 812 400]					
24.020^{C}	$1s3p\ ^3P^o_2$	$1s4s\ ^3S_1$	[79 591 200]	[83 754 400]					
23.686^{C}	1	1	[79 532 500]	[83 754 400]					
23.944^{C}	$1s3d\ ^1D_2$	$1s4p\ ^1P^o_1$	[79 654 200]	[83 830 600]					
23.783^{C}	$1s3p\ ^1P^o_1$	$1s4d\ ^1D_2$	[79 634 300]	[83 838 900]					
23.599^{C}	$1s3p\ ^3P^o_2$	$1s4d\ ^3D_2$	[79 591 200]	[83 828 600]					
23.548^{C}	2	3	[79 591 200]	[83 837 800]					
23.277^{C}	1	2	[79 532 500]	[83 828 600]					
23.274^{C}	1	1	[79 532 500]	[83 829 100]					
23.244^{C}	0	1	[79 527 000]	[83 829 100]					
23.254^{C}	$1s3s\ ^1S_0$	$1s4p\ ^1P^o_1$	[79 530 300]	[83 830 600]					
23.071^{C}	$1s3s\ ^3S_1$	$1s4p\ ^3P^o_1$	[79 453 200]	[83 787 700]					
22.940^{C}	1	2	[79 453 200]	[83 812 400]					
16.349^{C}	$1s3p\ ^1P^o_1$	$1s5s\ ^1S_0$	[79 634 300]	[85 750 700]					
16.278^{C}	$1s3p\ ^3P^o_2$	$1s5s\ ^3S_1$	[79 591 200]	[85 734 300]					
16.124^{C}	1	1	[79 532 500]	[85 734 300]					
16.018^{C}	$1s3s\ ^1S_0$	$1s5p\ ^1P^o_1$	[79 530 300]	[85 773 200]					
15.878^{C}	$1s3s\ ^3S_1$	$1s5p\ ^3P^o_1$	[79 453 200]	[85 751 300]					
15.846^{C}	1	2	[79 453 200]	[85 763 900]					

Cu XXVIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
8.4372^{C}	$1s2p\ ^1P^o_1$	$1s3s\ ^1S_0$	[67 678 080]	[79 530 300]					
8.3794^{C}	$1s2p\ ^3P^o_2$	$1s3s\ ^3S_1$	[67 519 170]	[79 453 200]					
8.2439^{C}	1	1	[67 322 950]	[79 453 200]					
8.3499^{C}	$1s2p\ ^1P^o_1$	$1s3d\ ^1D_2$	[67 678 080]	[79 654 200]					
8.2573^{C}	$1s2p\ ^3P^o_2$	$1s3d\ ^3D_2$	[67 519 170]	[79 629 700]					
8.2425^{C}	2	3	[67 519 170]	[79 651 400]					
8.1256^{C}	1	2	[67 322 950]	[79 629 700]					
8.1249^{C}	1	1	[67 322 950]	[79 630 800]					
8.1118^{C}	0	1	[67 303 150]	[79 630 800]					
8.1239^{C}	$1s2s\ ^1S_0$	$1s3p\ ^1P^o_1$	[67 324 970]	[79 634 300]					
8.0018^{C}	$1s2s\ ^3S_1$	$1s3p\ ^3P^o_1$	[67 035 380]	[79 532 500]					
7.9644^{C}	1	2	[67 035 380]	[79 591 200]					
6.2079^{C}	$1s2p\ ^1P^o_1$	$1s4s\ ^1S_0$	[67 678 080]	[83 786 500]					
6.1878^{C}	$1s2p\ ^1P^o_1$	$1s4d\ ^1D_2$	[67 678 080]	[83 838 900]					
6.1594^{C}	$1s2p\ ^3P^o_2$	$1s4s\ ^3S_1$	[67 519 170]	[83 754 400]					
6.0859^{C}	1	1	[67 322 950]	[83 754 400]					
6.1314^{C}	$1s2p\ ^3P^o_2$	$1s4d\ ^3D_2$	[67 519 170]	[83 828 600]					
6.1280^{C}	2	3	[67 519 170]	[83 837 800]					
6.0585^{C}	1	2	[67 322 950]	[83 828 600]					
6.0583^{C}	1	1	[67 322 950]	[83 829 100]					
6.0511^{C}	0	1	[67 303 150]	[83 829 100]					
6.0585^{C}	$1s2s\ ^1S_0$	$1s4p\ ^1P^o_1$	[67 324 970]	[83 830 600]					
5.9693^{C}	$1s2s\ ^3S_1$	$1s4p\ ^3P^o_1$	[67 035 380]	[83 787 700]					
5.9605^{C}	1	2	[67 035 380]	[83 812 400]					
5.5332^{C}	$1s2p\ ^1P^o_1$	$1s5s\ ^1S_0$	[67 678 080]	[85 750 700]					
5.4899^{C}	$1s2p\ ^3P^o_2$	$1s5s\ ^3S_1$	[67 519 170]	[85 734 300]					
5.4314^{C}	1	1	[67 322 950]	[85 734 300]					
5.4206^{C}	$1s2s\ ^1S_0$	$1s5p\ ^1P^o_1$	[67 324 970]	[85 773 200]					
5.3430^{C}	$1s2s\ ^3S_1$	$1s5p\ ^3P^o_1$	[67 035 380]	[85 751 300]					
5.3395^{C}	1	2	[67 035 380]	[85 763 900]					
1.491750^{C}	$1s^2\ ^1S_0$	$1s2s\ ^3S_1$	0	[67 035 380]		M1			
1.485378^{C}	$1s^2\ ^1S_0$	$1s2p\ ^3P^o_1$	0	[67 322 950]					71,73
1.481061^{C}	0	2	0	[67 519 170]					73
1.477583^{C}	$1s^2\ ^1S_0$	$1s2p\ ^1P^o_1$	0	[67 678 080]					71,72,73,85,86,87
1.4518^{C}	$1s2p\ ^1P^o_1$	$2s^2\ ^1S_0$	[67 678 080]	[136 557 000]					70
1.4445^{C}	$1s2p\ ^1P^o_1$	$2p^2\ ^3P_0$	[67 678 080]	[136 904 000]					70
1.4416^{C}	1	1	[67 678 080]	[137 042 000]					70
1.4403^{C}	1	2	[67 678 080]	[137 106 000]					70
1.4444^{C}	$1s2p\ ^3P^o_1$	$2s^2\ ^1S_0$	[67 322 950]	[136 557 000]					70
1.4426^{C}	$1s2s\ ^1S_0$	$2s2p\ ^3P^o_1$	[67 324 970]	[136 644 000]					70
1.4383^{C}	$1s2p\ ^3P^o_2$	$2p^2\ ^3P_1$	[67 519 170]	[137 042 000]					70
1.4372^{C}	1	0	[67 322 950]	[136 904 000]					70
1.4370^{C}	2	2	[67 519 170]	[137 106 000]					70
1.4344^{C}	1	1	[67 322 950]	[137 042 000]					70
1.4340^{C}	0	1	[67 303 150]	[137 042 000]					70
1.4331^{C}	1	2	[67 322 950]	[137 106 000]					70
1.4377^{C}	$1s2s\ ^3S_1$	$2s2p\ ^3P^o_0$	[67 035 380]	[136 591 000]					70
1.4366^{C}	1	1	[67 035 380]	[136 644 000]					70
1.4326^{C}	1	2	[67 035 380]	[136 838 000]					70

Cu XXVIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1.4353^{C}	$1s2p\ ^1P^o_1$	$2p^2\ ^1D_2$	[67 678 080]	[137 348 000]					70,73
1.4321^{C}	$1s2s\ ^1S_0$	$2s2p\ ^1P^o_1$	[67 324 970]	[137 152 000]					70
1.4320^{C}	$1s2p\ ^3P^o_2$	$2p^2\ ^1D_2$	[67 519 170]	[137 348 000]					70
1.4282^{C}	1	2	[67 322 950]	[137 348 000]					70
1.4293^{C}	$1s2p\ ^1P^o_1$	$2p^2\ ^1S_0$	[67 678 080]	[137 639 000]					70,73
1.4262^{C}	$1s2s\ ^3S_1$	$2s2p\ ^1P^o_1$	[67 035 380]	[137 152 000]					70
1.4222^{C}	$1s2p\ ^3P^o_1$	$2p^2\ ^1S_0$	[67 322 950]	[137 639 000]					70
1.25734^{C}	$1s^2\ ^1S_0$	$1s3p\ ^3P^o_1$	0	[79 532 500]					71
1.25574^{C}	$1s^2\ ^1S_0$	$1s3p\ ^1P^o_1$	0	[79 634 300]					71
1.19349^{C}	$1s^2\ ^1S_0$	$1s4p\ ^3P^o_1$	0	[83 787 700]					71
1.19288^{C}	$1s^2\ ^1S_0$	$1s4p\ ^1P^o_1$	0	[83 830 600]					71
1.16616^{C}	$1s^2\ ^1S_0$	$1s5p\ ^3P^o_1$	0	[85 751 300]					71
1.16587^{C}	$1s^2\ ^1S_0$	$1s5p\ ^1P^o_1$	0	[85 773 200]					71

Cu XXIX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1300[C]	$3s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[82 929 560]	[83 006 500]					
1269[C]	$3p\ ^2P^o_{1/2}$	$3d\ ^2D_{3/2}$	[82 927 480]	[83 006 310]					
385.06[C]	$2s\ ^2S_{1/2}$	$2p\ ^2P^o_{3/2}$	[69 902 760]	[70 162 460]					
22.2471[C]	$3d\ ^2D_{5/2}$	$4f\ ^2F^o_{7/2}$	[83 032 080]	[87 527 040]					
22.1477[C]	$3p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[83 006 500]	[87 521 640]					
21.8281[C]	$3s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[82 929 560]	[87 510 820]					
15.2157[C]	$3d\ ^2D_{5/2}$	$5f\ ^2F^o_{7/2}$	[83 032 080]	[89 604 250]					
15.1630[C]	$3p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[83 006 500]	[89 601 490]					
15.0006[C]	$3s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[82 929 560]	[89 595 950]					
7.770237[C]	$2p\ ^2P^o_{3/2}$	$3d\ ^2D_{5/2}$	[70 162 460]	[83 032 080]					
7.631409[C]	$2s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[69 902 760]	[83 006 500]					
5.760641[C]	$2p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[70 162 460]	[87 521 640]					
5.679217[C]	$2s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[69 902 760]	[87 510 820]					
5.144290[C]	$2p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[70 162 460]	[89 601 490]					
5.077897[C]	$2s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[69 902 760]	[89 595 950]					
1.430694[C]	$1s\ ^2S_{1/2}$	$2p\ ^2P^o_{1/2}$	0	[69 896 140]					
1.425264[C]	$_{1/2}$	$_{3/2}$	0	[70 162 460]					
1.205873[C]	$1s\ ^2S_{1/2}$	$3p\ ^2P^o_{1/2}$	0	[82 927 480]					
1.204725[C]	$_{1/2}$	$_{3/2}$	0	[83 006 500]					
1.142716[C]	$1s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	0	[87 510 820]					
1.116122[C]	$1s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	0	[89 595 950]					

2.9.3. References for Comments and Tables for Cu Ions

[1] B. C. Fawcett, A. Ridgeley, and J. O. Ekberg, Phys. Scr. **21**, 155 (1980).
[2] E. Alexander, U. Feldman, B. S. Fraenkel, and S. Hoory, J. Opt. Soc. Am. **56**, 651 (1966).
[3] M. Even-Zohar and B. S. Fraenkel, J. Opt. Soc. Am. **58**, 1420 (1968).
[4] W. Lotz, J. Opt. Soc. Am **57**, 873 (1967).
[5] S. Goldsmith and B. S. Fraenkel, Astrophys. J. **161**, 317 (1970).
[6] A. A. Ramonas and A. N. Ryabtsev, Opt. Spectrosc. **48**, 348 (1980).
[7] V. Kaufman, J. Sugar, and W. L. Rowan, J. Opt. Soc. Am. B **6**, 142 (1989).
[8] E. Alexander, U. Feldman, and B. S. Fraenkel, J. Opt. Soc. Am. **55**, 650 (1965).
[9] S. Hoory, S. Goldsmith, B. S. Fraenkel, and U. Feldman, Astrophys. J. **160**, 781 (1970).
[10] J. Sugar and A. Musgrove, J. Phys. Chem. Ref. Data **19**, 527 (1990).
[11] J. Sugar, V. Kaufman, and W. L. Rowan, J. Opt. Soc. Am. B **4**, 1927 (1987).
[12] M. Swartz, S. O. Kastner, L. Goldsmith, and W. M. Neupert, J. Opt. Soc. Am. **66**, 240 (1976).
[13] E. Hinnov, S. Suckewer, S. Cohen, and K. Sato, Phys. Rev. A **25**, 2293 (1982).
[14] B. Denne, E. Hinnov, S. Suckewer, and S. Cohen, Phys. Rev. A **28**, 206 (1983).
[15] V. Kaufman, J. Sugar, and W. L. Rowan, J. Opt. Soc. Am. B **6**, 1444 (1989).
[16] B. C. Fawcett and R. W. Hayes, J. Opt. Soc. Am. **65**, 623 (1975).
[17] J. R. Roberts, T. L. Pittman, J. Sugar, V. Kaufman, and W. L. Rowan, Phys. Rev. A **35**, 2591 (1987).
[18] J. Sugar and V. Kaufman, J. Opt. Soc. Am. B **3**, 704 (1986).
[19] V. Kaufman, J. Sugar, and W. L. Rowan, J. Opt. Soc. Am. B **7**, 1169 (1990).
[20] B. Denne, E. Hinnov, S. Suckewer, and J. Timberlake, J. Opt. Soc. Am. B **1**, 296 (1984).
[21] J. Sugar and V. Kaufman, J. Opt. Soc. Am. B **4**, 2010 (1987).
[22] R. Hutton, C. Jupén, E. Träbert, and P. H. Heckmann, Nucl. Instrum. Meth. B **23**, 297 (1987).
[23] J. Sugar, V. Kaufman, and W. L. Rowan, J. Opt. Soc. Am. B **8**, 22 (1991).
[24] R. U. Datla, J. R. Roberts, N. Woodward, S. Lippman, and W. L. Rowan, Phys. Rev. A **40**, 1484 (1989).
[25] J. Sugar, V. Kaufman, and W. L. Rowan, J. Opt. Soc. Am. B **7**, 152 (1990).
[26] E. Träbert, Z. Phys. D **2**, 213 (1986).
[27] E. Träbert, R. Hutton, and I. Martinson, Z. Phys. D **5**, 125 (1987).
[28] E. Träbert, P. H. Heckmann, R. Hutton, and I. Martinson, J. Opt. Soc. Am. B **5**, 2173 (1988).
[29] M. A. Khan, Opt. Commun. **27**, 242 (1978).
[30] S. O. Kastner, M. Swartz, A. K. Bhatia, and J. Lapides, J. Opt. Soc. Am. **68**, 1558 (1978).
[31] M. C. Buchet-Poulizac and J. P. Buchet, Nucl. Instrum. Meth. B **31**, 182 (1988).
[32] J. Sugar, V. Kaufman, and W. L. Rowan, J. Opt. Soc. Am. B **5**, 2183 (1988).
[33] U. Litzén and A. Redfors, Phys. Lett. A **127**, 88 (1988).
[34] M. Finkenthal, E. Hinnov, S. Cohen, and S. Suckewer, Phys. Lett. **91A**, 284 (1982).
[35] J. Sugar and V. Kaufman, J. Opt. Soc. Am. B **3**, 1612 (1986).
[36] J. Sugar, V. Kaufman, P. Indelicato, and W. L. Rowan, J. Opt. Soc. Am. B **6**, 1437 (1989).
[37] U. Litzén and A. Redfors, Phys. Scr. **36**, 895 (1987).
[38] A. Redfors, Phys. Scr. **38**, 702 (1988).
[39] U. Feldman, L. Katz, W. Behring, and L. Cohen, J. Opt. Soc. Am. **61**, 91 (1971).
[40] M. Swartz, S. Kastner, E. Rothe, and W. Neupert, J. Phys. B **4**, 1747 (1971).
[41] E. Ya. Kononov, A. N. Ryabtsev, and S. S. Churilov, Phys. Scr. **19**, 328 (1979).
[42] J. Reader, V. Kaufman, J. Sugar, J. O. Ekberg, U. Feldman, C. M. Brown, J. F. Seely, and W. L. Rowan, J. Opt. Soc. Am. B **4**, 1821 (1987).
[43] C. Jupén, L. Engström, R. Hutton, and E. Träbert, J. Phys. B **21**, L347 (1988).
[44] E. Ya. Kononov, V. I. Kovalev, A. N. Ryabtsev, and S. S. Churilov, Sov. J. Quantum Electron. **7**, 111 (1977).
[45] U. Feldman and L. Cohen, J. Opt. Soc. Am. **57**, 1128 (1967).
[46] J. P. Buchet, M. C. Buchet-Poulizac, A. Denis, J. Desesquelles, M. Druetta, S. Martin, and J. F. Wyart, J. Phys. B **20**, 1709 (1987).
[47] U. Feldman, L. Cohen, and M. Swartz, Astrophys. J. **148**, 585 (1967).
[48] U. Feldman and L. Cohen, Astrophys. J. **149**, 265 (1967).
[49] V. A. Boiko, A. Ya. Faenov, and S. A. Pikuz, J. Quant. Spectrosc. Radiat. Transfer **19**, 11 (1978).
[50] H. Gordon, M. G. Hobby, and N. J. Peacock, J. Phys. B **13**, 1985 (1980).
[51] R. J. Hutcheon, L. Cooke, M. H. Key, C. L. S. Lewis, and G. E. Bromage, Phys. Scr. **21**, 89 (1980).
[52] W. E. Behring, J. F. Seely, S. Goldsmith, L. Cohen, M. Richardson, and U. Feldman, J. Opt. Soc. Am. B **2**, 886 (1985).
[53] V. A. Boiko, S. A. Pikuz, A. S. Safronova, and A. Ya. Faenov, Opt. Spectrosc. **44**, 498 (1978).
[54] V. A. Boiko, S. A. Pikuz, A. S. Safronova, A. Ya. Faenov, P. O. Bogdanovich, G. V. Merkelis, Z. B. Rudzikas, and S. D. Sadziuviene, J. Phys. B **12**, 1927 (1979).
[55] V. A. Boiko, S. A. Pikuz, A. S. Safronova, and A. Ya. Faenov, Phys. Scr. **20**, 138 (1979).
[56] R. J. Hutcheon, G. E. Bromage, R. L. Cooke, M. H. Key, and C. L. S. Lewis, J. Phys. B **13**, 673 (1980).
[57] K. T. Cheng, unpublished material (1981).
[58] W. C. Martin, unpublished material (1982).
[59] G. V. Peregudov, E. N. Ragozine, I. Yu. Skobelev, A. V. Vinogradov, and E. A. Yukov, J. Phys. D **11**, 2305 (1978).
[60] J. O. Ekberg, J. F. Seely, C. M. Brown, U. Feldman, M. C. Richardson, and W. E. Behring, J. Opt. Soc. Am. B **4**, 420 (1987).
[61] B. Edlén, Phys. Scr. **28**, 483 (1983).
[62] B. Denne, G. Magyar, and J. Jacquinot, Phys. Rev. A **40**, 3702 (1989).
[63] J. P. Buchet, M. C. Buchet-Poulizac, A. Denis, J. Desesquelles, M. Druetta, J. P. Grandin, X. Husson, D. Lecler, and H. F. Beyer, Nucl. Instrum. Meth. B **9**, 645 (1985).
[64] C. M. Brown, J. O. Ekberg, U. Feldman, J. F. Seely, M. C. Richardson, F. J. Marshall, and W. E. Behring, J. Opt. Soc. Am. B **4**, 533 (1987).
[65] V. A. Boiko, S. A. Pikuz, U. I. Safronova, and A. Ya. Faenov, J. Phys. B **10**, 1253 (1977).
[66] R. J. Knize, A. T. Ramsey, B. C. Stratton, and J. Timberlake, The Sixth Topical Conference on Atomic Processes in High Temperture Plasmas (1987).
[67] E. Hinnov, the TFTR Operating Team, B. Denne, and the JET Operating Team, Phys. Rev. A **40**, 4357 (1989).
[68] R. J. Knize, Phys. Rev. A **43**, 1637 (1991).
[69] Y.-K. Kim, D. H. Baik, P. Indelicato, and J. P. Desclaux, Phys. Rev. A **44**, 148 (1991).
[70] L. A. Vainshtein and U. I. Safronova, Reprint No. 2, Acad. Nauk USSR, Inst. Spectrosc. Moscow (1985).
[71] E. V. Aglitskii and A. M. Panin, Opt. Spectrosc. **58**, 453 (1985).
[72] E. V. Aglitsky, P. S. Antsiferov, S. L. Mandelstam, A. M. Panin, U. I. Safronova, S. A. Ulitin, and L. A. Vainshtein, Phys. Scr. **38**, 136 (1988).

[73] J. J. Turechek and H. J. Kunze, Z. Phys. A **273**, 111 (1975).
[74] K. T. Cheng, M. H. Chen, W. R. Johnson, and J. Sapirstein, Phys. Rev. A **50**, 247 (1994).
[75] K. T. Cheng, private communication (1996).
[76] W. R. Johnson and G. Soff, Atom. Data Nucl. Data Tables **33**, 405 (1985).
[77] G. W. F. Drake, *Calculated transition frequencies for helium-like ions*, unpublished (1985).
[78] P. Beiersdorfer, M. Bitter, S. von Goeler, and K. W. Hill, Phys. Rev. A **40**, 150 (1989).
[79] P. J. Mohr, Atom. Data Nucl. Data Tables **29**, 453 (1983).
[80] G. W. Erickson, J. Phys. Chem. Ref. Data **6**, 831 (1977).
[81] B. Edlén, Z. Phys. **100**, 621 (1936).
[82] U. Feldman, L. Cohen, and M. Swartz, J. Opt. Soc. Am. **57**, 535 (1967).
[83] E. Hinnov, private communication (1985).
[84] E. Ya. Kononov, A. N. Ryabtsev, U. I. Safronova, and S. S. Churilov, J. Phys. B **9**, L477 (1976).
[85] T. N. Lie and R. C. Elton, Phys. Rev. A **3**, 865 (1971).
[86] S. Morita, J. Phys. Soc. Jpn. **52**, 2673 (1983).
[87] S. Morita and J. Fujita, Nucl. Instrum. Meth. B **9**, 713 (1985).
[88] V. Kaufman and J. Sugar, J. Phys. Chem. Ref. Data **15**, 321 (1986).

2.10. Krypton

2.10.1. Brief Comments on Each Krypton Ion

Kr V

Ge I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^{10}4s^24p^2\ ^3P_0$

Ionization energy 521 800 ± 1600 cm^{-1}
(64.7 ± 0.2 eV)

The $4s^24p^2 - 4s^24p4d$ and $4s^24p^2 - 4s4p^3$ transition arrays were identified by Fawcett and Bromage [1]. They measured 29 lines in the range of 465 – 811 Å with an uncertainty of ±0.03 Å. More accurate wavelengths and an extended analysis were given by Trigueiros *et al.* [2] in the range of 434 – 910 Å. They increased the identifications to 50 lines, including revisions of classifications of a few lines in Ref. [1]. Observations were made with a theta-pinch plasma source with a measurement uncertainty of ±0.01 Å. We have adopted their results.

The value for the ionization energy was calculated by Finkelnburg and Humbach [3] by extrapolation of the effective charge on the residual ion.

Kr VI

Ga I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^{10}4s^24p\ ^2P^\circ_{1/2}$

Ionization energy 633 100 ± 1600 cm^{-1}
(78.5 ± 0.2 eV)

The $4s^24p - 4s4p^2$ and $4s^24p - 4s^24d$ transition arrays were identified by Fawcett *et al.* [4] in a Z-pinch plasma source. Trigueiros *et al.* [5] reobserved the spectrum in a wider range of 450 – 960 Å using a theta-pinch plasma source. They classified the $4s^24d\ ^2D - 4s^25p\ ^2P^\circ$ doublet in the range of 936 – 960 Å. Ten lines comprising the $4s^24p\ ^2P^\circ - 4s^24d\ ^2D$, $4s^24p\ ^2P^\circ - 4s4p^2\ ^2P$ and ^2D transitions are taken from Ref. [5]. The uncertainty of their wavelengths is ±0.01 Å.

Twenty-two emission lines, including intercombination transitions, from the terms of $4s4p^2\ ^4P$, $4p^3\ ^4S^\circ$, $^2D^\circ$, $^2P^\circ$, $4s^25s\ ^2S$, and $4s^24f\ ^2F^\circ$ to lower terms were identified by Tauheed *et al.* [6] in a beam-foil spectrum in the range of 363 – 1054 Å. The uncertainty of their wavelengths varies from ±0.2 Å to ±0.5 Å. The spectrum was observed from 230 – 2540 Å by Pagan *et al.* [7] with an uncertainty of ±0.01 to 0.005 Å. New values for the $4s4p^2\ ^2S$ term and the $4s^25p\ ^2P^\circ_{1/2,3/2}$ levels were found, replacing those given in Ref. [5]. The $4s^24f\ ^2F^\circ_{5/2,7/2}$ levels reported in Ref. [6] were replaced and their designations were changed to $4s4p(^1P^\circ)4d\ ^2F^\circ$ in accordance with a calculation of the eigenvectors. The value for the $4p^3\ ^2P^\circ_{1/2}$ level given in Ref. [6] was also changed. In addition to these corrections, Pagan *et al.* [7] identified most of the levels of the $4s4p4d$ configuration and all but one of $4s4p5s$. They have reevaluated all of the energy levels with their new measurements and have given percentage compositions for them.

It should be noted that earlier measurements of Druetta and Buchet [8] and Livingston [9] are less accurate and incompatible with the level scheme adopted here.

Jacquet *et al.* [10] observed three-electron capture transitions $4s^26g - 4s^27h$ and $4s^26h - 4s^27i$ at 3381.7 Åand 3394.7 Å.

The value for the ionization energy was derived by Finkelnburg and Humbach [3] by extrapolation of the effective charge on the residual ion.

Kr VII

Zn I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^{10}4s^2\ ^1S_0$

Ionization energy 895 300 ± 2400 cm^{-1}
(111.0 ± 0.3 eV)

The first observation was reported by Fawcett *et al.* [4], who identified the $4s^2\ ^1S_0 - 4s4p\ ^1P^\circ_1$ resonance line at 585.37 Å and the $4s4p\ ^3P^\circ_2 - 4p^2\ ^3P_2$ line at 618.67 Å in a Z-pinch plasma discharge. The analysis was extended by Druetta and Buchet [8], Livingston [9], and Pinnington *et al.* [11] in beam-foil experiments and by Trigueiros *et al.* [12] using a theta-pinch plasma source. Trigueiros *et al.* [12] identified 22 lines as transitions between levels of the $4s^2$, $4s4d$, $4p^2$, and $4s4p$ configurations with an uncertainty of ±0.01 Å. Their results are given here.

Trigueiros *et al.* [13] identified 17 new lines in the range of 200 – 2070 Å, comprising the $n = 4-4, n = 4-5$, and $n = 5-5$ transitions, with an uncertainty of ±0.01 Å. The $n = 4-5$ transitions were also observed by Bouchama *et al.* [14] in an experiment on electron capture into excited states. Extended analyses were made by Pinnington *et al.* [15] in a beam-foil experiment. They reobserved the spectrum in the range of 554 – 2080 Å with uncertainties of ±0.2 Å to ±0.5 Å. Wavelengths adopted here are taken from Refs. [13], [14], and [15]. Five lines in Ref. [13] from the upper levels $4s5s\ ^1S_0$ and $4s5p\ ^1P^\circ_1$ and $^3P^\circ_0$ at 200.07 Å, 356.33 Å, 704.32 Å, 831.07 Å, and 2068.83 Å have been omitted, because they are inconsistent with the measurements of Bouchama *et al.* [14] and with those of Pinnington *et al.* [15] Moreover, the $4s5s\ ^3S_1 - 4s5p\ ^3P^\circ_{1,0}$ lines at 1832.5 Å and 1847.5 Å in Ref. [15] disagree by 1.2 Å and 1.3 Å with those calculated from the level values. However, they are retained as tentatively identified lines.

Jacquet *et al.* [10] observed double-electron capture transitions $4snl - 4sn'l'$ with $n \geq 6$ in the range of 2494 – 5659 Å. They have been omitted because their classifications are incomplete.

The value for the ionization energy was derived by Finklenburg and Humbach [3] by extrapolation of the effective charge on the residual ion.

Kr VIII

Cu I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^{10}4s$ $^2S_{1/2}$

Ionization energy 1 014 665 ± 25 cm^{-1} (125.8025 ± 0.003 eV)

The resonance doublet $4s\ ^2S - 4p\ ^2P^\circ$ was first identified by Fawcett *et al.* [4] in a Z-pinch plasma and by Druetta and Buchet [8], who also observed the three lines of the $4p\ ^2P^\circ - 4d\ ^2D$ doublet in a beam-foil spectrum. Livingston *et al.* [16] reobserved the spectrum in the range of 180 – 2000 Å in a beam-foil experiment. They identified twenty new transitions, including $4d - 4f$, $4f - 5g$, $5g - 6h$, and $6h - 7i$. The $4p\ ^2P^\circ_{1/2,3/2} - 5d\ ^2D^\circ_{3/2,5/2}$ lines at 201.1 Å and 204.9 Å were also identified by McPherson *et al.* [17]. Improved measurements in the range of 288 – 2000 Å were made by Gallardo *et al.* [18] with a theta-pinch plasma with an uncertainty of ±0.02 Å. The $5p - 6s$ transition was observed by them and Bouchama *et al.* [14] who also reported the $n = 4 - 6$ transitions.

Reader *et al.* [19] provided classifications of the $3d^{10}nl - 3d^{10}nl'$ arrays through $7i$, and the $3d^{10}4s - 3d^94s4p$ and $3d^{10}4p - 3d^94p^2$ transitions in the range of 114 – 700 Å. Their wavelength uncertainty was ±0.008 Å. They used wavelengths from Gallardo *et al.* [18] above 1000 Å . We quote their results. Calculated Ritz wavelengths are given for the $5p - 6s$ and $4d - 6p$ lines, because the measured wavelengths [14,18] are poor compared with those calculated from the levels of Reader *et al.* [19].

In colliding beams of Kr^{8+} and Li, Jacquet *et al.* [10] observed 46 lines above 1916 Å and identified the lines as Kr^{7+} due to electron-capture. We adopt all the measurements except for the $7p - 7d$, $5f\ ^2F^\circ_{7/2} - 6d\ ^2D_{5/2}$, and $6d\ ^2D_{5/2} - 7p\ ^2P^\circ_{3/2}$ doublets because of deviations greater than 1 Å present between their wavelengths and those calculated from the levels of Reader *et al.* [19].

The value for the ionization energy was derived by Reader *et al.* [19] from the ns and nf series and from polarization formulas.

Kr IX

Ni I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^{10}$ $^1S_0$

Ionization energy 1 863 000 cm^{-1} (230.9 eV)

The $3d^{10} - 3d^94p$, $4f$ resonance transitions were identified by Fawcett and Gabriel [20] in a theta-pinch plasma. Reader *et al.* [19] gave improved measurements for these transitions with an uncertainty of ±0.005 Å in a low-inductance spark discharge.

The value for the ionization energy was calculated by Kim [21] from observations of the three-member $3d^9nf$ series.

Kr X

Co I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^9$ $^2D_{5/2}$

Ionization energy 2 163 000 cm^{-1} (268.2 eV)

Fawcett and Gabriel [20] identified five lines as belonging to the $3d^9 - 3d^84p$ array in the range of 99 – 104 Å. Reader *et al.* [22] classified 44 lines in the range of 91 – 105 Å obtained with a spark discharge as the $3p^63d^9 - 3p^53d^{10}$ and $3p^63d^9 - 3p^63d^84p$ transitions. The uncertainty of their wavelengths is ±0.005 Å. We quote their results.

The value for the ionization energy was calculated with the Cowan [23] HFR code by Sugar and Musgrove [24].

Kr XI

Fe I isoelectronic sequence

Ground state: $1s^22s^22p^63s^23p^63d^8$ $^3F_4$

Ionization energy 2 486 000 cm^{-1} (308.2 eV)

No wavelengths have been reported for this ion.

The value for the ionization energy was calculated with the Cowan [23] HFR code by Sugar and Musgrove [24].

Kr XII

Mn I isoelectronic sequence

Ground state: $1s^22s^22p^63s^23p^63d^7$ $^4F_{9/2}$

Ionization energy 2 824 000 cm^{-1} (350.1 eV)

No wavelengths have been reported for this ion.
The value for the ionization energy was calculated with the Cowan [23] HFR code by Sugar and Musgrove [24].

Kr XIII

Cr I isoelectronic sequence

Ground state: $1s^22s^22p^63s^23p^63d^6$ $^5D_4$

Ionization energy 3 153 000 cm^{-1} (390.9 eV)

No wavelengths have been reported for this ion.
The value for the ionization energy was calculated with the Cowan [23] HFR code by Sugar and Musgrove [24].

Kr XIV

V I isoelectronic sequence

Ground state: $1s^22s^22p^63s^23p^63d^5$ $^6S_{5/2}$

Ionization energy 3 602 000 cm^{-1} (446.6 eV)

No wavelengths have been reported for this ion.
The value for the ionization energy was calculated with the Cowan [23] HFR code by Sugar and Musgrove [24].

Kr XV

Ti I isoelectronic sequence

Ground state: $1s^22s^22p^63s^23p^63d^4$ $^5D_0$

Ionization energy 3 967 000 cm^{-1} (491.8 eV)

No wavelengths have been reported for this ion.
The value for the ionization energy was calculated with the Cowan [23] HFR code by Sugar and Musgrove [24].

Kr XVI

Sc I isoelectronic sequence

Ground state: $1s^22s^22p^63s^23p^63d^3$ $^4F_{3/2}$

Ionization energy 4 361 000 cm^{-1} (540.7 eV)

No wavelengths have been reported for this ion.
The value for the ionization energy was calculated with the Cowan [23] HFR code by Sugar and Musgrove [24].

Kr XVII

Ca I isoelectronic sequence

Ground state: $1s^22s^22p^63s^23p^63d^2$ $^3F_2$

Ionization energy 4 771 000 cm^{-1} (591.5 eV)

No wavelengths have been reported for this ion.
The value for the ionization energy was calculated with the Cowan [23] HFR code by Sugar and Musgrove [24].

Kr XVIII

K I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d$ $^2D_{3/2}$

Ionization energy 5 169 000 cm^{-1} (640.9 eV)

The $3p^63d - 3p^53d^2$ and $3p^63d - 3p^64f$ lines in the ranges of 91.3 – 93.6 Å and 35.1 – 35.4 Å, respectively, were first identified by Wyart and the TFR Group [25]. Their tokamak-plasma measurements have an uncertainty of ±0.015 Å. The spectrum in the range of 92.2 – 102 Å was reobserved by Kaufman *et al.* [26] with an uncertainty of ±0.005 Å in a similar light source. They found four of the seven lines given by Wyart and the TFR Group [25] and identified two new lines at 99.330 Å and 102.001 Å as the $3p^63d$ $^2D_{5/2,3/2} - 3p^5(^2P^\circ)3d^2(^1G)$ $^2F^\circ_{7/2}$ and (^3F) $^2F^\circ_{5/2}$ transitions.
The value for the ionization energy was calculated with the Cowan [23] HFR code by Sugar and Musgrove [24].

Kr XIX

Ar I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^6$ $^1S_0$

Ionization energy 6 339 000 cm^{-1} (785.9 eV)

The resonance transitions $3p^6$ $^1S_0 - 3p^53d$ $^1P^\circ_1$, $^3D^\circ_1$ were identified by Wyart and the TFR Group [25] as the lines at 96.263±0.015 Å and 118.063±0.015 Å, observed in a tokamak plasma. Sugar *et al.* [27] reobserved the lines at 96.238 Å and 118.672 Å with a similar light source. From a plot of transition energy differences between observed and calculated values along the isoelectronic sequence they derived smoothed wavelengths with an uncertainty of ±0.005 Å. We adopt their results.
The value for the ionization energy was calculated with the Cowan [23] HFR code by Sugar and Musgrove [24].

Kr XX

Cl I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^5$ $^2P^\circ_{3/2}$

Ionization energy 6 719 000 cm^{-1} (833.0 eV)

Four lines of the $3p^5 - 3p^43d$ array were identified by the TFR Group and Wyart [28] with an uncertainty of ±0.02 Å. The calculated $^2P^\circ$ ground term was combined with the four lines of the $3p^5 - 3p^43d$ array to obtain the upper levels. Improved measurements were obtained by Kaufman *et al.* [29] with an uncertainty of ±0.005 Å.

The value for the ionization energy was calculated with the Cowan [23] HFR code by Sugar and Musgrove [24].

Kr XXI

S I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^4$ $^3P_2$

Ionization energy 7 129 000 cm^{-1} (883.9 eV)

Six lines of the $3p^4 - 3p^33d$ array were identified by Kaufman *et al.* [30] with an uncertainty of ±0.007 Å. They predicted energy levels of the $3p^4$ ground configuration and gave predicted wavelengths of magnetic-dipole transitions: $^3P_0 - {}^3P_1$, $^3P_2 - {}^3P_1$, $^3P_1 - {}^1D_2$, $^3P_2 - {}^1D_2$, and $^3P_1 - {}^1S_0$. Roberts *et al.* [31] assigned the line at 1268.7±0.2 Å observed in a tokamak discharge to the $^3P_2 - {}^3P_1$ transition. The $3p^4$ levels were combined with the six lines of the $3p^4 - 3p^33d$ array to obtain the upper levels.

The value for the ionization energy was calculated with the Cowan [23] HFR code by Sugar and Musgrove [24].

Kr XXII

P I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^3$ $^4S^\circ_{3/2}$

Ionization energy 7 555 000 cm^{-1} (936.7 eV)

Sugar *et al.* [32] classified six lines of the $3p^3 - 3p^23d$ array, obtained with an uncertainty of ±0.005 Å in a tokamak discharge. They derived the energy levels of the $3p^3$ ground configuration by interpolation on a curve of calculated minus observed M1 transition energies, and gave a predicted wavelength of 913.1±0.2 Å for the $^2D^\circ_{5/2} - {}^2P^\circ_{3/2}$ magnetic-dipole transition. This was found by Roberts *et al.* [31] at 912.0±1.0 Å. The levels of the $3p^3$ configuration were combined with the classified lines of the $3p^3 - 3p3d$ array to derive the values of the upper levels.

The value for the ionization energy was calculated with the Cowan [23] HFR code by Sugar and Musgrove [24].

Kr XXIII

Si I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^2$ $^3P_0$

Ionization energy 8 047 000 cm^{-1} (997.7 eV)

Roberts *et al.* [31] observed the $3p^2$ $^3P_1 - {}^3P_2$, $^3P_0 - {}^3P_1$, and $^3P_1 - {}^1D_2$ magnetic-dipole transitions at 3840.9±0.3 Å, 1461.8±0.2 Å, and 853.8±1.0 Å in a tokamak discharge. For the $^3P_0 - {}^3P_1$ line, Benjamin *et al.* [33] obtained the wavelength 1462.65±0.03 Å with the same tokamak.

Four lines of the $3p^2 - 3p3d$ array were identified by the TFR Group and Wyart [28] in the range of 116 – 145 Å. More extensive and accurate measurements were made by Sugar *et al.* [34], who assigned eleven lines to the above array measured with an uncertainty of ±0.005 Å. Their results are given here. Sugar *et al.* [34] revised the classification of $3p^2$ $^3P_2 - 3p3d$ $^1P^\circ_1$ in Ref. [28] as $3s^23p^2$ $^3P_2 - 3s3p^3$ $^3S^\circ_1$. The $3p^2 - 3p3d$ array was combined with the $3p^2$ levels to derive the upper levels.

The value for the ionization energy was calculated with the Cowan [23] HFR code by Sugar and Musgrove [24].

Kr XXIV

Al I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p$ $^2P^\circ_{1/2}$

Ionization energy 8 476 000 cm^{-1} (1050.9 eV)

The $3s^23p - 3s^23d$, $3s3p^2$ arrays were identified by Wyart and the TFR Group [25] and the TFR Group and Wyart [28] in a tokamak discharge and by Stewart *et al.* [35] in a Z-pinch plasma. These transitions, except for the $3s^23p$ $^2P^\circ_{1/2} - 3s3p^2$ $^2P_{1/2}$ line at 132.44±0.02 Å, were reobserved by Sugar *et al.* [36] with an uncertainty of ±0.01 Å. An isoelectronic comparison of the measured wavelengths with Hartree-Fock calculations was made by them, and smoothed wavelengths were derived. We give these results. The smoothed wavelength for the $3s^23p$ $^2P^\circ_{1/2} - 3s3p^2$ $^2P_{1/2}$ line is 132.498 Å, which is different by 0.06 Å from the value of the TFR Group and Wyart [28].

Three $3s^23p$ $^2P^\circ - 3s3p^2$ ^4P intercombination transitions were identified by Jupén *et al.* [37] with an uncertainty of ±0.02 Å using a tokamak light source. The $^2P^\circ_{1/2} - {}^4P_{1/2}$ line at 242.56 Å is blended with the Mg-like intercombination transition $3s^2$ $^1S_0 - 3s3p$ $^3P^\circ_1$.

The value for the ionization energy was calculated with the Cowan [23] HFR code by Sugar and Musgrove [24].

Kr XXV

Mg I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2$ $^1S_0$

Ionization energy 9 287 000 cm^{-1} (1151.4 eV)

Roberts *et al.* [31] identified the $3s3p$ $^3P^\circ_1 - ^3P^\circ_2$ magnetic-dipole transition at 1277.1±1 Å. The value calculated from the levels derived with E1 lines by Sugar *et al.* [38] is 1275.0 Å.

The first observation of the $3s^2$ $^1S_0 - 3s3p$ $^1P^\circ_1$ transition was reported by Hinnov [39] at 159.0±0.5 Å using a tokamak discharge. Wyart and the TFR Group [25] observed 11 lines of the $3s^2 - 3s3p$, $3s3p - 3s3d$, $3s3p - 3p^2$ arrays in the range of 10 – 243 Å. They also observed the $3s^2$ $^1S_0 - 3s4p$ $^1P^\circ_1$ line at 21.840±0.015 Å. The TFR Group and Wyart [28] withdrew the identification of two lines in Ref. [25], $3s3p$ $^3P^\circ_{1,2} - 3s3d$ $^3D_2$ at 129.895 Å and 144.665 Å. The $3s3p$ $^3P^\circ_0 - 3s3d$ $^3D_1$ line was identified by Stewart *et al.* [35] in a Z-pinch plasma. Sugar *et al.* [38] remeasured the $3s^2$ $^1S_0 - 3s3p$ $^{1,3}P_1$, $3s3p$ $^3P^\circ_2 - 3p^2$ $^3P_2$, and $3s3p$ ($^3P^\circ_{0,2}$, $^1P^\circ_1$) – $3s3d$ ($^3D_{1,3}$, $^1D_2$) lines with an uncertainty of ±0.005 Å in a tokamak discharge. They derived smoothed wavelengths, except for the $3s3p$ $^3P^\circ_0 - 3s3d$ $^3D_1$ transition, in an isoelectronic comparison with Dirac-Fock calculations.

Churilov *et al.* [40] analyzed the $3p3d - 3d^2$ transitions from the spectrum observed by Stewart *et al.* [35] in the range of 129.3 – 246 Å. They included data from Ref. [25]. They identified 35 $n = 3 - 3$ lines. Seven of them, comprising the $3s3p$ $^3P^\circ_1 - 3s3d$ $^3D_2$ line and six $3s3p - 3p^2$ lines, were reobserved by Jupén *et al.* [37], who assigned the line at 129.420 Å to the $3s3p$ $^3P^\circ_1 - 3s3d$ $^3D_2$ transition. The uncertainty of their wavelengths is ±0.02 Å. The $3s3p$ $^1P^\circ_1 - 3p^2$ $^3P_2$ line at 217.03 Å has a deviation of ±0.06 Å from the value calculated with the levels [38].

It should be noted that many wavelengths taken from Ref. [40], especially those of blended lines, exceed the stated uncertainty of ±0.03 Å, compared with wavelengths calculated from the level values adopted here.

The value for the ionization energy was calculated by Cowan [23].

Kr XXVI

Na I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s$ $^2S_{1/2}$

Ionization energy 9 721 300 ± 2000 cm^{-1}
(1205.3 ± 0.3 eV)

Hinnov [39] first identified the $3s - 3p$ resonance doublet in a tokamak plasma. In addition to this doublet, Wyart and the TFR Group [25] measured 12 new lines, including the $3p - 3d$, the $4f - 5g$, and $n = 3 - 4$ transitions. The uncertainties of the wavelengths above 100 Å and of those below 100 Å are estimated to be ±0.015 Å and ±0.03 Å, respectively. Jupén *et al.* [37] identified the line at 165.120±0.02 Å as the $3p$ $^2P^\circ_{3/2} - 3d$ $^2D_{3/2}$ transition. An isoelectronic comparison of the measured wavelengths of the $3s - 3p$, $3p - 3d$, and $3d - 4f$ doublets with Dirac-Fock calculations was made by Reader *et al.* [41] for Ar^{7+} to Xe^{43+}, and least squares adjusted (smoothed) wavelengths were derived. The overall uncertainty estimate is ±0.007 Å. We quote these results.

An extended analysis using a Z-pinch plasma was given by Stewart *et al.* [35] in the range of 15 – 221 Å. They reobserved the above lines and identified the $n = 4 - 5$ and $n = 3 - 5$ transitions with an uncertainty of ±0.03 Å. Additional lines are taken from these results.

The inner-shell $2p - 3s$ transitions were observed by Burkhalter *et al.* [42] in the range of 7.3 – 7.6 Å with a Z-pinch plasma source. The classification of two lines, $2p^6 3s$ $^2S_{1/2} - 2p^5 3s^2$ $^2P^\circ_{1/2,3/2}$ at 7.322±0.003 Å and 7.570±0.003 Å, are adopted here. The other 10 lines are not resolved and cannot be classified.

The value for the ionization energy was derived with the $4f$ and $5g$ levels by means of a polarization formula [24].

Kr XXVII

Ne I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6$ $^1S_0$

Ionization energy 23 616 000 cm^{-1} (2928 eV)

Stewart *et al.* [35] proposed identifications of 14 lines as $n = 3 - 3$ transitions observed in a Z-pinch plasma source. An interpretation of 28 lines of the $2p^5 3s - 2p^5 3p$ and $2p^5 3p - 2p^5 3d$ arrays was made by Buchet *et al.* [43], who identified these transitions in a beam-foil plasma. The uncertainties of the wavelengths range from ±0.05 Å to 0.2 Å. The lines at 147.51 Å, 158.45 Å, and 170.55 Å are tentatively identified. The last is confirmed in an isoelectronic study by Nilsen and Scofield [44] but the first is given by 149.77 Å. We adjusted the level values of the $2p^5 3p(\frac{1}{2},\frac{3}{2})_1$, $2p^5 3d(\frac{3}{2},\frac{5}{2})^\circ_4$, and $2p^5 3d(\frac{1}{2},\frac{5}{2})^\circ_2$ to 14 283 900 cm^{-1}, 14 399 000 cm^{-1}, and 14 858 300 cm^{-1}, in order to get a better agreement with the measured wavelengths.

The $2s - 3p$, $2p - 3s$, and $3d$ transitions in the range of 6.3 – 7.6 Å were observed by Burkhalter *et al.* [42] and Gordon *et al.* [45] in a Z-pinch plasma and a laser-produced plasma, respectively. The tabulated wavelengths with an uncertainty of ±0.005 Å are from Gordon *et al.* [45].

The value for the ionization energy was calculated by Cowan [23].

Kr XXVIII

F I isoelectronic sequence

Ground state $1s^22s^22p^5$ $^2P^\circ_{3/2}$

Ionization energy 24 757 200 cm^{-1} (3069.50 eV)

The $2s^22p^5$ $^2P^\circ_{3/2,1/2}$ – $2s2p^6$ $^2S_{1/2}$ transitions were identified by Wyart and the TFR Group [25] and reobserved by Dietrich *et al.* [46] using a Z-pinch plasma source. In addition to observing these lines at 52.594±0.02 Å and 68.733±0.03 Å in a tokamak plasma, Denne *et al.* [47] identified a line at 223.995±0.03 Å as the $^2P^\circ_{3/2}$ – $^2P^\circ_{1/2}$ magnetic-dipole transition in the ground configuration. We adopted their results.

Burkhalter *et al.* [42] observed the spectrum in the range of 6.1 – 7.2 Å with a Z-pinch plasma and identified the $2p^5 - 2p^43s$, $3d$, $2s^22p^5 - 2s2p^53p$, and $2s2p^6 - 2p^63p$ transitions. We have changed the $2p^4$ parent term of the $2p^43s$ configuration to $^3P_0$, $^3P_1$, and $^3P_1$ for the lines at 7.123 Å, 6.997 Å, and 6.975 Å, respectively, based on our calculation of the percentage compositions of the levels with Cowan's code [23]. Concerning the $2p^5 - 2p^43d$ line at 6.449 Å, we find no correspondence with a calculated level.

For the ionization energy we use a value calculated by Cheng [48] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [49].

Kr XXIX

O I isoelectronic sequence

Ground state $1s^22s^22p^4$ $^3P_2$

Ionization energy 26 022 700 cm^{-1} (3226.41 eV)

Wyart and the TFR Group [25] identified three lines of the $2s^22p^4 - 2s2p^5$ array in a tokamak discharge. This array was increased to seven lines by Dietrich *et al.* [46] using a Z-pinch plasma and to nine lines by Denne *et al.* [47] using a tokamak. The latter reference includes two magnetic-dipole transitions $2s^22p^4$ $^3P_2 - {}^1D_2$ and $^3P_2$ – $^3P_1$ at 190.515±0.03 Å and 235.95±0.10 Å, respectively. We give the results of Denne *et al.* [47] with a measurement uncertainty of ±0.03 Å, supplemented by the $2s^22p^4$ – $2s2p^5$ $^1D_2$ – $^1P^\circ_1$ transition at 53.977±0.015 Å reported by Wyart and the TFR Group [25] and the $^3P_1 - {}^3P^\circ_0$ transition at 58.48±0.05 Å by Dietrich *et al.* [46].

For the ionization energy we use a value calculated by Cheng [48] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [49].

Kr XXX

N I isoelectronic sequence

Ground state $1s^22s^22p^3$ $^4S^\circ_{3/2}$

Ionization energy 27 258 700 cm^{-1} (3379.65 eV)

Denne *et al.* [47] identified the magnetic-dipole lines $2s^22p^3$ $^2S^\circ_{3/2}$ – $^2D^\circ_{3/2,5/2}$ at 259.807±0.02 Å and 205.247±0.025 Å in a tokamak discharge. In addition, the $^4S^\circ_{3/2}$ – $^2P^\circ_{1/2}$ line was tentatively identified at 160.90±0.10 Å. They also reported the three strong lines of the $2s^22p^3$ $^4S^\circ$ – $2s2p^4$ ^4P multiplet and four weaker lines of this multiplet in the range of 54 – 111 Å with an uncertainty varying from ±0.025 Å to ±0.06 Å.

For the ionization energy we use a value calculated by Cheng [48] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [49].

Kr XXXI

C I isoelectronic sequence

Ground state $1s^22s^22p^2$ $^3P_0$

Ionization energy 28 958 700 cm^{-1} (3590.42 eV)

The magnetic-dipole line, $2s^22p^2$ $^3P_0$ – $^3P_1$ at 252.001±0.02 Å and eight lines of the $2s^22p^2$ – $2s2p^3$ array were identified by Denne *et al.* [47] in a tokamak plasma and measured with an uncertainty between ±0.02 Å and ±0.05 Å. The line at 56.976±0.05 Å is tentatively identified as the $2s^22p^2$ $^3P_1 - 2s2p^3$ $^3S^\circ_1$ transition. Beam-foil observations by Martin *et al.* [50] comprised four $2s^22p^2$ – $2s2p^3$ transitions, including one new line, the $^3P_1 - {}^3P^\circ_0$ transition at 64.14±0.05 Å. They also identified the $2s2p^3$ $^3P^\circ_1 - 2p^4$ $^3P_0$ transition at 79.45±0.05 Å.

For the ionization energy we use a value calculated by Cheng [48] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [49].

Kr XXXII

B I isoelectronic sequence

Ground state $1s^22s^22p$ $^2P^\circ_{1/2}$

Ionization energy 30 270 400 cm^{-1} (3753.06 eV)

The $2s^22p$ $^2P_{1/2} - {}^2P_{3/2}$ magnetic-dipole line was identified at 203.021±0.02 Å by Denne *et al.* [47] in a tokamak plasma, together with four lines of the $2s^22p - 2s2p^2$ array. Two of them, the $^2P^\circ_{3/2} - {}^2P_{3/2}$ at 64.65±0.10 Å and $^2P^\circ_{3/2}$ – $^2D_{5/2}$ at 84.94±0.10 Å, are tentative identifications. Reobservations of this array by Martin *et al.* [50] in a beam-foil experiment and by Myrnäs *et al.* [51] in a tokamak plasma produced three lines of this array, not found by Denne *et al.* [47]. We adopt the results by Myrnäs *et al.* [51] with an uncertainty of ±0.025 Å. They also identified two intercombination lines $2s^22p\ ^2P^o_{1/2,3/2}$ $2s2p^2\ ^4P_{1/2,5/2}$ at 143.266±0.010 Å and 151.121±0.025 Å. Martin *et al.* [50] identified the lines at 78.90±0.20 Å and 93.75±0.20 Å as the $2s2p^2 - 2p^3$ transitions.

For the ionization energy we use a value calculated by Cheng [48] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [49].

Kr XXXIII

Be I isoelectronic sequence

Ground state $1s^22s^2\ ^1S_0$

Ionization energy 32 039 200 cm^{-1} (3972.36 eV)

The intercombination line $2s^2\ ^1S_0 - 2s2p\ ^3P^o_1$ was measured by Dietrich *et al.* [52] at 169.9±0.5 Å in a beam-foil spectrum and by Denne *et al.* [47] at 169.845±0.025 Å in a tokamak discharge. Denne *et al.* [47] also identified the magnetic-dipole transition $2s2p\ ^3P^o_1 - {}^3P^o_2$ with a weak and blended line at 235.48±0.05 Å, and the resonance line $2s^2\ ^1S_0 - 2s2p\ ^1P^o_1$ at 72.756±0.020 Å. Their results are given here. Nine lines of the $2s2p - 2p^2$ transitions were obtained by Martin *et al.* [50] in a beam-foil experiment. The uncertainties of the wavelengths are estimated to be between ±0.05 Å and ±0.2 Å.

For the ionization energy we use a value calculated by Cheng [48] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [49].

Kr XXXIV

Li I isoelectronic sequence

Ground state $1s^22s\ ^2S_{1/2}$

Ionization energy 33 137 600 ± 800 cm^{-1}
(4108.54 ± 0.01 eV)

The resonance doublet $2s\ ^2S_{1/2} - 2p\ ^2P^o_{3/2,1/2}$ was observed by Dietrich *et al.* [52] and Martin *et al.* [50] in beam-foil spectra and by Denne *et al.* [47] in a tokamak plasma. The wavelengths of 91.049±0.025 Å and 174.036±0.026 Å are reported by Denne *et al.* [47]. However, the smoothed values of 91.050 Å and 174.050 Å of Kim *et al.* [53] are adopted here.

Vainshtein and Safronova [54] calculated energy levels of the $1s^2nl$ configurations with $n = 2 - 5$, and $l = s, p$, and d. Their results are adjusted to the $1s^22p\ ^2P^o_{1/2,3/2}$ experimental levels of Denne *et al.* [47] by adding 1360 cm^{-1}. They also calculated wavelengths of the $1s^22s - 1s2s2p$, $1s^22p - 1s2p^2$, $1s^22p - 1s2s^2$ transitions. We use their results to derive these autoionizing levels. All the wavelengths given here are derived from the adjusted energy levels from Ref. [54].

The value for the ionization energy was calculated by Indelicato [55] with a MCDF code including radiative corrections.

Kr XXXV

He I isoelectronic sequence

Ground state $1s^2\ ^1S_0$

Ionization energy 139 505 500 ± 7000 cm^{-1}
(17 296.48 ± 0.87 eV)

Four beam-foil experiments were reported. Gould and Marrus [56] gave the $1s^2\ ^1S_0 - 1s2s\ ^3S_1$ transition. The $1s^2\ ^1S_0 - 1s2p\ ^1P^o_1$ and $^3P^o_{1,2}$ transitions were identified by Briand *et al.* [57] at 0.94545 Å, 0.95198 Å, and 0.94708 Å with an uncertainty of ±0.00010 Å. Indelicato *et al.* [58] gave the wavelengths 0.945330 Å and 0.951763 Å with an uncertainty of ±0.000028 Å for the first two transitions. Martin *et al.* [50] observed the $1s2s\ ^3S_1 - 1s2p\ ^3P^o_{0,2}$ lines at 279.80±0.2 Å and 111.11±0.03 Å. We adopt the results of Martin *et al.* and Indelicato *et al.*

Cheng *et al.* [59] give calculated binding energies for the ground and $n = 2$ singlet states of selected He-like ions. We use a later calculation of both singlet and triplet states by Cheng [60] for all elements from Ti through Cu and Kr for the $n = 1$ and 2 configurations. With these data and the binding energy of the H-like ions [61] we obtain the value for the ionization energy of the He-like ions. For the $1s3l$ states we use the level values from Drake [62].

The levels $1s4l$ and $5l$ calculated by Vainshtein and Safronova [54] have been tabulated after increasing them by 1400 cm^{-1} to correspond with corrected values of lower n by Drake. All wavelengths have been derived from differences of the adopted energy levels.

Vainshtein and Safronova also calculated wavelengths of the transitions $1s2s - 2s2p$, $1s2p - 2s^2$, and $1s2p - 2p^2$, which have been compiled without correction.

Kr XXXVI

H I isoelectronic sequence

Ground state 1s $^2S_{1/2}$

Ionization energy 144 665 280 cm^{-1} (17 936.21 eV)

Tavernier *et al.* [64] observed the 1s $^2S_{1/2}$ – 2p $^2P^\circ_{3/2}$ transition at 0.91779±0.00004 Å in a beam-foil experiment.

We have tabulated the wavelengths calculated from the theoretical energy levels of Johnson and Soff [61] for the n = 2 shell whose estimated uncertainty is ±90 cm^{-1}. Their energy differences are in close agreement with those of Mohr [65]. The binding energies for the levels with n = 2 – 5 have been calculated by Erickson [66]. We subtract Erickson's values from the binding energy of the ground state calculated by Johnson and Soff to obtain corrected values for Erickson's levels.

The value for the ionization energy is from Johnson and Soff [61].

2.10.2. Spectroscopic Data for Kr v through Kr xxxvi

Kr v

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
909.63	$4s^24p^2\ ^1D_2$	$4s4p^3\ ^3D^o_1$	19 722.93	129 658.16	7				2
908.63	2	2	19 722.93	129 779.27	7				2
898.53	2	3	19 722.93	131 016.42	6				2
819.25	$4s^24p^2\ ^3P_2$	$4s4p^3\ ^3D^o_1$	7 595.34	129 658.16	10				2
818.43	2	2	7 595.34	129 779.27	9				2
810.23	2	3	7 595.34	131 016.42	10				2
794.19	1	1	3 742.86	129 658.16	10				2
793.43	1	2	3 742.86	129 779.27	10				2
771.25	0	1	0.00	129 658.16	10				2
777.82	$4s^24p^2\ ^1D_2$	$4s4p^3\ ^3P^o_1$	19 722.93	148 286.78	3				2
775.53	2	2	19 722.93	148 668.41	6				2
710.77	$4s^24p^2\ ^3P_2$	$4s4p^3\ ^3P^o_1$	7 595.34	148 286.78	10				2
708.85	2	2	7 595.34	148 668.41	10				2
693.57	1	0	3 742.86	147 925.28	10				2
691.84	1	1	3 742.86	148 286.78	10				2
690.01	1	2	3 742.86	148 668.41	10				2
674.36	0	1	0.00	148 286.78	10				2
696.07	$4s^24p^2\ ^1D_2$	$4s4p^3\ ^1D^o_2$	19 722.93	163 387.17	9				2
645.85	$4s^24p^2\ ^1S_0$	$4s4p^3\ ^1P^o_1$	39 203.92	194 041.06	10				2
641.88	$4s^24p^2\ ^3P_2$	$4s4p^3\ ^1D^o_2$	7 595.34	163 387.17	5				2
573.67	$4s^24p^2\ ^1D_2$	$4s4p^3\ ^1P^o_1$	19 722.93	194 041.06	10				2
563.49	$4s^24p^2\ ^3P_2$	$4s4p^3\ ^3S^o_1$	7 595.34	185 063.54	10				2
551.51	1	1	3 742.86	185 063.54	10				2
540.35	0	1	0.00	185 063.54	10				2
536.34	$4s^24p^2\ ^3P_2$	$4s4p^3\ ^1P^o_1$	7 595.34	194 041.06	10				2
525.49	1	1	3 742.86	194 041.06	4				2
515.35	0	1	0.00	194 041.06	6				2
521.87	$4s^24p^2\ ^1D_2$	$4s^24p4d\ ^3P^o_2$	19 722.93	211 336.57	3				2
507.23	$4s^24p^2\ ^1D_2$	$4s^24p4d\ ^1D^o_2$	19 722.93	216 874.54	2				2
503.73	$4s^24p^2\ ^1S_0$	$4s^24p4d\ ^1P^o_1$	39 203.92	237 720.58	7				2
502.45	$4s^24p^2\ ^1D_2$	$4s^24p4d\ ^3D^o_1$	19 722.93	218 746.81	2				2
500.84	2	3	19 722.93	219 381.57	2				2
499.75	2	2	19 722.93	219 823.27	2				2
490.81	$4s^24p^2\ ^3P_2$	$4s^24p4d\ ^3P^o_2$	7 595.34	211 336.57	7				2
484.64	2	1	7 595.34	213 932.87	3				2
481.72	1	2	3 742.86	211 336.57	6				2
475.75	1	1	3 742.86	213 932.87	6				2
470.20	1	0	3 742.86	216 420.28	5				2
467.45	0	1	0.00	213 932.87	6				2
477.82	$4s^24p^2\ ^3P_2$	$4s^24p4d\ ^1D^o_2$	7 595.34	216 874.54	5				2
469.20	1	2	3 742.86	216 874.54	2				2
473.59	$4s^24p^2\ ^3P_2$	$4s^24p4d\ ^3D^o_1$	7 595.34	218 746.81	5				2
472.19	2	3	7 595.34	219 381.57	7				2
471.21	2	2	7 595.34	219 823.27	5				2
465.11	1	1	3 742.86	218 746.81	6				2
462.77	1	2	3 742.86	219 823.27	7				2
457.15	0	1	0.00	218 746.81	4				2
466.43	$4s^24p^2\ ^1D_2$	$4s^24p4d\ ^1F^o_3$	19 722.93	234 120.87	7				2
441.44	$4s^24p^2\ ^3P_2$	$4s^24p4d\ ^1F^o_3$	7 595.34	234 120.87	2				2
434.55	$4s^24p^2\ ^3P_2$	$4s^24p4d\ ^1P^o_1$	7 595.34	237 720.58	4				2

Kr VI

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3394.7^L	$4s^26h\ ^2H^o$	$4s^27i\ ^2I$							10
3381.7^L	$4s^26g\ ^2G$	$4s^27h\ ^2H^o$							10
2051.06	$4s^25s\ ^2S_{1/2}$	$4s^25p\ ^2P^o_{1/2}$	275 380	324 120	100				7
1950.20	$_{1/2}$	$_{3/2}$	275 380	326 657	50				7
1817.45	$4s^24d\ ^2D_{5/2}$	$4p^3\ ^2D^o_{5/2}$	223 040	278 062	8				7
1061.069	$4s4p^2\ ^2P_{3/2}$	$4p^3\ ^2D^o_{5/2}$	183 817	278 062	75				7
1045.23	$_{1/2}$	$_{3/2}$	180 339	276 011	30				7
1053.3	$4s4p^2\ ^2P_{3/2}$	$4p^3\ ^4S^o_{3/2}$	183 817	278 787					6
1015.77	$_{1/2}$	$_{3/2}$	180 339	278 787	11				7
1011.14	$4s^25s\ ^2S_{1/2}$	$4s4p(^3P^o)4d\ ^2P^o_{3/2}$	275 380	374 279	8				7
1002.8	$4s^24p\ ^2P^o_{3/2}$	$4s4p^2\ ^4P_{1/2}$	8 110	107 836					6
970.2	$_{3/2}$	$_{3/2}$	8 110	111 193					6
931.4	$_{3/2}$	$_{5/2}$	8 110	115 479					6
927.4	$_{1/2}$	$_{1/2}$	0	107 836					6
899.4	$_{1/2}$	$_{3/2}$	0	111 193					6
980.411	$4s^24d\ ^2D_{3/2}$	$4s^25p\ ^2P^o_{1/2}$	222 122	324 120	30				7
965.093	$_{5/2}$	$_{3/2}$	223 040	326 657	20				7
956.615	$_{3/2}$	$_{3/2}$	222 122	326 657	12				7
944.05	$4s4p^2\ ^2S_{1/2}$	$4p^3\ ^2D^o_{3/2}$	170 084	276 011	15				7
919.934	$4s4p^2\ ^2S_{1/2}$	$4p^3\ ^4S^o_{3/2}$	170 084	278 787	9				7
918.14	$4s^24d\ ^2D_{5/2}$	$4s4p(^3P^o)4d\ ^4P^o_{5/2}$	223 040	331 956	8				7
910.47	$_{3/2}$	$_{5/2}$	222 122	331 956	3				7
868.96	$4s^24d\ ^2D_{5/2}$	$4s4p(^3P^o)4d\ ^4D^o_{7/2}$	223 040	338 119	9				7
859.65	$_{3/2}$	$_{5/2}$	222 122	338 447	3				7
834.17	$4s4p^2\ ^2P_{3/2}$	$4p^3\ ^2P^o_{1/2}$	183 817	303 697	12				7
822.8	$_{3/2}$	$_{3/2}$	183 817	305 385					6
810.65	$_{1/2}$	$_{1/2}$	180 339	303 697	20				7
799.8	$_{1/2}$	$_{3/2}$	180 339	305 385					6
830.11	$4s^24d\ ^2D_{5/2}$	$4s4p(^3P^o)4d\ ^2D^o_{5/2}$	223 040	343 505	7				7
825.98	$_{3/2}$	$_{3/2}$	222 122	343 190	5				7
823.84	$_{3/2}$	$_{5/2}$	222 122	343 505	3				7
780.92	$4s^25s\ ^2S_{1/2}$	$4s4p(^3P^o)5s\ ^2P^o_{1/2}$	275 380	403 436	5				7
751.10	$_{1/2}$	$_{3/2}$	275 380	408 520	2				7
766.72	$4s^24d\ ^2D_{3/2}$	$4s4p(^3P^o)4d\ ^2F^o_{5/2}$	222 122	352 547	6				7
735.316	$_{5/2}$	$_{7/2}$	223 040	359 035	10				7
750.277	$4s4p^2\ ^2D_{5/2}$	$4p^3\ ^2D^o_{3/2}$	142 727	276 011	30				7
744.3	$_{3/2}$	$_{3/2}$	141 672	276 011	5				6
738.9	$_{5/2}$	$_{5/2}$	142 727	278 062					6
733.2	$_{3/2}$	$_{5/2}$	141 672	278 062					6
748.70	$4s^24p\ ^2P^o_{3/2}$	$4s4p^2\ ^2D_{3/2}$	8 110	141 672	5				5
742.83	$_{3/2}$	$_{5/2}$	8 110	142 727	9				5
705.85	$_{1/2}$	$_{3/2}$	0	141 672	8				5
739.096	$4s4p^2\ ^2S_{1/2}$	$4p^3\ ^2P^o_{3/2}$	170 084	305 385	20				7
735.1	$4s4p^2\ ^2D_{5/2}$	$4p^3\ ^4S^o_{3/2}$	142 727	278 787					6
729.4	$_{3/2}$	$_{3/2}$	141 672	278 787					6
700.06	$4s4p^2\ ^2P_{3/2}$	$4s^25p\ ^2P^o_{3/2}$	183 817	326 657	3				7
675.033	$4s4p^2\ ^2P_{3/2}$	$4s4p(^3P^o)4d\ ^4P^o_{5/2}$	183 817	331 956	10				7
657.20	$4s^24d\ ^2D_{3/2}$	$4s4p(^3P^o)4d\ ^2P^o_{3/2}$	222 122	374 279	3				7
638.68	$4s4p^2\ ^2S_{1/2}$	$4s^25p\ ^2P^o_{3/2}$	170 084	326 657	5				7

Kr VI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
626.220	$4s4p^2\ ^2P_{3/2}$	$4s4p(^3P^o)4d\ ^2D^o_{5/2}$	183 817	343 505	10				7
614.05	1/2	3/2	180 339	343 190	9				7
622.8	$4s4p^2\ ^4P_{5/2}$	$4p^3\ ^2D^o_{3/2}$	115 479	276 011					6
615.07	5/2	5/2	115 479	278 062	10				7
606.726	3/2	3/2	111 193	276 011	20				7
599.26	3/2	5/2	111 193	278 062	1				7
594.618	1/2	3/2	107 836	276 011	12				7
617.379	$4s^24p\ ^2P^o_{3/2}$	$4s4p^2\ ^2S_{1/2}$	8 110	170 084	9				7
587.94	1/2	1/2	0	170 084	12				7
617.18	$4s4p^2\ ^2D_{3/2}$	$4p^3\ ^2P^o_{1/2}$	141 672	303 697	150bl				7
614.9	5/2	3/2	142 727	305 385					6
610.828	3/2	3/2	141 672	305 385	5				7
612.4	$4s4p^2\ ^4P_{5/2}$	$4p^3\ ^4S^o_{3/2}$	115 479	278 787					6
596.7	3/2	3/2	111 193	278 787					6
584.958	1/2	3/2	107 836	278 787	11				7
599.79	$4s^25s\ ^2S_{1/2}$	$4s4p(^1P^o)5s\ ^2P^o_{1/2}$	275 380	442 106	9				7
595.970	1/2	3/2	275 380	443 176	9				7
593.56	$4s^24d\ ^2D_{3/2}$	$4s4p(^1P^o)4d\ ^2D^o_{3/2}$	222 122	390 595	4				7
592.28	5/2	5/2	223 040	391 878	4				7
592.68	$4s4p^2\ ^2P_{3/2}$	$4s4p(^3P^o)4d\ ^2F^o_{5/2}$	183 817	352 547	2				7
588.31	$4s^24d\ ^2D_{5/2}$	$4s4p(^1P^o)4d\ ^2P^o_{3/2}$	223 040	393 018	9				7
585.14	3/2	3/2	222 122	393 018	4				7
580.63	$4s^24p\ ^2P^o_{3/2}$	$4s4p^2\ ^2P_{1/2}$	8 110	180 339	6				5
569.13	3/2	3/2	8 110	183 817	9				5
554.51	1/2	1/2	0	180 339	8				5
544.02	1/2	3/2	0	183 817	6				5
577.68	$4s4p^2\ ^2S_{1/2}$	$4s4p(^3P^o)4d\ ^2D^o_{3/2}$	170 084	343 190	6				7
569.354	$4s^24d\ ^2D_{5/2}$	$4s4p(^1P^o)4d\ ^2F^o_{7/2}$	223 040	398 678	11				7
563.44	3/2	5/2	222 122	399 599	7				7
548.107	$4s4p^2\ ^2D_{3/2}$	$4s^25p\ ^2P^o_{1/2}$	141 672	324 120	10				7
543.689	5/2	3/2	142 727	326 657	10				7
540.587	3/2	3/2	141 672	326 657	4				7
528.457	$4s4p^2\ ^2D_{5/2}$	$4s4p(^3P^o)4d\ ^4P^o_{5/2}$	142 727	331 956	5				7
525.04	$4s4p^2\ ^2P_{3/2}$	$4s4p(^3P^o)4d\ ^2P^o_{3/2}$	183 817	374 279	6				7
516.96	3/2	1/2	183 817	377 255	1				7
507.82	1/2	1/2	180 339	377 255	6				7
522.30	$4s4p^2\ ^2D_{3/2}$	$4s4p(^3P^o)4d\ ^4D^o_{3/2}$	141 672	333 133	2				7
511.79	5/2	7/2	142 727	338 119	1				7
498.061	$4s4p^2\ ^2D_{5/2}$	$4s4p(^3P^o)4d\ ^2D^o_{5/2}$	142 727	343 505	9				7
496.237	3/2	3/2	141 672	343 190	8				7
495.46	3/2	5/2	141 672	343 505	7				7
489.738	$4s4p^2\ ^2S_{1/2}$	$4s4p(^3P^o)4d\ ^2P^o_{3/2}$	170 084	374 279	7				7
482.702	1/2	1/2	170 084	377 255	3				7
480.63	$4s4p^2\ ^2P_{3/2}$	$4s4p(^1P^o)4d\ ^2D^o_{5/2}$	183 817	391 878	2				7
475.62	1/2	3/2	180 339	390 595	8				7
478.016	$4s4p^2\ ^2P_{3/2}$	$4s4p(^1P^o)4d\ ^2P^o_{3/2}$	183 817	393 018	7				7
470.191	1/2	3/2	180 339	393 018	5				7
474.209	$4s4p^2\ ^2D_{3/2}$	$4s4p(^3P^o)4d\ ^2F^o_{5/2}$	141 672	352 547	7				7
462.31	5/2	7/2	142 727	359 035	8				7
467.25	$4s^24p\ ^2P^o_{3/2}$	$4s^24d\ ^2D_{3/2}$	8 110	222 122	6				5
465.27	3/2	5/2	8 110	223 040	9				5
450.20	1/2	3/2	0	222 122	8				5

Kr VI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
461.94	$4s4p^2\ ^4P_{5/2}$	$4s4p(^3P^o)4d\ ^4P^o_{5/2}$	115 479	331 956	4				7
452.972	3/2	5/2	111 193	331 956	7				7
448.668	5/2	3/2	115 479	338 364	5				7
440.840	3/2	1/2	111 193	338 032	5				7
440.192	3/2	3/2	111 193	338 364	5				7
433.79	1/2	3/2	107 836	338 364	1				7
459.47	$4s4p^2\ ^4P_{5/2}$	$4s4p(^3P^o)4d\ ^4D^o_{3/2}$	115 479	333 133	2bl				7
450.581	3/2	3/2	111 193	333 133	6				7
449.15	5/2	7/2	115 479	338 119	7				7
448.95	3/2	1/2	111 193	333 936	2bl				7
448.502	5/2	5/2	115 479	338 447	4				7
443.858	1/2	3/2	107 836	333 133	6				7
442.28	1/2	1/2	107 836	333 936	6				7
440.038	3/2	5/2	111 193	338 447	2				7
445.0	$4s4p^2\ ^2P_{3/2}$	$4s4p(^3P^o)5s\ ^2P^o_{3/2}$	183 817	408 520	1				7
430.46	$4s4p^2\ ^4P_{3/2}$	$4s4p(^3P^o)4d\ ^2D^o_{5/2}$	111 193	343 505	4				7
424.91	1/2	3/2	107 836	343 190	4				7
428.56	$4s4p^2\ ^2S_{1/2}$	$4s4p(^3P^o)5s\ ^2P^o_{1/2}$	170 084	403 436	6				7
419.42	1/2	3/2	170 084	408 520	6				7
410.59	$4s4p^2\ ^4P_{5/2}$	$4s4p(^3P^o)4d\ ^2F^o_{7/2}$	115 479	359 035	4				7
403.43	$4s4p^2\ ^2D_{5/2}$	$4s4p(^1P^o)4d\ ^2D^o_{3/2}$	142 727	390 595	2				7
399.54	$4s4p^2\ ^2D_{5/2}$	$4s4p(^1P^o)4d\ ^2P^o_{3/2}$	142 727	393 018	2				7
390.70	$4s4p^2\ ^2D_{5/2}$	$4s4p(^1P^o)4d\ ^2F^o_{7/2}$	142 727	398 678	6				7
389.29	5/2	5/2	142 727	399 599	2				7
387.72	3/2	5/2	141 672	399 599	4				7
387.17	$4s4p^2\ ^2P_{3/2}$	$4s4p(^1P^o)5s\ ^2P^o_{1/2}$	183 817	442 106	4				7
382.01	1/2	1/2	180 339	442 106	6				7
380.48	1/2	3/2	180 339	443 176	2				7
382.01	$4s4p^2\ ^2D_{3/2}$	$4s4p(^3P^o)5s\ ^2P^o_{1/2}$	141 672	403 436	6				7
376.23	5/2	3/2	142 727	408 520	6				7
374.74	3/2	3/2	141 672	408 520	4				7
374.2	$4s^24p\ ^2P^o_{3/2}$	$4s^25s\ ^2S_{1/2}$	8 110	275 380					6
363.2	1/2	1/2	0	275 380					6
366.17	$4s4p^2\ ^2S_{1/2}$	$4s4p(^1P^o)5s\ ^2P^o_{3/2}$	170 084	443 176	4				7
357.99	$4s4p^2\ ^4P_{5/2}$	$4s4p(^3P^o)5s\ ^4P^o_{3/2}$	115 479	394 817	2				7
351.93	5/2	5/2	115 479	399 630	6bl				7
348.45	1/2	3/2	107 836	394 817	1				7
346.69	3/2	5/2	111 193	399 630	4				7
332.83	$4s4p^2\ ^2D_{5/2}$	$4s4p(^1P^o)5s\ ^2P^o_{3/2}$	142 727	443 176	6				7
332.83	3/2	1/2	141 672	442 106	6				7
331.65	3/2	3/2	141 672	443 176	1				7

Kr VII

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2076.3	$4s4f\ ^3F^o_2$	$4s5d\ ^3D_1$	530 380	578 520					15
2073.3	3	2	530 550	578 770					15
2068.3	4	3	530 820	579 150					15
2056.8	3	3	530 550	579 150					15
2049.8	2	3	530 380	579 150					15
1985.5	$4s5s\ ^1S_0$	$4s5p\ ^1P^o_1$	447 400	497 760					15
1847.5^T	$4s5s\ ^3S_1$	$4s5p\ ^3P^o_0$	438 643.9	492 810					15
1832.5^T	1	1	438 643.9	493 250					15
1756.36	1	2	438 643.9	495 578.4	10				13°, 15
1202.7	$4s5p\ ^3P^o_2$	$4s5d\ ^3D_2$	495 578.4	578 770					15
1197.1	2	3	495 578.4	579 150					15
1172.8	1	1	493 250	578 520					15
1169.3	1	2	493 250	578 770					15
1166.6	0	1	492 810	578 520					15
1168.8	$4s5p\ ^1P^o_1$	$4s5d\ ^1D_2$	497 760	583 320					15
960.638	$4s4p\ ^1P^o_1$	$4p^2\ ^3P_0$	170 835.0	274 931.7	5				12
920.983	1	1	170 835.0	279 414.5	5				12
852.120	1	2	170 835.0	288 190.2	5				12
918.446	$4s4p\ ^1P^o_1$	$4p^2\ ^1D_2$	170 835.0	279 714.8	60				12
845.5	$4s4d\ ^1D_2$	$4s5p\ ^1P^o_1$	379 488.3	497 760					15
832.682	$4s^2\ ^1S_0$	$4s4p\ ^3P^o_1$	0.0	120 094.8	9				12
700.1	$4s4d\ ^3D_1$	$4s5p\ ^3P^o_0$	349 973.1	492 810					15
700.1	2	1	350 416.8	493 250					15
697.9	1	1	349 973.1	493 250					15
692.22	3	2	351 116.2	495 578.4	10				13°, 15
688.89	2	2	350 416.8	495 578.4	10				13°, 15
686.76	1	2	349 973.1	495 578.4	1				13
662.43	$4s4p\ ^1P^o_1$	$4p^2\ ^1S_0$	170 835.0	321 794	10				13
654.189	$4s4p\ ^3P^o_2$	$4p^2\ ^3P_1$	126 553.0	279 414.5	50				12
645.847	1	0	120 094.8	274 931.7	30				12
627.668	1	1	120 094.8	279 414.5	30				12
618.664	2	2	126 553.0	288 190.2	40				12
617.189	0	1	117 389.6	279 414.5	30				12
594.899	1	2	120 094.8	288 190.2	30				12
652.905	$4s4p\ ^3P^o_2$	$4p^2\ ^1D_2$	126 553.0	279 714.8	5				12
626.486	1	2	120 094.8	279 714.8	4				12
585.361	$4s^2\ ^1S_0$	$4s4p\ ^1P^o_1$	0.0	170 835.0	15				12
558.221	$4s4p\ ^1P^o_1$	$4s4d\ ^3D_1$	170 835.0	349 973.1	4				12
556.855	1	2	170 835.0	350 416.8	4				12
557.3	$4s4d\ ^3D_3$	$4s4f\ ^3F^o_3$	351 116.2	530 550					15
556.5	3	4	351 116.2	530 820					15
555.2	2	3	350 416.8	530 550					15
554.3	1	2	349 973.1	530 380					15
487.4	$4p^2\ ^3P_2$	$4s5p\ ^3P^o_1$	288 190.2	493 250					14
482.19	2	2	288 190.2	495 578.4	2				13
462.63	1	2	279 414.5	495 578.4	3				13°, 14
457.6	0	1	274 931.7	493 250					14
479.264	$4s4p\ ^1P^o_1$	$4s4d\ ^1D_2$	170 835.0	379 488.3	25				12
458.5	$4p^2\ ^1D_2$	$4s5p\ ^1P^o_1$	279 714.8	497 760					14
447.606	$4s4p\ ^3P^o_2$	$4s4d\ ^3D_1$	126 553.0	349 973.1	3				12
446.700	2	2	126 553.0	350 416.8	8				12
445.309	2	3	126 553.0	351 116.2	20				12
435.018	1	1	120 094.8	349 973.1	8				12
434.140	1	2	120 094.8	350 416.8	15				12
429.98	0	1	117 389.6	349 973.1	4				13
385.51	$4s4p\ ^3P^o_1$	$4s4d\ ^1D_2$	120 094.8	379 488.3	4				13

Kr VII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
362.0	$4s4p\ ^1P^o_1$	$4s5s\ ^1S_0$	170 835.0	447 400					14
320.41	$4s4p\ ^3P^o_2$	$4s5s\ ^3S_1$	126 553.0	438 643.9	2				13
313.92	1	1	120 094.8	438 643.9	3				13
311.26	0	1	117 389.6	438 643.9	1				13
221.4	$4s4p\ ^3P^o_2$	$4s5d\ ^3D_2$	126 553.0	578 770					14
200.9	$4s^2\ ^1S_0$	$4s5p\ ^1P^o_1$	0.0	497 760					14

Kr VIII

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
6065.5	$3d^{10}9l\ ^2L$	$3d^{10}10m\ ^2M^o$	927 985	944 467					10
6056.3	$3d^{10}9l\ ^2L$	$3d^{10}10m\ ^2M^o$	927 985	944 467					10
5848.8^T	$3d^{10}7s\ ^2S_{1/2}$	$3d^{10}7p\ ^2P^o_{3/2}$	796 490	813 577					10
4667.9	$3d^{10}10m\ ^2M^o$	$3d^{10}12n\ ^2N$	944 467	965 884					10
4338.1	$3d^{10}8k\ ^2K^o$	$3d^{10}9l\ ^2L$	904 940	927 985					10
4337.7	$3d^{10}8i\ ^2I$	$3d^{10}9k\ ^2K^o$	904 901	927 948					10
4332.7^L	$3d^{10}8h\ ^2H^o$	$3d^{10}9i\ ^2I$							10
4299.5^L	$3d^{10}8g\ ^2G$	$3d^{10}9h\ ^2H^o$							10
3929.2^L	$3d^{10}8f\ ^2F^o$	$3d^{10}9g\ ^2G$							10
3770.7	$3d^{10}7d\ ^2D_{3/2}$	$3d^{10}8p\ ^2P^o_{1/2}$	840 501	867 014					10
3702.9^T	5/2	3/2	840 686	867 694					10
3677.8^T	3/2	3/2	840 501	867 694					10
3759.0	$3d^{10}6f\ ^2F^o_{5/2}$	$3d^{10}7d\ ^2D_{3/2}$	813 913	840 501					10
3727.4	7/2	5/2	813 865	840 686					10
3712.7	$3d^{10}7d\ ^2D_{5/2}$	$3d^{10}7f\ ^2F^o_{7/2}$	840 686	867 613					10
3710.5	5/2	5/2	840 686	867 633					10
3684.1	3/2	5/2	840 501	867 633					10
3590.0	$3d^{10}8p\ ^2P^o_{3/2}$	$3d^{10}9s\ ^2S_{1/2}$	867 694	895 541					10
3506.2	1/2	1/2	867 014	895 541					10
3558.8^T	$3d^{10}6s\ ^2S_{1/2}$	$3d^{10}6p\ ^2P^o_{1/2}$	692 482	720 565					10
3337.4	1/2	3/2	692 482	722 429					10
3486.9	$3d^{10}9l\ ^2L$	$3d^{10}11m\ ^2M^o$	927 985	956 656					10
3483.5	$3d^{10}9k\ ^2K^o$	$3d^{10}11l\ ^2L$	927 948	956 647					10
3189.4^L	$3d^{10}7g\ ^2G$	$3d^{10}8f\ ^2F^o$							10
2973.5	$3d^{10}7i\ ^2I$	$3d^{10}8k\ ^2K^o$	871 319.5	904 940					10
2970.4	$3d^{10}7h\ ^2H^o$	$3d^{10}8i\ ^2I$	871 245	904 901					10
2949.2^L	$3d^{10}7g\ ^2G$	$3d^{10}8h\ ^2H^o$							10
2529.9	$3d^{10}8k\ ^2K^o$	$3d^{10}10l\ ^2L$	904 940	944 456					10
2527.8	$3d^{10}8i\ ^2I$	$3d^{10}10k\ ^2K^o$	904 901	944 449					10
2425.3^L	$3d^{10}8d\ ^2D_{5/2}$	$3d^{10}9f\ ^2F^o_{7/2}$							10
2418.3^L	3/2	5/2							10
2295.7^T	$3d^{10}7p\ ^2P^o_{3/2}$	$3d^{10}8s\ ^2S_{1/2}$	813 577	857 086					10
2292.2	$3d^{10}6d\ ^2D_{3/2}$	$3d^{10}7p\ ^2P^o_{1/2}$	768 898	812 506					10
2276.5	$3d^{10}5f\ ^2F^o_{5/2}$	$3d^{10}6d\ ^2D_{3/2}$	724 997.3	768 898					10
2237.2	$3d^{10}6d\ ^2D_{5/2}$	$3d^{10}6f\ ^2F^o_{7/2}$	769 179	813 865					10
2219.9	3/2	5/2	768 898	813 913					10
2152.3^T	$3d^{10}6p\ ^2P^o_{3/2}$	$3d^{10}6d\ ^2D_{3/2}$	722 429	768 898					10
2137.8	3/2	5/2	722 429	769 179					10
2068.7	1/2	3/2	720 565	768 898					10
1929.10	$3d^{10}6h\ ^2H^o$	$3d^{10}7i\ ^2I$	819 482.0	871 319.5	2				18
1916.7	$3d^{10}6g\ ^2G$	$3d^{10}7f\ ^2F^o$	815 450	867 623					10
1766.99	$3d^{10}5s\ ^2S_{1/2}$	$3d^{10}5p\ ^2P^o_{1/2}$	490 090.2	546 683.7	4				18
1656.78	1/2	3/2	490 090.2	550 448.0	5				18

Kr VIII – Continued

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1276.94	$3d^{10}4f\ ^2F^o_{5/2}$	$3d^{10}5d\ ^2D_{3/2}$	562 763.8	641 075.6	6				18
1267.68	$_{7/2}$	$_{5/2}$	562 738.1	641 623.1	7				18
1199.22	$3d^{10}5d\ ^2D_{5/2}$	$3d^{10}5f\ ^2F^o_{7/2}$	641 623.1	725 010.6	8				18
1191.59	$_{3/2}$	$_{5/2}$	641 075.6	724 997.3	2				18
1157.60	$3d^{10}5g\ ^2G$	$3d^{10}6h\ ^2H^o$	733 095.6	819 482.0	4				18
1096.77	$3d^{10}5p\ ^2P^o_{3/2}$	$3d^{10}5d\ ^2D_{5/2}$	550 448.0	641 623.1	11				18
1059.41	$_{1/2}$	$_{3/2}$	546 683.7	641 075.6	20				18
704.057^C	$3d^{10}5p\ ^2P^o_{3/2}$	$3d^{10}6s\ ^2S_{1/2}$	550 448.0	692 482					18
685.879^C	$_{1/2}$	$_{1/2}$	546 683.7	692 482					14
695.918	$3d^{10}4s\ ^2S_{1/2}$	$3d^{10}4p\ ^2P^o_{1/2}$	0.0	143 695.3	2000				19
651.566	$_{1/2}$	$_{3/2}$	0.0	153 476.1	4000				19
587.121	$3d^{10}4f\ ^2F^o_{5/2}$	$3d^{10}5g\ ^2G_{7/2}$	562 763.8	733 086.4	45				19
586.969	$_{7/2}$	$_{9/2}$	562 738.1	733 104.8	50				19
579.246	$3d^{10}4d\ ^2D_{3/2}$	$3d^{10}5p\ ^2P^o_{1/2}$	374 046.5	546 683.7	40				19
571.203	$_{5/2}$	$_{3/2}$	375 381.0	550 448.0	60				19
533.753	$3d^{10}4d\ ^2D_{5/2}$	$3d^{10}4f\ ^2F^o_{7/2}$	375 381.0	562 738.1	500				19
533.651	$_{5/2}$	$_{5/2}$	375 381.0	562 763.8	10				19
529.893	$_{3/2}$	$_{5/2}$	374 046.5	562 763.8	400				19
453.360	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^{10}4d\ ^2D_{3/2}$	153 476.1	374 046.5	500				19
450.649	$_{3/2}$	$_{5/2}$	153 476.1	375 381.0	5000				19
434.124	$_{1/2}$	$_{3/2}$	143 695.3	374 046.5	3500				19
297.077	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^{10}5s\ ^2S_{1/2}$	153 476.1	490 090.2	2000				19
288.684	$_{1/2}$	$_{1/2}$	143 695.3	490 090.2	1000				19
288.585^C	$3d^{10}4d\ ^2D_{3/2}$	$3d^{10}6p\ ^2P^o_{1/2}$	374 046.5	720 565					14
288.145^C	$_{5/2}$	$_{3/2}$	375 381.0	722 429					14
204.862	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^{10}5d\ ^2D_{5/2}$	153 476.1	641 623.1	8				19
201.061	$_{1/2}$	$_{3/2}$	143 695.3	641 075.6	10				19
185.525	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^{10}6s\ ^2S_{1/2}$	153 476.1	692 482	130				19
182.222	$_{1/2}$	$_{1/2}$	143 695.3	692 482	70				19
182.922	$3d^{10}4s\ ^2S_{1/2}$	$3d^{10}5p\ ^2P^o_{1/2}$	0.0	546 683.7	600				19
181.673	$_{1/2}$	$_{3/2}$	0.0	550 448.0	1000				19
162.416	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^{10}6d\ ^2D_{5/2}$	153 476.1	769 179	35				19
159.948	$_{1/2}$	$_{3/2}$	143 695.3	768 898	15				19
155.518	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^{10}7s\ ^2S_{1/2}$	153 476.1	796 490	50				19
153.187	$_{1/2}$	$_{1/2}$	143 695.3	796 490	35				19
145.516	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^{10}7d\ ^2D_{5/2}$	153 476.1	840 686	10				19
143.512	$_{1/2}$	$_{3/2}$	143 695.3	840 501	3				19
142.123	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^{10}8s\ ^2S_{1/2}$	153 476.1	857 086	10				19
140.177	$_{1/2}$	$_{1/2}$	143 695.3	857 086	3				19
138.780	$3d^{10}4s\ ^2S_{1/2}$	$3d^{10}6p\ ^2P^o_{1/2}$	0.0	720 565	100				19
138.422	$_{1/2}$	$_{3/2}$	0.0	722 429	200				19
127.738	$3d^{10}4s\ ^2S_{1/2}$	$3d^9(^2D)4s4p(^3P^o)\ ^4P^o_{3/2}$	0.0	782 852	90				19
126.692	$_{1/2}$	$_{1/2}$	0.0	789 316	40				19
126.813	$3d^{10}4s\ ^2S_{1/2}$	$3d^9(^2D)4s4p(^3P^o)\ ^4F^o_{3/2}$	0.0	788 563	15				19
125.437	$3d^{10}4s\ ^2S_{1/2}$	$3d^9(^2D)4s4p(^3P^o)\ ^2D^o_{3/2}$	0.0	797 213	450				19
125.301	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^9(^2D)4p^2(^1D)\ ^2S_{1/2}$	153 476.1	951 580	10				19
123.776	$_{1/2}$	$_{1/2}$	143 695.3	951 580	50				19

Kr VIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
125.014	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^9(^2D)4p^2(^1D)\ ^2P_{3/2}$	153 476.1	953 414	20				19
123.570	3/2	1/2	153 476.1	962 734	20				19
123.495	1/2	3/2	143 695.3	953 414	30				19
124.823	$3d^{10}4s\ ^2S_{1/2}$	$3d^9(^2D)4s4p(^3P^o)\ ^2P^o_{3/2}$	0.0	801 134	550				19
124.759	1/2	1/2	0.0	801 545	450				19
124.481	$3d^{10}4s\ ^2S_{1/2}$	$3d^9(^2D)4s4p(^3P^o)\ ^4D^o_{1/2}$	0.0	803 335	50				19
123.891	1/2	3/2	0.0	807 161	120				19
123.076	$3d^{10}4s\ ^2S_{1/2}$	$3d^{10}7p\ ^2P^o_{1/2}$	0.0	812 506	35				19
122.914	1/2	3/2	0.0	813 577	50				19
121.890	$3d^{10}4p\ ^2P^o_{1/2}$	$3d^9(^2D)4p^2(^3P)\ ^4F_{3/2}$	143 695.3	964 107	80				19
121.595	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^9(^2D)4p^2(^3P)\ ^2D_{5/2}$	153 476.1	975 878	250				19
121.577	1/2	3/2	143 695.3	966 219	90				19
121.493	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^9(^2D)4p^2(^3P)\ ^4P_{3/2}$	153 476.1	976 569	35				19
119.603	1/2	1/2	143 695.3	979 794	5				19
121.303	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^9(^2D)4p^2(^3P)\ ^2P_{1/2}$	153 476.1	977 863	20				19
120.958	3/2	3/2	153 476.1	980 229	100				19
119.880	1/2	1/2	143 695.3	977 863	20				19
119.538	1/2	3/2	143 695.3	980 229	3				19
120.906	$3d^{10}4p\ ^2P^o_{1/2}$	$3d^9(^2D)4p^2(^1D)\ ^2D_{3/2}$	143 695.3	970 784	100				19
119.447	$3d^{10}4s\ ^2S_{1/2}$	$3d^9(^2D)4s4p(^1P^o)\ ^2P^o_{3/2}$	0.0	837 191	600				19
118.178	1/2	1/2	0.0	846 181	350				19
117.355	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^9(^2D)4p^2(^1S)\ ^2D_{5/2}$	153 476.1	1 005 591	12				19
116.047	3/2	3/2	153 476.1	1 015 205	1				19
114.742	1/2	3/2	143 695.3	1 015 205	4				19
115.248	$3d^{10}4s\ ^2S_{1/2}$	$3d^{10}8p\ ^2P^o_{3/2}$	0.0	867 694	5				19

Kr IX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
117.709	$3d^{10}$ $^1S_0$	$3d^9(^2D)4p$ $^3P^o_1$	0	849 553	30				19
115.738	$3d^{10}$ $^1S_0$	$3d^9(^2D)4p$ $^1P^o_1$	0	864 020	1000				19
114.948	$3d^{10}$ $^1S_0$	$3d^9(^2D)4p$ $^3D^o_1$	0	869 959	400				19
76.789	$3d^{10}$ $^1S_0$	$3d^9(^2D)4f$ $^3P^o_1$	0	1 302 270	5				19
76.296	$3d^{10}$ $^1S_0$	$3d^9(^2D)4f$ $^3D^o_1$	0	1 310 680	20				19
75.455	$3d^{10}$ $^1S_0$	$3d^9(^2D)4f$ $^1P^o_1$	0	1 325 290	40				19

Kr X

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
104.618	$3p^63d^9\ ^2D_{3/2}$	$3p^63d^8(^3F)4p\ ^4G^\circ_{5/2}$	10 367	966 252	25				22
103.493	$5/2$	$5/2$	0	966 252	100				22
104.369	$3p^63d^9\ ^2D_{3/2}$	$3p^53d^{10}\ ^2P^\circ_{3/2}$	10 367	968 510	75				22
103.251	$5/2$	$3/2$	0	968 510	20000				22
96.690	$3/2$	$1/2$	10 367	1 044 605	200				22
104.023	$3p^63d^9\ ^2D_{3/2}$	$3p^63d^8(^3F)4p\ ^2D^\circ_{3/2}$	10 367	971 691	1000				22
103.796	$3/2$	$5/2$	10 367	973 832	50				22
102.914	$5/2$	$3/2$	0	971 691	300				22
102.687	$5/2$	$5/2$	0	973 832	10000				22
103.572	$3p^63d^9\ ^2D_{5/2}$	$3p^63d^8(^3F)4p\ ^4D^\circ_{3/2}$	0	965 513	10000				22
102.837	$3p^63d^9\ ^2D_{5/2}$	$3p^63d^8(^3F)4p\ ^2F^\circ_{7/2}$	0	972 410	8000				22
101.367	$5/2$	$5/2$	0	986 513	10000				22
102.750	$3p^63d^9\ ^2D_{3/2}$	$3p^63d^8(^3F)4p\ ^4F^\circ_{3/2}$	10 367	983 596	200				22
102.151	$5/2$	$5/2$	0	978 945	1500				22
101.985	$5/2$	$7/2$	0	980 534	5000				22
101.668	$5/2$	$3/2$	0	983 596	200				22
102.299	$3p^63d^9\ ^2D_{3/2}$	$3p^63d^8(^3P)4p\ ^4P^\circ_{3/2}$	10 367	987 902	1500				22
102.260	$3/2$	$5/2$	10 367	988 265	1500				22
101.224	$5/2$	$3/2$	0	987 902	100				22
101.181	$5/2$	$5/2$	0	988 265	30				22
101.719	$3p^63d^9\ ^2D_{5/2}$	$3p^63d^8(^3F)4p\ ^2G^\circ_{7/2}$	0	983 099	250				22
101.691	$3p^63d^9\ ^2D_{3/2}$	$3p^63d^8(^1D)4p\ ^2F^\circ_{5/2}$	10 367	993 739	300				22
100.075	$5/2$	$7/2$	0	999 248	4000				22
101.162	$3p^63d^9\ ^2D_{3/2}$	$3p^63d^8(^1D)4p\ ^2D^\circ_{3/2}$	10 367	998 883	1500				22
100.876	$3/2$	$5/2$	10 367	1 001 691	100				22
100.111	$5/2$	$3/2$	0	998 883	125				22
99.831	$5/2$	$5/2$	0	1 001 691	3000				22
101.065	$3p^63d^9\ ^2D_{3/2}$	$3p^63d^8(^1D)4p\ ^2P^\circ_{1/2}$	10 367	999 829	5				22
100.261	$3/2$	$3/2$	10 367	1 007 768	150				22
100.662	$3p^63d^9\ ^2D_{3/2}$	$3p^63d^8(^3P)4p\ ^4D^\circ_{3/2}$	10 367	1 003 790	100				22
100.653	$3/2$	$1/2$	10 367	1 003 879	150				22
100.297	$3/2$	$5/2$	10 367	1 007 410	100				22
99.262	$5/2$	$5/2$	0	1 007 410	2000				22
98.410	$5/2$	$7/2$	0	1 016 191	1200				22
99.648	$3p^63d^9\ ^2D_{3/2}$	$3p^63d^8(^3P)4p\ ^2P^\circ_{1/2}$	10 367	1 013 897	1200				22
99.530	$3/2$	$3/2$	10 367	1 015 092	1000				22
98.513	$5/2$	$3/2$	0	1 015 092	250				22
99.530	$3p^63d^9\ ^2D_{3/2}$	$3p^63d^8(^3P)4p\ ^2D^\circ_{5/2}$	10 367	1 015 092	1000				22
99.196	$3/2$	$3/2$	10 367	1 018 468	5				22
98.513	$5/2$	$5/2$	0	1 015 092	250				22
98.187	$5/2$	$3/2$	0	1 018 468	150				22
99.246	$3p^63d^9\ ^2D_{5/2}$	$3p^63d^8(^1G)4p\ ^2F^\circ_{7/2}$	0	1 007 600	8000				22
99.037	$3/2$	$5/2$	10 367	1 020 095	6000				22
98.910	$3p^63d^9\ ^2D_{3/2}$	$3p^63d^8(^3P)4p\ ^2S^\circ_{1/2}$	10 367	1 021 383	75				22
97.012	$3p^63d^9\ ^2D_{5/2}$	$3p^63d^8(^1G)4p\ ^2G^\circ_{7/2}$	0	1 030 797	100				22
91.768	$3p^63d^9\ ^2D_{5/2}$	$3p^63d^8(^1S)4p\ ^2P^\circ_{3/2}$	0	1 089 708	50				22

Kr XVIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
102.001	$3s^23p^63d\ ^2D_{3/2}$	$3s^23p^5(^2P^o)3d^2(^3F)\ ^2F^o_{5/2}$	0	980 380	50				26
99.330	$3s^23p^63d\ ^2D_{5/2}$	$3s^23p^5(^2P^o)3d^2(^1G)\ ^2F^o_{7/2}$	15 694	1 022 440	100				26
93.569	$3s^23p^63d\ ^2D_{5/2}$	$3s^23p^5(^2P^o)3d^2(^3F)\ ^2D^o_{3/2}$	15 694	1 084 470	2				25
93.349	5/2	5/2	15 694	1 086 940	100				26
92.211	3/2	3/2	0	1 084 470	100				26
92.005	3/2	5/2	0	1 086 940	3				25
92.949	$3s^23p^63d\ ^2D_{3/2}$	$3s^23p^5(^2P^o)3d^2(^3P)\ ^2P^o_{1/2}$	0	1 075 860	20				26
92.721	5/2	3/2	15 694	1 094 200	30				26
91.391	3/2	3/2	0	1 094 200	5				25
35.397	$3s^23p^63d\ ^2D_{5/2}$	$3s^23p^64f\ ^2F^o_{7/2}$	15 694	2 840 800	20				25
35.190	3/2	5/2	0	2 841 700	10				25

Kr XIX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
118.667^{S}	$3p^6\ ^1S_0$	$3p^5 3d\ ^3D^\circ_1$	0	842 690	15				25$^{\triangle}$, 27°
96.232^{S}	$3p^6\ ^1S_0$	$3p^5 3d\ ^1P^\circ_1$	0	1 039 160	45				25$^{\triangle}$, 27°

Kr XX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
103.021	$3s^2 3p^5\ ^2P^o_{3/2}$	$3s^2 3p^4(^1D)3d\ ^2S_{1/2}$	0	970 680	200				29
100.254	$3s^2 3p^5\ ^2P^o_{1/2}$	$3s^2 3p^4(^3P)3d\ ^2D_{3/2}$	87 287	1 084 750	20				29
99.156	$_{3/2}$	$_{5/2}$	0	1 008 510	200				29
99.660	$3s^2 3p^5\ ^2P^o_{3/2}$	$3s^2 3p^4(^3P)3d\ ^2P_{3/2}$	0	1 003 410	60				29

Kr XXI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
1268.7	$3s^23p^4\ ^3P_2$	$3s^23p^4\ ^3P_1$	0	78 680		M1	9.19+3	D	31°, 67*
108.854	$3s^23p^4\ ^1S_0$	$3s^23p^3(^2P^o)3d\ ^1P^o_1$	225 100	1 143 760	5				30
107.709	$3s^23p^4\ ^3P_1$	$3s^23p^3(^4S^o)3d\ ^3D^o_2$	78 680	1 007 100	10				30
107.173	$3s^23p^4\ ^3P_2$	$3s^23p^3(^2P^o)3d\ ^3P^o_2$	0	933 070	15				30
104.028	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)3d\ ^1F^o_3$	114 820	1 076 100	10				30
103.684	$3s^23p^4\ ^3P_2$	$3s^23p^3(^2D^o)3d\ ^3P^o_2$	0	964 470	5				30
103.268	$3s^23p^4\ ^3P_2$	$3s^23p^3(^2P^o)3d\ ^1F^o_3$	0	968 350	100				30

Kr XXII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
912.0	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^3\ ^2P^o_{3/2}$	106 960	216 479		M1	5.59+3	D	31°, 67*
114.005	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^3P)3d\ ^2D_{5/2}$	216 479	1 093 630	10				32
111.669	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)3d\ ^4P_{5/2}$	0	895 500	100				32
110.063	$_{3/2}$	$_{3/2}$	0	908 570	20				32
109.648	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^2(^1D)3d\ ^2D_{3/2}$	77 801	989 810	10				32
108.977	$_{3/2}$	$_{5/2}$	77 801	995 430	10				32
108.362	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^2F_{7/2}$	106 960	1 029 790	300				32

Kr XXIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3840.9	$3s^23p^2\ ^3P_1$	$3s^23p^2\ ^3P_2$	68 369	94 397		M1	1.46+2	C	31°,67*
1462.65	0	1	0	68 369		M1	4.91+3	C	33°,67*
853.8	$3s^23p^2\ ^3P_1$	$3s^23p^2\ ^1D_2$	68 369	185 490		M1	8.43+3	D	31°,67*
144.666	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3S^\circ_1$	94 397	785 644	5				34
130.703	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^3D^\circ_3$	185 490	950 580	30				34
127.653	2	2	185 490	968 860	20				34
124.322	$3s^23p^2\ ^3P_1$	$3s^23p3d\ ^3P^\circ_2$	68 369	872 750	5				34
114.005	1	0	68 369	945 520	10				34
112.586	1	1	68 369	956 580	5				34
118.850	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^1F^\circ_3$	185 490	1 026 920	10				34
118.468	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^1D^\circ_2$	94 397	938 520	5				34
114.921	1	2	68 369	938 520	8				34
116.797	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^3D^\circ_3$	94 397	950 580	10				34
112.586	0	1	0	888 210	50				34
107.231	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^1F^\circ_3$	94 397	1 026 920	7				34

Kr XXIV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
272.54	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^4P_{3/2}$	97 312	464 230	70				37
248.07	3/2	5/2	97 312	500 420	180				37
242.56	1/2	1/2	0	412 270	720				37
194.420S	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2D_{5/2}$	97 312	611 662	2				36
172.471S	1/2	3/2	0	579 808	10				36
152.111S	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2P_{1/2}$	97 312	754 727	10				36
149.765S	3/2	3/2	97 312	765 062	50				36
132.44	1/2	1/2	0	754 727					28
130.702S	1/2	3/2	0	765 062	30				36
152.016S	$3s^23p\ ^2P^o_{1/2}$	$3s3p^2\ ^2S_{1/2}$	0	657 825	20				36
134.097S	$3s^23p\ ^2P^o_{3/2}$	$3s^23d\ ^2D_{3/2}$	97 312	843 013	15				36
131.795S	3/2	5/2	97 312	856 066	200				36
118.626S	1/2	3/2	0	843 013	50				36

Kr XXV

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
242.548^{S}	$3s^2\ ^1S_0$	$3s3p\ ^3P^o_1$	0	412 290	20				38
217.03	$3s3p\ ^1P^o_1$	$3p^2\ ^3P_2$	632 187	1 092 830	5				37
217.03	$3s3d\ ^3D_2$	$3p3d\ ^3F^o_3$	1 184 970	1 645 700	6				40
192.92	3	4	1 196 618	1 715 000	bl				40
197.620	$3s3p\ ^3P^o_2$	$3p^2\ ^1D_2$	490 722	996 610	7				25
171.14	1	2	412 290	996 610	70				37
195.63	$3s3p\ ^3P^o_2$	$3p^2\ ^3P_1$	490 722	1 001 890	20				37
192.92	1	0	412 290	930 645	bl				40
169.61	1	1	412 290	1 001 890	40				37
166.083^{S}	2	2	490 722	1 092 830	2				38
163.32	0	1	389 580	1 001 890	60				37
146.942^{S}	1	2	412 290	1 092 830					38
186.79	$3s3d\ ^3D_3$	$3p3d\ ^3D^o_2$	1 196 618	1 731 900	8				40
175.77	3	3	1 196 618	1 765 500	10				40
172.38	2	3	1 184 970	1 765 500	10				40
181.90	$3s3d\ ^1D_2$	$3p3d\ ^1F^o_3$	1 319 434	1 869 500?	18				40
174.86	$3s3d\ ^1D_2$	$3p3d\ ^1P^o_1$	1 319 434	1 891 300	6				40
174.01	$3s3p\ ^1P^o_1$	$3p^2\ ^1S_0$	632 187	1 206 900	10				40
168.9	$3s3d\ ^3D_2$	$3p3d\ ^3P^o_2$	1 184 970	1 777 000	bl				40
168.9	1	0	1 177 690	1 769 800	bl				40
168.55	1	1	1 177 690	1 771 700	bl				40
168.55	$3p3d\ ^1F^o_3$	$3d^2\ ^1G_4$	1 869 500?	2 464 200?	bl				40
161.31	$3p3d\ ^3P^o_2$	$3d^2\ ^3F_3$	1 777 000	2 396 500	4				40
158.181^{S}	$3s^2\ ^1S_0$	$3s3p\ ^1P^o_1$	0	632 187	600				38
155.09	$3p3d\ ^3D^o_3$	$3d^2\ ^3F_4$	1 765 500	2 410 000	15				40
150.42	2	3	1 731 900	2 396 500	13				40
144.40	1	2	1 689 400	2 381 900	8				40
149.768	$3p^2\ ^1D_2$	$3p3d\ ^1D^o_2$	996 610	1 664 300	23				40
148.61	$3p^2\ ^3P_2$	$3p3d\ ^3D^o_3$	1 092 830	1 765 500	16				40
136.97	1	2	1 001 890	1 731 900	14				40
131.789	0	1	930 645	1 689 400	bl				40
146.15	$3p^2\ ^1S_0$	$3p3d\ ^1P^o_1$	1 206 900	1 891 300	bl				40
146.15	$3p^2\ ^3P_2$	$3p3d\ ^3P^o_2$	1 092 830	1 777 000	7				40
129.895^{S}	1	1	1 001 890	1 771 700	bl				40
145.508	$3s3p\ ^1P^o_1$	$3s3d\ ^1D_2$	632 187	1 319 434	10				38
145.498	$3p3d\ ^3P^o_2$	$3d^2\ ^3P_2$	1 777 000	2 465 611	25				40
143.90	$3p3d\ ^3F^o_4$	$3d^2\ ^3F_4$	1 715 000	2 410 000	10				40
133.24	3	3	1 645 700	2 396 500	bl				40
143.90	$3s3p\ ^3P^o_2$	$3s3d\ ^3D_2$	490 722	1 184 970	bl				40
141.664^{S}	2	3	490 722	1 196 618	15				38
129.420	1	2	412 290	1 184 970	50				37
126.886	0	1	389 580	1 177 690	4				38
136.04	$3p^2\ ^1D_2$	$3p3d\ ^3D^o_2$	996 610	1 731 900	11				40
129.895	2	3	996 610	1 765 500	bl				40
110.242	$3s3p\ ^3P^o_1$	$3s3d\ ^1D_2$	412 290	1 319 434	10				25
21.840	$3s^2\ ^1S_0$	$3s4p\ ^1P^o_1$	0	4 579 000	5				25

Kr XXVI

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
220.064	$2p^63s\ ^2S_{1/2}$	$2p^63p\ ^2P^o_{1/2}$	0	454 413	50				25$^\triangle$, 41°
178.994	1/2	3/2	0	558 678	70				25$^\triangle$, 41°
165.160	$2p^63p\ ^2P^o_{3/2}$	$2p^63d\ ^2D_{3/2}$	558 678	1 164 182					41
159.920	3/2	5/2	558 678	1 183 991	30				25$^\triangle$, 41°
140.891	1/2	3/2	454 413	1 164 182	25				25$^\triangle$, 41°
59.459	$2p^64f\ ^2F^o_{7/2}$	$2p^65g\ ^2G_{9/2}$	5 070 800	6 752 600	8				25
59.377	5/2	7/2	5 067 200	6 751 400	6				25
55.93	$2p^64d\ ^2D_{5/2}$	$2p^65f\ ^2F^o_{7/2}$	4 955 600	6 743 600					35
55.71	3/2	5/2	4 947 400	6 742 400					35
50.86	$2p^64p\ ^2P^o_{3/2}$	$2p^65d\ ^2D_{5/2}$	4 720 300	6 686 500					35
49.93	1/2	3/2	4 679 700	6 683 100					35
48.59	$2p^64s\ ^2S_{1/2}$	$2p^65p\ ^2P^o_{1/2}$	4 492 700	6 550 700					35
48.11	1/2	3/2	4 492 700	6 571 200					35
25.728	$2p^63d\ ^2D_{5/2}$	$2p^64f\ ^2F^o_{7/2}$	1 183 991	5 070 800	40				25$^\triangle$, 41°
25.621	3/2	5/2	1 164 182	5 067 200	30				25$^\triangle$, 41°
25.416	$2p^63p\ ^2P^o_{3/2}$	$2p^64s\ ^2S_{1/2}$	558 678	4 492 700	30				25
24.766	1/2	1/2	454 413	4 492 700	10				25
22.743	$2p^63p\ ^2P^o_{3/2}$	$2p^64d\ ^2D_{5/2}$	558 678	4 955 600	10				25
22.257	1/2	3/2	454 413	4 947 400	5				25
21.369	$2p^63s\ ^2S_{1/2}$	$2p^64p\ ^2P^o_{1/2}$	0	4 679 700	10				25
21.185	1/2	3/2	0	4 720 300	15				25
17.99	$2p^63d\ ^2D_{5/2}$	$2p^65f\ ^2F^o_{7/2}$	1 183 991	6 743 600					35
17.94	3/2	5/2	1 164 182	6 742 400					35
16.34	$2p^63p\ ^2P^o_{3/2}$	$2p^65d\ ^2D_{3/2}$	558 678	6 683 100					35
16.07	1/2	3/2	454 413	6 683 100					35
15.21	$2p^63s\ ^2S_{1/2}$	$2p^65p\ ^2P^o_{1/2}$	0	6 550 700					35
15.21	1/2	3/2	0	6 571 200					35
7.570	$2p^63s\ ^2S_{1/2}$	$2p^53s^2\ ^2P^o_{3/2}$	0	13 210 000					42
7.322	1/2	1/2	0	13 657 000					42

Kr XXVII

Wavelength (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
242.85	$2p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2p^5(^2P^o_{3/2})3p\ (\frac{3}{2},\frac{1}{2})_2$	13 326 500	13 738 200					43
242.25	2	1	13 300 500	13 713 300					43
228.50	2	2	13 300 500	13 738 200					43
241.37	$2p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2p^5(^2P^o_{1/2})3p\ (\frac{1}{2},\frac{1}{2})_1$	13 758 000	14 172 300					43
234.18	0	1	13 745 300	14 172 300					43
170.55^{T}	1	0	13 758 000	14 344 300?					43
196.30	$2p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	$2p^5(^2P^o_{3/2})3p\ (\frac{3}{2},\frac{3}{2})_1$	13 326 500	13 835 900					43
188.38	2	3	13 300 500	13 831 300	11				$35^{\triangle}$, 43°
183.90	1	2	13 326 500	13 870 200	4				$35^{\triangle}$, 43°
175.55	2	2	13 300 500	13 870 200	10				$35^{\triangle}$, 43°
147.51^{T}	1	0	13 326 500	14 004 200?					43
190.14	$2p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	$2p^5(^2P^o_{1/2})3p\ (\frac{1}{2},\frac{3}{2})_1$	13 758 000	14 283 900					43
186.70	1	2	13 758 000	14 293 600	8				$35^{\triangle}$, 43°
185.65	0	1	13 745 300	14 283 900	4				$35^{\triangle}$, 43°
188.38	$2p^5(^2P^o_{3/2})3p\ (\frac{3}{2},\frac{3}{2})_2$	$2p^5(^2P^o_{3/2})3d\ (\frac{3}{2},\frac{5}{2})^o_2$	13 870 200	14 401 100	11				$35^{\triangle}$, 43°
176.15	3	4	13 831 300	14 399 000	10				$35^{\triangle}$, 43°
173.05	2	3	13 870 200	14 448 200	10				$35^{\triangle}$, 43°
162.08	3	3	13 831 300	14 448 200					43
177.65	$2p^5(^2P^o_{3/2})3p\ (\frac{3}{2},\frac{3}{2})_3$	$2p^5(^2P^o_{3/2})3d\ (\frac{3}{2},\frac{3}{2})^o_3$	13 831 300	14 394 500					43
169.97	1	2	13 835 900	14 424 300	4				$35^{\triangle}$, 43°
174.10	$2p^5(^2P^o_{1/2})3p\ (\frac{1}{2},\frac{3}{2})_1$	$2p^5(^2P^o_{1/2})3d\ (\frac{1}{2},\frac{5}{2})^o_2$	14 283 900	14 858 300	10				$35^{\triangle}$, 43°
173.60	2	3	14 293 600	14 869 700	9				$35^{\triangle}$, 43°
159.06	$2p^5(^2P^o_{3/2})3p\ (\frac{3}{2},\frac{1}{2})_1$	$2p^5(^2P^o_{3/2})3d\ (\frac{3}{2},\frac{3}{2})^o_0$	13 713 300	14 342 000					43
158.45^{T}	2	1	13 738 200	14 369 400					43
152.38	1	1	13 713 300	14 369 400					43
152.38	2	3	13 738 200	14 394 500					43
145.75	2	2	13 738 200	14 424 300					43
150.89	$2p^5(^2P^o_{3/2})3p\ (\frac{3}{2},\frac{1}{2})_2$	$2p^5(^2P^o_{3/2})3d\ (\frac{3}{2},\frac{5}{2})^o_2$	13 738 200	14 401 100					43
145.35	1	2	13 713 300	14 401 100					43
149.75	$2p^5(^2P^o_{1/2})3p\ (\frac{1}{2},\frac{1}{2})_1$	$2p^5(^2P^o_{1/2})3d\ (\frac{1}{2},\frac{3}{2})^o_2$	14 172 300	14 840 100					43
7.504	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})3s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	13 326 500	9				45
7.268	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})3s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	13 758 000	6				45
6.955	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})3d\ (\frac{3}{2},\frac{3}{2})^o_1$	0	14 369 400	7				45
6.878	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{3/2})3d\ (\frac{3}{2},\frac{5}{2})^o_1$	0	14 533 000	10				45
6.694	$2s^22p^6\ ^1S_0$	$2s^22p^5(^2P^o_{1/2})3d\ (\frac{1}{2},\frac{3}{2})^o_1$	0	14 928 000	8				45
6.383	$2s^22p^6\ ^1S_0$	$2s2p^6(^2S_{1/2})3p\ (\frac{1}{2},\frac{1}{2})^o_1$	0	15 662 000	5				45
6.333	$2s^22p^6\ ^1S_0$	$2s2p^6(^2S_{1/2})3p\ (\frac{1}{2},\frac{3}{2})^o_1$	0	15 783 000	4				45

Kr XXVIII

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
223.995	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^5\ ^2P^o_{1/2}$	0	446 440		M1	1.59+6	B	47°, 67*
68.733	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^6\ ^2S_{1/2}$	446 440	1 901 350	10				25△, 47°
52.594	3/2	1/2	0	1 901 350	25				25△, 47°
7.209	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P_2)3s\ (2, \frac{1}{2})_{5/2}$	0	13 872 000					42
7.193	3/2	3/2	0	13 902 000					42
7.209	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P_1)3s\ (1, \frac{1}{2})_{1/2}$	446 440	14 337 000					42
6.997	3/2	3/2	0	14 292 000					42
6.975	3/2	1/2	0	14 337 000					42
7.162	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D_2)3s\ (2, \frac{1}{2})_{3/2}$	446 440	14 409 000					42
6.941	3/2	5/2	0	14 407 000					42
7.123	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P_0)3s\ (0, \frac{1}{2})_{1/2}$	0	14 039 000					42
6.881	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P_2)3d\ (2, \frac{5}{2})_{3/2}$	446 440	14 977 000					42
6.678	3/2	3/2	0	14 977 000					42
6.678	3/2	1/2	0	14 977 000?					42
6.663	3/2	5/2	0	15 008 000					42
6.727	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P_0)3d\ (0, \frac{3}{2})_{3/2}$	446 440	15 312 000					42
6.715	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P_2)3d\ (2, \frac{3}{2})_{1/2}$	0	14 892 000					42
6.699	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^3P_1)3d\ (1, \frac{5}{2})_{3/2}$	446 440	15 374 000					42
6.502	3/2	5/2	0	15 380 000					42
6.663	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D_2)3d\ (2, \frac{3}{2})_{3/2}$	446 440	15 460 000					42
6.479	3/2	1/2	0	15 434 000					42
6.466	3/2	3/2	0	15 460 000					42
6.466	3/2	5/2	0	15 466 000					42
6.639	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^1S_0)3d\ (0, \frac{3}{2})_{3/2}$	0	15 062 000					42
6.626	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P_0)3d\ (0, \frac{5}{2})_{5/2}$	0	15 092 000					42
6.626	$2s^22p^5\ ^2P^o_{1/2}$	$2s^22p^4(^1D_2)3d\ (2, \frac{5}{2})_{3/2}$	446 440	15 557 000					42
6.614	1/2	1/2	446 440	15 573 000					42
6.428	3/2	3/2	0	15 557 000					42
6.418	3/2	1/2	0	15 573 000					42
6.519	$2s^22p^5\ ^2P^o_{3/2}$	$2s^22p^4(^3P_1)3d\ (1, \frac{3}{2})_{5/2}$	0	15 340 000					42
6.428	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^1P^o)3p\ ^2S_{1/2}$	446 440	15 990 000?					42
6.259	3/2	1/2	0	15 990 000?					42
6.214	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^3P^o)3p\ ^4D_{3/2}$	446 440	16 540 000?					42
6.185	$2s2p^6\ ^2S_{1/2}$	$2p^63p\ ^2P^o_{1/2}$	1 901 350	18 069 000					42
6.145	1/2	3/2	1 901 350	18 175 000					42
6.171	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^3P^o)3p\ ^4P_{3/2}$	446 440	16 652 000?					42
6.171	$2s^22p^5\ ^2P^o_{3/2}$	$2s2p^5(^1P^o)3p\ ^2P_{1/2}$	0	16 200 000?					42
6.166	$2s^22p^5\ ^2P^o_{3/2}$	$2s2p^5(^1P^o)3p\ ^2D_{5/2}$	0	16 218 000?					42
6.145	$2s^22p^5\ ^2P^o_{3/2}$	$2s2p^5(^3P^o)3p\ ^2S_{1/2}$	0	16 273 000?					42
6.145	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^5(^3P^o)3p\ ^2P_{1/2}$	446 440	16 720 000?					42
6.129	3/2	3/2	0	16 316 000?					42

Kr XXIX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
235.95	$2s^22p^4\ ^3P_2$	$2s^22p^4\ ^3P_1$	0	423 820		M1	1.34+6	C	47°, 67*
190.515	$2s^22p^4\ ^3P_2$	$2s^22p^4\ ^1D_2$	0	524 890		M1	9.82+5	D	47°, 67*
86.98	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^3P^o_2$	524 890	1 674 650					47
74.663	2	1	524 890	1 864 320					47
79.947	$2s^22p^4\ ^3P_1$	$2s2p^5\ ^3P^o_2$	423 820	1 674 650					47
69.414	1	1	423 820	1 864 320					47
59.714	2	2	0	1 674 650					25, 47°
58.700	0	1	160 700	1 864 320					47
58.48	1	0	423 820	2 133 800					46
53.640	2	1	0	1 864 320					25, 47°
53.977	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^1P^o_1$	524 890	2 377 700					25

Kr XXX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
259.807	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^3\ ^2D^o_{3/2}$	0	384 900		M1	1.21+6	D	47°, 67*
205.247	$_{3/2}$	$_{5/2}$	0	487 220		M1	2.19+5	D	47°, 67*
160.90^T	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^3\ ^2P^o_{1/2}$	0	621 500?		M1	1.52+6	D	47°, 67*
110.62	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^4P_{5/2}$	487 220	1 391 300					47
86.26	$_{5/2}$	$_{3/2}$	487 220	1 646 580					47
71.875	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^4P_{5/2}$	0	1 391 300					47
60.732	$_{3/2}$	$_{3/2}$	0	1 646 580					47
60.332	$_{3/2}$	$_{1/2}$	0	1 657 500					47
63.671	$2s^22p^3\ ^2D^o_{3/2}$	$2s2p^4\ ^2D_{3/2}$	384 900	1 955 480					47
54.596	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^2P_{3/2}$	487 220	2 318 860					47

Kr XXXI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
252.001	$2s^22p^2\ ^3P_0$	$2s^22p^2\ ^3P_1$	0	396 820		M1	8.78+5	B	47°, 67*
95.057	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^3D^\circ_1$	478 200	1 530 200					47
79.557	1	2	396 820	1 653 800					47
76.610	2	3	478 200	1 783 500					47
65.352	0	1	0	1 530 200					47
79.45	$2s2p^3\ ^3P^\circ_1$	$2p^4\ ^3P_0$	1 999 100	3 258 000					50
64.14	$2s^22p^2\ ^3P_1$	$2s2p^3\ ^3P^\circ_0$	396 820	1 955 900					50
63.103	2	2	478 200	2 062 900					47
62.411	1	1	396 820	1 999 100					47
59.748	$2s^22p^2\ ^3P_2$	$2s2p^3\ ^3S^\circ_1$	478 200	2 151 900					47
56.976[T]	1	1	396 820	2 151 900					47

Kr XXXII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
203.021	$2s^22p\ ^2P^o_{1/2}$	$2s^22p\ ^2P^o_{3/2}$	0	492 560		M1	1.06+6	B	47°, 67*
151.121	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^4P_{5/2}$	492 560	1 154 280					51
143.266	$1/2$	$1/2$	0	698 000					51
93.75	$2s2p^2\ ^2D_{5/2}$	$2p^3\ ^2D^o_{5/2}$	1 676 630	2 743 000					50
84.454	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^2D_{5/2}$	492 560	1 676 630					51
69.957	$1/2$	$3/2$	0	1 429 450					47
78.90	$2s2p^2\ ^2P_{3/2}$	$2p^3\ ^2P^o_{3/2}$	2 039 330	3 307 000					50
66.538	$2s^22p\ ^2P^o_{1/2}$	$2s2p^2\ ^2S_{1/2}$	0	1 502 900					47
65.067	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^2P_{1/2}$	492 560	2 029 440					51
64.651	$3/2$	$3/2$	492 560	2 039 330					51

Kr XXXIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
235.48	$1s^22s2p\ ^3P^o_1$	$1s^22s2p\ ^3P^o_2$	588 770	1 013 440		M1	9.29+5	C	47°, 67*
169.845	$1s^22s^2\ ^1S_0$	$1s^22s2p\ ^3P^o_1$	0	588 770					47
123.10	$1s^22s2p\ ^3P^o_2$	$1s^22p^2\ ^3P_1$	1 013 440	1 827 200					50
117.74	1	0	588 770	1 438 100					50
111.65	2	2	1 013 440	1 909 800					50
80.75	1	1	588 770	1 827 200					50
75.66	0	1	505 500	1 827 200					50
75.66	1	2	588 770	1 909 800					50
98.19	$1s^22s2p\ ^1P^o_1$	$1s^22p^2\ ^1D_2$	1 374 460	2 391 300					50
77.10	$1s^22s2p\ ^1P^o_1$	$1s^22p^2\ ^1S_0$	1 374 460	2 671 500					50
72.756	$1s^22s^2\ ^1S_0$	$1s^22s2p\ ^1P^o_1$	0	1 374 460					47
72.66	$1s^22s2p\ ^3P^o_2$	$1s^22p^2\ ^1D_2$	1 013 440	2 391 300					50

Kr XXXIV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
174.040[S]	$1s^22s\ ^2S_{1/2}$	$1s^22p\ ^2P^o_{1/2}$	0	574 582					47, 53°
91.050[S]	1/2	3/2	0	1 098 294					47, 53°
34.507[C]	$1s^24p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	[25 147 000]	[28 045 000]					
34.388[C]	3/2	5/2	[25 147 000]	[28 055 000]					
33.750[C]	1/2	3/2	[25 082 000]	[28 045 000]					
16.377[C]	$1s^23p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	[18 911 000]	[25 017 000]					
15.972[C]	1/2	1/2	[18 756 000]	[25 017 000]					
15.969[C]	$1s^23p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	[18 911 000]	[25 173 000]					
15.916[C]	3/2	5/2	[18 911 000]	[25 194 000]					
15.584[C]	1/2	3/2	[18 756 000]	[25 173 000]					
15.425[C]	$1s^23s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	[18 599 000]	[25 082 000]					
15.272[C]	1/2	3/2	[18 599 000]	[25 147 000]					
11.046[C]	$1s^23p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	[18 911 000]	[27 964 000]					
10.860[C]	1/2	1/2	[18 756 000]	[27 964 000]					
10.948[C]	$1s^23p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	[18 911 000]	[28 045 000]					
10.936[C]	3/2	5/2	[18 911 000]	[28 055 000]					
10.765[C]	1/2	3/2	[18 756 000]	[28 045 000]					
5.7143[C]	$1s^22p\ ^2P^o_{3/2}$	$1s^23s\ ^2S_{1/2}$	1 098 294	[18 599 000]					54
5.5482[C]	1/2	1/2	574 582	[18 599 000]					54
5.5951[C]	$1s^22p\ ^2P^o_{3/2}$	$1s^23d\ ^2D_{3/2}$	1 098 294	[18 971 000]					54
5.5799[C]	3/2	5/2	1 098 294	[19 020 000]					54
5.4359[C]	1/2	3/2	574 582	[18 971 000]					54
5.3316[C]	$1s^22s\ ^2S_{1/2}$	$1s^23p\ ^2P^o_{1/2}$	0	[18 756 000]					54
5.2879[C]	1/2	3/2	0	[18 911 000]					54
4.1809[C]	$1s^22p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	1 098 294	[25 017 000]					54
4.0913[C]	1/2	1/2	574 582	[25 017 000]					54
4.1537[C]	$1s^22p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	1 098 294	[25 173 000]					54
4.1502[C]	3/2	5/2	1 098 294	[25 194 000]					54
4.0653[C]	1/2	3/2	574 582	[25 173 000]					54
3.9870[C]	$1s^22s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	0	[25 082 000]					54
3.9766[C]	1/2	3/2	0	[25 147 000]					54
3.7222[C]	$1s^22p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	1 098 294	[27 964 000]					54
3.6510[C]	1/2	1/2	574 582	[27 964 000]					54
3.7111[C]	$1s^22p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	1 098 294	[28 045 000]					54
3.7097[C]	3/2	5/2	1 098 294	[28 055 000]					54
3.6404[C]	1/2	3/2	574 582	[28 045 000]					54
3.5718[C]	$1s^22s\ ^2S_{1/2}$	$1s^25p\ ^2P^o_{1/2}$	0	[27 997 000]					54
3.5676[C]	1/2	3/2	0	[28 030 000]					54
0.96884[C]	$1s^22p\ ^2P^o_{3/2}$	$1s2s^2\ ^2S_{1/2}$	1 098 294	[104 304 000]					54
0.96415[C]	1/2	1/2	574 582	[104 304 000]					54
0.96028[C]	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^4P_{1/2}$	1 098 294	[105 225 000]					54
0.95699[C]	3/2	3/2	1 098 294	[105 582 000]					54
0.95615[C]	3/2	5/2	1 098 294	[105 674 000]					54
0.95566[C]	1/2	1/2	574 582	[105 225 000]					54
0.95241[C]	1/2	3/2	574 582	[105 582 000]					54
0.95725[C]	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^4P^o_{1/2}$	0	[104 466 000]					54
0.95652[C]	1/2	3/2	0	[104 546 000]					54
0.95491[C]	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^2P_{1/2}$	1 098 294	[105 810 000]					54
0.95034[C]	1/2	1/2	574 582	[105 810 000]					54
0.94963[C]	3/2	3/2	1 098 294	[106 393 000]					54
0.94511[C]	1/2	3/2	574 582	[106 393 000]					54

Kr XXXIV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
0.95451^C	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1D)\ ^2D_{3/2}$	1 098 294	[105 854 000]					54
0.95137^C	$_{3/2}$	$_{5/2}$	1 098 294	[106 199 000]					54
0.94995^C	$_{1/2}$	$_{3/2}$	574 582	[105 854 000]					54
0.95288^C	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^2P^o_{1/2}$	0	[104 945 000]					54
0.94961^C	$_{1/2}$	$_{3/2}$	0	[105 306 000]					54
0.94808^C	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1S)\ ^2S_{1/2}$	1 098 294	[106 564 000]					54
0.94359^C	$_{1/2}$	$_{1/2}$	574 582	[106 564 000]					54
0.94804^C	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^1P^o)\ ^2P^o_{1/2}$	0	[105 481 000]					54
0.94746^C	$_{1/2}$	$_{3/2}$	0	[105 545 000]					54

Kr XXXV

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4970^{C}	1s4p $^3P^o_2$	1s4d $^3D_2$	[131 037 700]	[131 057 800]					
2320^{C}	2	3	[131 037 700]	[131 080 700]					
1170^{C}	1	2	[130 972 200]	[131 057 800]					
1150^{C}	1	1	[130 972 200]	[131 059 000]					
1120^{C}	0	1	[130 969 500]	[131 059 000]					
4520^{C}	1s5s $^3S_1$	1s5p $^3P^o_1$	[134 035 500]	[134 057 600]					
1800^{C}	1	2	[134 035 500]	[134 091 100]					
2300^{C}	1s4s $^3S_1$	1s4p $^3P^o_1$	[130 928 700]	[130 972 200]					
917^{C}	1	2	[130 928 700]	[131 037 700]					
2200^{C}	1s5s $^1S_0$	1s5p $^1P^o_1$	[134 056 900]	[134 102 400]					
1130^{C}	1s4s $^1S_0$	1s4p $^1P^o_1$	[130 970 800]	[131 059 600]					
962^{C}	1s3s $^3S_1$	1s3p $^3P^o_1$	[124 175 700]	[124 279 600]					
385.2^{C}	1	2	[124 175 700]	[124 435 300]					
477.3^{C}	1s3s $^1S_0$	1s3p $^1P^o_1$	[124 278 000]	[124 487 500]					
279.8	1s2s $^3S_1$	1s2p $^3P^o_0$	[104 684 520]	[105 041 440]					50
264.6^{C}	1	1	[104 684 520]	[105 062 480]					
111.11	1	2	[104 684 520]	[105 584 760]					50
141.0^{C}	1s2s $^1S_0$	1s2p $^1P^o_1$	[105 065 860]	[105 774 980]					
91.70^{C}	1s2s $^3S_1$	1s2p $^1P^o_1$	[104 684 520]	[105 774 980]					
33.363^{C}	1s4p $^1P^o_1$	1s5s $^1S_0$	[131 059 600]	[134 056 900]					
33.358^{C}	1s4p $^3P^o_2$	1s5s $^3S_1$	[131 037 700]	[134 035 500]					
32.645^{C}	1	1	[130 972 200]	[134 035 500]					
31.960^{C}	1s4s $^3S_1$	1s5p $^3P^o_1$	[130 928 700]	[134 057 600]					
31.933^{C}	1s4s $^1S_0$	1s5p $^1P^o_1$	[130 970 800]	[134 102 400]					
15.424^{C}	1s3p $^1P^o_1$	1s4s $^1S_0$	[124 487 500]	[130 970 800]					
15.424^{C}	1s3d $^3D_1$	1s4p $^3P^o_0$	[124 485 900]	[130 969 500]					
15.417^{C}	1	1	[124 485 900]	[130 972 200]					
15.410^{C}	2	1	[124 483 100]	[130 972 200]					
15.383^{C}	3	2	[124 537 200]	[131 037 700]					
15.256^{C}	2	2	[124 483 100]	[131 037 700]					
15.400^{C}	1s3p $^3P^o_2$	1s4s $^3S_1$	[124 435 300]	[130 928 700]					
15.040^{C}	1	1	[124 279 600]	[130 928 700]					
15.342^{C}	1s3d $^1D_2$	1s4p $^1P^o_1$	[124 541 600]	[131 059 600]					
15.163^{C}	1s3p $^1P^o_1$	1s4d $^1D_2$	[124 487 500]	[131 082 500]					
15.100^{C}	1s3p $^3P^o_2$	1s4d $^3D_2$	[124 435 300]	[131 057 800]					
15.048^{C}	2	3	[124 435 300]	[131 080 700]					
14.753^{C}	1	2	[124 279 600]	[131 057 800]					
14.751^{C}	1	1	[124 279 600]	[131 059 000]					
14.738^{C}	0	1	[124 273 800]	[131 059 000]					
14.746^{C}	1s3s $^1S_0$	1s4p $^1P^o_1$	[124 278 000]	[131 059 600]					
14.713^{C}	1s3s $^3S_1$	1s4p $^3P^o_1$	[124 175 700]	[130 972 200]					
14.573^{C}	1	2	[124 175 700]	[131 037 700]					
10.450^{C}	1s3p $^1P^o_1$	1s5s $^1S_0$	[124 487 500]	[134 056 900]					
10.416^{C}	1s3p $^3P^o_2$	1s5s $^3S_1$	[124 435 300]	[134 035 500]					
10.250^{C}	1	1	[124 279 600]	[134 035 500]					
10.179^{C}	1s3s $^1S_0$	1s5p $^1P^o_1$	[124 278 000]	[134 102 400]					
10.120^{C}	1s3s $^3S_1$	1s5p $^3P^o_1$	[124 175 700]	[134 057 600]					
10.085^{C}	1	2	[124 175 700]	[134 091 100]					

Kr XXXV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
5.4045^{C}	$1s2p\ ^1P^o_1$	$1s3s\ ^1S_0$	[105 774 980]	[124 278 000]					
5.3790^{C}	$1s2p\ ^3P^o_2$	$1s3s\ ^3S_1$	[105 584 760]	[124 175 700]					
5.2320^{C}	1	1	[105 062 480]	[124 175 700]					
5.3286^{C}	$1s2p\ ^1P^o_1$	$1s3d\ ^1D_2$	[105 774 980]	[124 541 600]					
5.2915^{C}	$1s2p\ ^3P^o_2$	$1s3d\ ^3D_2$	[105 584 760]	[124 483 100]					
5.2764^{C}	2	3	[105 584 760]	[124 537 200]					
5.1492^{C}	1	2	[105 062 480]	[124 483 100]					
5.1484^{C}	1	1	[105 062 480]	[124 485 900]					
5.1429^{C}	0	1	[105 041 440]	[124 485 900]					
5.1489^{C}	$1s2s\ ^1S_0$	$1s3p\ ^1P^o_1$	[105 065 860]	[124 487 500]					
5.1033^{C}	$1s2s\ ^3S_1$	$1s3p\ ^3P^o_1$	[104 684 520]	[124 279 600]					
5.0631^{C}	1	2	[104 684 520]	[124 435 300]					
3.96891^{C}	$1s2p\ ^1P^o_1$	$1s4s\ ^1S_0$	[105 774 980]	[130 970 800]					
3.95139^{C}	$1s2p\ ^1P^o_1$	$1s4d\ ^1D_2$	[105 774 980]	[131 082 500]					
3.94572^{C}	$1s2p\ ^3P^o_2$	$1s4s\ ^3S_1$	[105 584 760]	[130 928 700]					
3.86605^{C}	1	1	[105 062 480]	[130 928 700]					
3.92572^{C}	$1s2p\ ^3P^o_2$	$1s4d\ ^3D_2$	[105 584 760]	[131 057 800]					
3.92219^{C}	2	3	[105 584 760]	[131 080 700]					
3.84685^{C}	1	2	[105 062 480]	[131 057 800]					
3.84667^{C}	1	1	[105 062 480]	[131 059 000]					
3.84356^{C}	0	1	[105 041 440]	[131 059 000]					
3.84708^{C}	$1s2s\ ^1S_0$	$1s4p\ ^1P^o_1$	[105 065 860]	[131 059 600]					
3.80406^{C}	$1s2s\ ^3S_1$	$1s4p\ ^3P^o_1$	[104 684 520]	[130 972 200]					
3.79461^{C}	1	2	[104 684 520]	[131 037 700]					
3.53583^{C}	$1s2p\ ^1P^o_1$	$1s5s\ ^1S_0$	[105 774 980]	[134 056 900]					
3.51485^{C}	$1s2p\ ^3P^o_2$	$1s5s\ ^3S_1$	[105 584 760]	[134 035 500]					
3.45149^{C}	1	1	[105 062 480]	[134 035 500]					
3.44394^{C}	$1s2s\ ^1S_0$	$1s5p\ ^1P^o_1$	[105 065 860]	[134 102 400]					
3.40448^{C}	$1s2s\ ^3S_1$	$1s5p\ ^3P^o_1$	[104 684 520]	[134 057 600]					
3.40060^{C}	1	2	[104 684 520]	[134 091 100]					
0.95519^{C}	$1s^2\ ^1S_0$	$1s2s\ ^3S_1$	0	[104 684 520]		M1			56
0.951763	$1s^2\ ^1S_0$	$1s2p\ ^3P^o_1$	0	[105 062 480]					57, 58°
0.94705^{C}	0	2	0	[105 584 760]		M2			57
0.945330	$1s^2\ ^1S_0$	$1s2p\ ^1P^o_1$	0	[105 774 980]					57, 58°
0.93642^{C}	$1s2p\ ^1P^o_1$	$2s^2\ ^1S_0$	[105 774 980]	[212 560 000]					54
0.93215^{C}	$1s2p\ ^1P^o_1$	$2p^2\ ^3P_0$	[105 774 980]	[213 049 000]					54
0.92861^{C}	1	1	[105 774 980]	[213 458 000]					54
0.92300^{C}	1	2	[105 774 980]	[214 116 000]					54
0.93042^{C}	$1s2p\ ^3P^o_1$	$2s^2\ ^1S_0$	[105 062 480]	[212 560 000]					54
0.92919^{C}	$1s2s\ ^1S_0$	$2s2p\ ^3P^o_1$	[105 065 860]	[212 693 000]					54
0.92787^{C}	$1s2p\ ^1P^o_1$	$2p^2\ ^1D_2$	[105 774 980]	[213 548 000]					54
0.92697^{C}	$1s2p\ ^3P^o_2$	$2p^2\ ^3P_1$	[105 584 760]	[213 458 000]					54
0.92621^{C}	1	0	[105 062 480]	[213 049 000]					54
0.92271^{C}	1	1	[105 062 480]	[213 458 000]					54
0.92252^{C}	0	1	[105 041 440]	[213 458 000]					54
0.92138^{C}	2	2	[105 584 760]	[214 116 000]					54
0.91717^{C}	1	2	[105 062 480]	[214 116 000]					54
0.92670^{C}	$1s2s\ ^3S_1$	$2s2p\ ^3P^o_0$	[104 684 520]	[212 602 000]					54
0.92592^{C}	1	1	[104 684 520]	[212 693 000]					54
0.92160^{C}	1	2	[104 684 520]	[213 198 000]					54

Kr XXXV – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
0.92623^{C}	$1s2p\ ^3P^o_2$	$2p^2\ ^1D_2$	[105 584 760]	[213 548 000]					54
0.92198^{C}	1	2	[105 062 480]	[213 548 000]					54
0.92173^{C}	$1s2s\ ^1S_0$	$2s2p\ ^1P^o_1$	[105 065 860]	[213 563 000]					54
0.92027^{C}	$1s2p\ ^1P^o_1$	$2p^2\ ^1S_0$	[105 774 980]	[214 433 000]					54
0.91852^{C}	$1s2s\ ^3S_1$	$2s2p\ ^1P^o_1$	[104 684 520]	[213 563 000]					54
0.91448^{C}	$1s2p\ ^3P^o_1$	$2p^2\ ^1S_0$	[105 062 480]	[214 433 000]					54
0.804637^{C}	$1s^2\ ^1S_0$	$1s3p\ ^3P^o_1$	0	[124 279 600]					
0.803294^{C}	$1s^2\ ^1S_0$	$1s3p\ ^1P^o_1$	0	[124 487 500]					
0.763521^{C}	$1s^2\ ^1S_0$	$1s4p\ ^3P^o_1$	0	[130 972 200]					
0.763012^{C}	$1s^2\ ^1S_0$	$1s4p\ ^1P^o_1$	0	[131 059 600]					
0.745948^{C}	$1s^2\ ^1S_0$	$1s5p\ ^3P^o_1$	0	[134 057 600]					
0.745699^{C}	$1s^2\ ^1S_0$	$1s5p\ ^1P^o_1$	0	[134 102 400]					

Kr XXXVI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
537.3^C	$3s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[128 585 640]	[128 771 760]					
525.7^C	$3p\ ^2P^o_{1/2}$	$3d\ ^2D_{3/2}$	[128 581 180]	[128 771 410]					
159.11^C	$2s\ ^2S_{1/2}$	$2p\ ^2P^o_{3/2}$	[108 328 400]	[108 956 890]					
14.4214^C	$3d\ ^2D_{5/2}$	$4f\ ^2F^o_{7/2}$	[128 832 870]	[135 767 020]					
14.3217^C	$3p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[128 771 760]	[135 754 190]					
14.0002^C	$3s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[128 585 640]	[135 728 370]					
9.86602^C	$3d\ ^2D_{5/2}$	$5f\ ^2F^o_{7/2}$	[128 832 870]	[138 968 670]					
9.81322^C	$3p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[128 771 760]	[138 962 100]					
9.64949^C	$3s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[128 585 640]	[138 948 880]					
5.03120^C	$2p\ ^2P^o_{3/2}$	$3d\ ^2D_{5/2}$	[108 956 890]	[128 832 870]					
4.89156^C	$2s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[108 328 400]	[128 771 760]					
3.73172^C	$2p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[108 956 890]	[135 754 190]					
3.64964^C	$2s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[108 328 400]	[135 728 370]					
3.33275^C	$2p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[108 956 890]	[138 962 100]					
3.26579^C	$2s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[108 328 400]	[138 948 880]					
0.9232377^C	$1s\ ^2S_{1/2}$	$2p\ ^2P^o_{1/2}$	0	[108 314 470]					
0.9177942^C	$_{1/2}$	$_{3/2}$	0	[108 956 890]					
0.7777188^C	$1s\ ^2S_{1/2}$	$3p\ ^2P^o_{1/2}$	0	[128 581 180]					
0.7765678^C	$_{1/2}$	$_{3/2}$	0	[128 771 760]					
0.7367656^C	$1s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	0	[135 728 370]					
0.7196891^C	$1s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	0	[138 948 880]					

2.10.3. References for Comments and Tables for Kr Ions

[1] B. C. Fawcett and G. E. Bromage, J. Phys. B **13**, 2711 (1980).
[2] A. G. Trigueiros, C. J. B. Pagan, S. G. Pettersson, and J. G. R. Almandos, Phys. Rev. A **40**, 3911 (1989).
[3] W. Finkelnburg and W. Humbach, Naturwiss. **42**, 35 (1955).
[4] B. C. Fawcett, B. B. Jones, and R. Wilson, Proc. Phys. Soc. London **78**, 1223 (1961).
[5] A. G. Trigueiros, C. J. B. Pagan, and J. G. R. Almandos, Phys. Rev. A **38**, 166 (1988).
[6] A. Tauheed, E. H. Pinnington, W. Ansbacher, and J. A. Kernahan, Phys. Scr. **42**, 431 (1990).
[7] C. J. B. Pagan, J. G. Reyna Almandos, M. Gallardo, S. -G. Pettersson, G. H. Cavalcanti, and A. G. Trigueiros, J. Opt. Soc. Am. B **12**, 203 (1995).
[8] M. Druetta and J. P. Buchet, J. Opt. Soc. Am. **66**, 433 (1976).
[9] A. E. Livingston, J. Phys. B **9**, L215 (1976).
[10] E. Jacquet, P. Boduch, M. Chantepie, M. Druetta, D. Hennecart, X. Husson, D. Lecler, N. Stolterfort, and M. Wilson, *4th International Colloquium on Atomic Spectra and Oscillator Strengths for Astrophysical and Laboratory Plasmas* 136, NIST Special Publication 850, edited by J. Sugar and D. Leckrone (1993).
[11] E. H. Pinnington, W. Ansbacher, and J. A. Kernahan, J. Opt. Soc. Am. B **1**, 30 (1984).
[12] A. Trigueiros, S. G. Petterson, and J. G. R. Almandos, Phys. Scr. **34**, 164 (1986).
[13] A. G. Trigueiros, S. G. Petterson, J. G. R. Almandos, and M. Gallardo, Phys. Lett. A **141**, 135 (1989).
[14] T. Bouchama, M. Druetta, and S. Martin, J. Phys. B **22**, 71 (1989).
[15] E. H. Pinnington, A. Tauheed, W. Ansbacher, and J. A. Kernahan, J. Opt. Soc. Am. B **8**, 193 (1991).
[16] A. E. Livingston, L. J. Curtis, R. M. Schectman, and H. G. Berry, Phys. Rev. A **21**, 771 (1980).
[17] A. McPherson, G. Gibson, H. Jara, U. Johann, T. S. Luk, I. A. McIntyre, K. Boyer, and C. K. Rhodes, J. Opt. Soc. Am. B **4**, 595 (1987).
[18] M. Gallardo, F. Bredice, M. Raineri, J. R. Almandos, A. G. Pettersson, and A. G. Trigueiros, Appl. Opt. **28**, 5088 (1989).
[19] J. Reader, N. Acquista, and V. Kaufman, J. Opt. Soc. Am. B **8**, 538 (1991).
[20] B. C. Fawcett and A. H. Gabriel, Proc. Phys. Soc. **84**, 1038 (1964).
[21] H. H. Kim, J. Opt. Soc. Am. **58**, 739 (1968).
[22] J. Reader, A. N. Ryabtsev, and A. A. Ramonas, J. Opt. Soc. Am. B **2**, 417 (1985).
[23] R. D. Cowan, *The Theory of Atomic Structure and Spectra*, University of California Press, Berkeley (1981)
[24] J. Sugar and A. Musgrove, J. Phys. Chem. Ref. Data **20**, 859 (1991).
[25] J. F. Wyart and TFR Group, Phys. Scr. **31**, 539 (1985).
[26] V. Kaufman, J. Sugar, and W. L. Rowan, J. Opt. Soc. Am. B **6**, 142 (1989).
[27] J. Sugar, V. Kaufman, and W. L. Rowan, J. Opt. Soc. Am. B **4**, 1927 (1987).
[28] TFR Group and J. F. Wyart, Phys. Scr. **37**, 66 (1988).
[29] V. Kaufman, J. Sugar, and W. L. Rowan, J. Opt. Soc. Am. B **6**, 1444 (1989).
[30] V. Kaufman, J. Sugar, and W. L. Rowan, J. Opt. Soc. Am. B **7**, 1169 (1990).
[31] J. R. Roberts, T. L. Pittman, J. Sugar, V. Kaufman, and W. L. Rowan, Phys. Rev. A **35**. 2591 (1987).
[32] J. Sugar, V. Kaufman, and W. L. Rowan, J. Opt. Soc. Am. B **8**, 22 (1991).
[33] R. D. Benjamin, J. L. Terry, and H. W. Moos, Phys. Rev. A **36**, 4504 (1987).
[34] J. Sugar, V. Kaufman, and W. L. Rowan, J. Opt. Soc. Am. B **7**, 152 (1990).
[35] R. E. Stewart, D. D. Dietrich, R. J. Forther, and R. Dukart, J. Opt. Soc. Am. B **4**, 396 (1987).
[36] J. Sugar, V. Kaufman, and W. L. Rowan, J. Opt. Soc. Am. B **5**, 2183 (1988).
[37] C. Jupén, B. Denne, and I. Martinson, Phys. Scr. **41**, 669 (1990).
[38] J. Sugar, V. Kaufman, P. Indelicato, and W. L. Rowan, J. Opt. Soc. Am. B **6**, 1437 (1989).
[39] E. Hinnov, Phys. Rev. A **14**, 1533 (1976).
[40] S. S. Churilov, V. E. Levashov, and J. F. Wyart, Phys. Scr. **40**, 625 (1989).
[41] J. Reader, V. Kaufman, J. Sugar, J. O. Ekberg, U. Feldman, C. M. Brown, J. F. Seely, and W. L. Rowan, J. Opt. Soc. Am. B **4**, 1821 (1987).
[42] P. G. Burkhalter, J. Shiloh, A. Fisher, and D. Cowan, J. Appl. Phys. **50**, 4532 (1979).
[43] J. P. Buchet, M. C. Buchet-Poulizac, J. Desesquelles, M. Druetta, S. Martin, D. Leclerc, E. Luc-Koenig, and J. F. Wyart, Nucl. Instrum. Meth. B **31**, 177 (1988).
[44] J. Nilsen and J. H. Scofield, Phys. Scr. **49**, 588 (1994).
[45] H. Gordon, M. G. Hobby, N. J. Peacock, and R. D. Cowan, J. Phys. B **12**, 881 (1979).
[46] D. D. Dietrich, R. E. Stewart, R. J. Fortner, and R. J. Dukart, Phys. Rev. A **34**, 1912 (1986).
[47] B. Denne, E. Hinnov, J. Ramette, and B. Saoutic, Phys. Rev. A **40**, 1488 (1989).
[48] K. T. Cheng, unpublished material (1981).
[49] W. C. Martin, unpublished material (1982).
[50] S. Martin, A. Denis, M. C. Buchet-Poulizac, J. P. Buchet, and J. Désesquelles, Phys. Rev. A **42**, 6570 (1990).
[51] R. Myrnäs, C. Jupén, G. Miecznik, I. Martinson, and B. Denne-Hinnov, Phys. Scr. **49**, 429 (1994).
[52] D. D. Dietrich, J. A. Leavitt, H. Gould, and R. Marrus, Phys. Rev. A **22**, 1109 (1980).
[53] Y. -K. Kim, D. H. Baik, P. Indelicato, and J. P. Desclaux, Phys. Rev. A **44**, 148 (1991).
[54] L. A. Vainshtein and U. I. Safronova, Reprint No. 2, Acad. Nauk USSR, Inst. Spectrosc. Moscow (1985).
[55] P. Indelicato, private communication (1989).
[56] H. Gould and R. Marrus, *4th International Conference on Beam-Foil Spectroscopy*, Gatlinburg, TN, 305, Vol. I (1975) edited by I. A. Sellin and D. J. Pegg (Plenum Press, New York 1976).
[57] J. P. Briand, P. Indelicato, M. Tavernier, O. Gorceix, D. Liesen, H. F. Beyer, B. Liu, A. Warczak, and J. P. Desclaux, Z. Phys. A **318**, 1 (1984).
[58] P. Indelicato, J. P. Briand, M. Tavernier, and D. Liesen, Z. Phys. D **2**, 249 (1986).
[59] K. T. Cheng, M. H. Chen, W. R. Johnson, and J. Sapirstein, Phys. Rev. A **50**, 247 (1994).
[60] K. T. Cheng, private communication (1996).
[61] W. R. Johnson and G. Soff, Atom. Data Nucl. Data Tables **33**, 405 (1985).
[62] G. W. F. Drake, *Calculated transition frequencies for helium-like ions*, unpublished (1985).
[63] P. Beiersdorfer, M. Bitter, S. von Goeler, and K. W. Hill, Phys. Rev. A **40**, 150 (1989).
[64] M. Tavernier, J. P. Briand, P. Indelicato, D. Liesen, and P. Richard, J. Phys. B **18**, L327 (1985).
[65] P. J. Mohr, Atom. Data Nucl. Data Tables **29**, 453 (1983).
[66] G. W. Erickson, J. Phys. Chem. Ref. Data **6**, 831 (1977).
[67] V. Kaufman and J. Sugar, J. Phys. Chem. Ref. Data **15**, 321 (1986).

2.11. Molybdenum

2.11.1. Brief Comments on Each Molybdenum Ion

Mo VI

Rb I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^{10}4s^24p^64d\ ^2D_{3/2}$

Ionization energy 555 132 ± 2 cm^{-1}
(68.8284 ± 0.0002 eV)

The $4d-4f$, $4d-5p$, $5s-5p$, $5p-6s$, and $5p-5d$ doublets were first identified by Trawick [1]. Later Charles [2] corrected the $4d-4f$ identifications and added the $4d-6p$ doublet. A comprehensive analysis of the spectrum in the range of 232 – 6337 Å was reported by Edlén *et al.* [3] who determined 44 levels of the one-electron configurations: ns ($n=5$ to 8), np ($n=5$ to 8), nd ($n=4$ to 8), nf ($n=4$ to 6), ng ($n=5$ to 8), nh ($n=6$ to 8), ni ($n=7$ to 9), and nk ($n=8$ and 9). Wavelengths are taken from Edlén *et al.* Applying a polarization formula to the $6h, 7i$, and $8k$ terms Edlén derived the value for the ionization energy quoted here. He found anomalous behavior of the nf series which he attributed to its interaction with the $4p^54d^2$ configuration.

Tauheed *et al.* [4] observed the $4p^64d-4p^54d^2$ transitions in the range of 238 – 347 Å and derived the $4p^54d^2$ levels. They also reported classifications of the two-electron transitions from and to these levels in the range of 447 – 2521 Å. Reobservation of the $4p^64d-4p^54d^2$ transitions was made by Kancerevicius *et al.* [5], who also newly identified the $4p^64d-4p^54d5s$, $4p^64d-4p^6np$ ($n=6-11$), $4p^64d-4p^6nf$ ($n=5-9$), and $4p^65s-4p^6np$ ($n=8-10$) transitions. Wavelengths were measured with an uncertainty of ±0.005 Å. They found that the identifications of Tauheed *et al.* were incorrect, as were the $6f$ and $8p$ levels of Edlén *et al.* The line at 224.083 Å in Ref. [5] should be 224.483 Å.

Mo VII

Kr I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^{10}4s^24p^6\ ^1S_0$

Ionization energy 1 013 340 ± 200 cm^{-1}
(125.638 ± 0.002 eV)

Chaghtai [6] identified nine resonance lines from the $4p^5nl$ ($4d$, $5s$, $5d$, and $6s$) configurations. The spectrum in the range of 107 – 328 Å was observed by Reader *et al.* [7] who extended the classifications of the transitions from $4p^56d$, $4p^5ns$ ($n=7-10$), and $4s4p^65p$ levels. The uncertainty of their wavelengths is ±0.003 Å and for weak lines ±0.006 Å. They confirm four of Chaghtai's classifications. The data from Reader *et al.* were adopted in the present compilation.

Tauheed and Chaghtai [8] classified 318 lines in the range of 282 – 2326 Å as transitions between the $4p^6$, $4p^5ns$ ($n=4$ to 10), $4p^5np$ ($n=5$ and 6), $4p^5nd$ ($n=4$ to 6), $4s4p^64d$, and $4s4p^65p$ configurations. Reader and Feldman [9] reinvestigated the spectrum in the range of 140 – 2280 Å with a sliding-spark discharge and completely revised the classifications of Tauheed and Chaghtai. They identified 399 lines as transitions betweeen 86 levels of the $4p^6$, $4p^54d$, $4f$, $5s$, $5p$, $5d$, $5f$, $5g$, $4s4p^64d$, and $4p^44d^2$ configurations. Wavelengths were measured with an uncertainty of ±0.005 Å. We adopted their results.

Reader and Feldman [9] determined the value for the ionization energy from the $4p^5ns$ series.

Mo VIII

Br I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^{10}4s^24p^5\ ^2P^\circ_{3/2}$

Ionization energy 1 162 000 ± 8000 cm^{-1}
(144.0±1.0 eV)

Wavelengths of the $4s^24p^5\ ^2P^\circ_{1/2,3/2}-4s4p^6\ ^2S_{1/2}$ transitions were measured by Charles [2]. The $4p^5\ ^2P^\circ_{1/2,3/2}-4p^44d$ and $5s$ transition arrays were first classified by Chaghtai [10]. Improved measurements and new energy levels and classifications were reported by Ekberg *et al.* [11] whose wavelength values and classifications are quoted in the present compilation. The uncertainty of the wavelengths is ±0.003 Å.

Classifications were extended to the transitions between the ground levels and the $4p^45d$, $6d$, $6s$, and $7s$ levels by Chaghtai *et al.* [12]. It should be noted that misprints in upper level designation (the J of the parent state) of the lines at 123.973, 126.296, and 126.747 – 130.111 Å occurred in this article. The wavelengths of the $4p^5\ ^2P^\circ_{1/2}-4p^4(^1D_2)6s\ (2,^1/_2)_{3/2}$ and $4p^5\ ^2P^\circ_{3/2}-4p^4(^1D_2)6s\ (2,^1/_2)_{5/2}$ lines at 124.620 Å and 121.111 Å, were revised as 125.561 Å and 121.080 Å by Khan *et al.* [13] The first is apparently a misprint and should be 124.561 Å.

The value for the ionization energy was calculated by Ekberg *et al.* [11].

Mo IX

Se I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^{10}4s^24p^4\ ^3P_2$

Ionization energy 1 323 700 ± 700 cm^{-1}
(164.11 ± 0.09 eV)

An analysis of the $4s^24p^4-4s^24p^35s$ array in the range of 155 – 178 Å was published by Chaghtai *et al.* [14]. Level values for the ground configuration were revised by Reader and Acquista [15] in their interpretation of the $4s^24p^4-4s4p^5$ array at 538 – 577 Å. These were used to improve the level values of the $4p^35s$ configuration.

The $4s^24p^4-4s^24p^34d$ array was analyzed by Rahimullah *et al.* [16]. A considerable extension of the work was reported by Khatoon *et al.* [17] who interpreted the transitions from the $4p^35d$, $6d$, $6s$, and $7s$ configurations.

The uncertainty of the wavelengths is ±0.005 Å.

The value for the ionization energy was derived by Khatoon *et al.* [17].

Mo X

As I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^{10}4s^24p^3$ $^4S^\circ_{3/2}$

Ionization energy 1 503 000 ± 10 000 cm^{-1}
(186.4 ± 1.2 eV)

The $4s^24p^3-4s^24p^25s$ transition array was first identified by Rahimullah *et al.* [18] and confirmed by Reader and Acquista [19], whose wavelengths are adopted in the present compilation. The uncertainty of their wavelengths is ±0.005 Å.

The $4s^24p^3-4s4p^4$ array was also analyzed by Reader and Acquista and all eight levels of $4s4p^4$ configuration were established.

The $4s^24p^3-4s^24p^24d$ array was identified and the 19 levels of $4s^24p^24d$ were determined by Rahimullah *et al.* [16]. Additional measurements were reported by Ateqad *et al.* [20] who determined the other seven levels of the $4s^24p^24d$ configuration (leaving $^4F_{9/2}$ which cannot combine with the ground configuration). The uncertainty of the wavelengths is ±0.01 Å.

The value for the ionization energy was determined by Reader and Acquista [19].

Mo XI

Ge I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^{10}4s^24p^2$ $^3P_0$

Ionization energy 1 688 000 cm^{-1} (209.3 eV)

An analysis of the $4s^24p^2-4s^24p5s$ array was first reported by Rahimullah *et al.* [18]. Rahimullah *et al.* [16] added analyses of the arrays $4s^24p^2-4s^24p4d$ and $4s^24p^2-4s4p^3$. Subsequently, the latter array was reobserved by Litzén and Reader [21], whose results are given here. Fifteen lines in the range of 287.7 – 432.5 Å were measured with an uncertainty of ±0.005 Å, using a laser-produced plasma. They established all levels of the $4s^24p^2$ and $4s4p^3$ configurations except for $4s4p^3$ $^5S^\circ_2$. In this compilation the $4s^24p4d$ levels have been revised with the new $4s^24p^2$ levels.

The value for the ionization energy was calculated by Cowan [22].

Mo XII

Ga I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^{10}4s^24p$ $^2P^\circ_{1/2}$

Ionization energy 1 857 300 ± 500 cm^{-1}
(230.28±0.06 eV)

There are few measurements for this ionic species. Alexander *et al.* [23] classified the doublet $4s^24p$ $^2P^\circ-4s^25d$ ^2D. Curtis *et al.* [24] measured the ground state $4s^24p$ $^2P^\circ$ splitting as 28 463 ± 2 cm^{-1} from an M1 transition observed in a tokamak plasma. Comparing the ^2P interval with that by Alexander *et al.*, they concluded that the line classifications in Ref. [23] were incorrect.

The transitions $4s^24p$ $^2P^\circ-4s^25s$ ^2S and $4s^24p$ $^2P^\circ-4s4p^2$ ^2P were identified by Reader *et al.* [25]. The analysis was extended to include additional $4s^24p-4s4p^2$ transitions and new $4s^24p-4s^24d$ and $4s4p^2-4p^3$ transitions by Litzén and Reader [26]. Their measurement uncertainty is ±0.005 Å, except for wavelengths of two decimal places with an uncertainty ±0.02 Å. Träbert and Pinnington [27] found four intercombination lines $4s^24p$ $^2P^\circ-4s4p^2$ ^4P in the range of 50 – 60 Å with an uncertainty of ±0.019 Å using a beam-foil technique.

The value for the ionization energy was determined by Reader *et al.* [25].

Mo XIII

Zn I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^{10}4s^2$ $^1S_0$

Ionization energy 2 251 000 ± 4000 cm^{-1}
(279.09 ± 0.50 eV)

The resonance line $4s^2$ $^1S_0-4s4p$ $^1P^\circ_1$ was observed in tokamak plasmas by Hinnov *et al.* [28] and Hinnov [29]. It was also identified in a laser-produced plasma by Reader and Acquista [30]. Finkenthal *et al.* [31] also observed this line as well as the intercombination line $^1S_0-{}^3P^\circ_1$ at 481.02 Å and the M2 line $4s^2$ $^1S_0-4s4p$ $^3P^\circ_2$ at 460.9 Å, in addition to three $4s4p-4p^2$ transitions. Wavelengths of the $4s^2-4s4p$ and $4s4p-4p^2$ transition arrays were remeasured by Litzén and Ando [32]. They showed that identification of the multiplet $4s4p$ $^3P^\circ-4s5s$ ^3S by Alexander *et al.* [23] is incorrect. They also confirmed the identification by Finkenthal *et al.* of the $4s4p$ $^3P^\circ_2-4p^2$ $^3P_2$ and $4s^2$ $^1S_0-4s4p$ $^3P^\circ_1$ lines, but found that the remaining are incorrect.

With new observations Wyart *et al.* [33] classified the $4s^2 - 4s5p$, $4s4p - 4s5s$, and $4s4p - 4s5d$ transitions, followed by more comprehensive results by Litzén and Reader [34] for transitions among the levels of the $4s^2$, $4s4p$, $4p^2$, $4s4d$, $4s5s$, $4s5p$, $4p5s$, and $4s5d$ configurations. They also found the $4s4f\ ^3F^\circ - 4s5g\ ^3G$ triplet. Wavelengths were measured with an uncertainty of ±0.005 Å except for a few of uncertainty ±0.02 Å given with two decimal places. Träbert and Pinnington [27] re-observed the intercombination line $4s^2\ ^1S_0 - 4s4p\ ^3P^\circ_1$ at 480.820±0.016 Å using a beam-foil technique.

The $4p^2\ ^1D_2$, $^3P_2 - 4p4d\ ^1F^\circ_3$ and $4s4d\ ^{1,3}D - 4p4d\ ^{1,3}F^\circ$ transitions were identified by Litzén and Hansson [35] in a laser-produced plasma with an uncertainty of ±0.01 Å.

Burkhalter *et al.* [36] reported the $3d^{10}4s^2\ ^1S_0 - 3d^94s^24p\ ^3D^\circ_1$ and $^1P^\circ_1$ transitions, and Wyart *et al.* [37] confirmed them with an uncertainty of ±0.010 Å. Wavelengths are quoted from the latter article.

The value for the ionization energy was determined by Litzén and Reader [34].

Mo XIV

Cu I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^{10}4s\ ^2S_{1/2}$

Ionization energy 2 440 600 ± 300 cm^{-1} (302.60 ± 0.04 eV)

Alexander *et al.* [23] observed the one-electron spectrum comprising the $4s - 5p$, $4s - 6p$, $4p - 5s$, $4p - 5d$, and $4d - 5f$ lines in the region from 45 to 350 Å.

The $4s - 4p$ resonance doublet was measured by Hinnov *et al.* [28] and Hinnov [29] in a tokamak discharge. An improved measurement was reported by Reader and Acquista [30].

Curtis *et al.* [38] classified the $4s - 7p$, $4p - ns$ ($n = 6 - 8$), $4f - ng$ ($n = 5$ and 6), and $4d - 5p$ transitions in the range of 35 – 184 Å with wavelength accuracies ranging from ±0.05 Å to ±0.2 Å.

Reader *et al.* [39] observed the spectrum in the range of 70 – 630 Å. From 35 line identifications, a system of 22 energy levels was determined. The level system ($3d^{10}nl$) includes the series ns ($n = 4 - 6$), np ($n = 4 - 6$), nd ($n = 4$ and 5), nf ($n = 4 - 6$), and ng ($n = 5 - 7$). The uncertainty of the wavelengths is ±0.005 Å. The value of the $6p\ ^2P^\circ_{1/2}$ level was revised by Reader *et al.* [40]. Their results are adopted. They found that the identifications by Curtis *et al.* of the $4f - 5g$, $4f - 6g$, and $4d - 5p$ transitions are incorrect.

The spectrum in the range of 50 – 54 Å was analyzed by Burkhalter *et al.* [36], Klapisch *et al.* [41], and Wyart *et al.* [37,42]. They identified the $3d^{10}4s - 3d^94s4p$, $3d^{10}4p - 3d^94p^2$, and $3d^{10}4s - 3d^{10}7p$ transitions. The wavelengths from Ref. [42] are adopted in this compilation. The uncertainty is given as ±0.005 Å. The $3d^{10}4p\ ^2P^\circ - 3d^94s^2\ ^2D$ array at 69.5±0.1 Å, 71.3±0.1 Å, and 72.50±0.025 Å was first observed by Sugar *et al.* [43] using a beam-foil technique.

Reader *et al.* [39] determined the value for the ionization energy from the ng series.

Mo XV

Ni I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^{10}\ ^1S_0$

Ionization energy 4 388 000 cm^{-1} (544.0 eV)

The three resonance lines $3d^{10}\ ^1S_0 - 3d^94p\ ^3P^\circ_1$, $^1P^\circ_1$, and $^3D^\circ_1$ were first measured by Alexander *et al.* [23]. The $^1S_0 - ^1P^\circ_1$ and $^3D^\circ_1$ lines were observed in tokamak discharges together with new lines: the resonance line $3d^{10}\ ^1S_0 - 3d^94f\ ^1P^\circ_1$ at 35.362±0.005 Å by Schwob *et al.* [44] and two E2 lines $3d^{10}\ ^1S_0 - 3d^94s\ ^{1,3}D_2$ at 57.927±0.005 Å and 58.832±0.005 Å by Klapisch *et al.* [45]. These lines were also observed by Mansfield *et al.* [46]

Improved measurements with an uncertainty of ±0.005 Å were given by Schweitzer *et al.* [47] for the $3d^{10} - 3d^94f$ and $5f$ transitions, by Wyart *et al.* [37] for the $3d^{10}\ ^1S_0 - 3d^94p\ ^1P^\circ_1$ and $^3D^\circ_1$ transitions, and by Wyart *et al.* [42] for the $3d^{10}\ ^1S_0 - 3d^94p\ ^3P^\circ_1$ transition. These wavelength data are adopted here.

The $3d^94s - 3d^94p$ transitions were observed by Ryabtsev *et al.* [48] and Brage and Litzén [49] in laser-produced plasmas. Ryabtsev *et al.* identified nineteen lines in the range of 347.3 – 421.6 Å with an uncertainty of ±0.015 Å, and determined all levels of the $3d^94s$ and $4p$ configurations.

The value for the ionization energy was determined from nf terms by Sugar and Musgrove [50].

Mo XVI

Co I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^9\ ^2D_{5/2}$

Ionization energy 4 610 000 cm^{-1} (571 eV)

The M1 line $3p^63d^9\ ^2D_{5/2} - ^2D_{3/2}$ was measured in a tokamak discharge by Suckewer *et al.* [51] with an uncertainty of ±0.2 Å.

The transition arrays $3p^63d^9 - 3p^53d^{10}$ and $3p^6 - 3d^84p$ in the range of 43 – 78 Å were first observed by Edlén [52]. Analyses of these arrays were given by Alexander *et al.* [23], Mansfield *et al.* [46], Burkhalter *et al.* [36], Ando [53], and Wyart *et al.* [54]. Revised identifications and additional lines were reported by Ryabtsev and Reader [55]. Their identifications of 46 lines of these transition arrays were adopted in the present compilation. The uncertainty of the wavelengths is ±0.005 Å. Their level designations were based on calculated eigenvectors. Upper levels without major eigenvector components are represented by the symbol $(\mathrm{N})_J$, the index N increasing with energy from the lowest level (N = 1) for each J.

The E2 lines of the $3d^9 - 3d^84s$ array were first observed in a tokamak discharge by Mansfield *et al.* [46] in the range of 51 – 55 Å. New measurements were obtained by Wyart [56], who suggested revised classifications for the lines. His measurement uncertainty was ±0.020 Å. More accurate measurements with an uncertainty of ±0.005 Å were given by Sugar *et al.* [57]. We have adopted their results.

The $3d^9 - 3d^84f$ lines in the region from 32 to 34 Å were first observed in a tokamak spectrum by Schwob *et al.* [44] Mansfield *et al.* [46] identified six lines of this array. The identifications were extended to a total of 17 lines by Burkhalter *et al.* [36]. Ando and Ishii [58] revised the previous identifications and extended the number to 29 lines. Wavelength data are taken from Ref. [58].

The value for the ionization energy was calculated by Carlson *et al.* [59].

Mo XVII

Fe I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^8\ \ ^3\mathrm{F}_4$

Ionization energy 5 130 000 cm^{-1} (636 eV)

The $3p^63d^8 - 3p^53d^9$ transitions were investigated by Bogdanovichene *et al.* [60] and Burkhalter *et al.* [36]. An extended analysis was reported by Reader and Ryabtsev [61], who measured wavelengths of 43 lines and established all of the $3p^63d^8$ and $3p^53d^9$ levels. The uncertainty of the wavelengths is ±0.005 Å. An additional measurement of the $3p^63d^8\ \ ^1\mathrm{S}_0 - 3p^53d^9\ \ ^3\mathrm{D}^\circ_1$ line and revision of the $3p^63d^8\ ^1\mathrm{S}_0$ level were made by Reader and Ryabtsev [62].

The $3d^8 - 3d^74p$ transitions were observed as a band of lines in the region from 42.1 – 43.2 Å in a tokamak plasma by Schwob *et al.* [44]. Mansfield *et al.* [46] reobserved the same wavelength range and identified 18 lines and a band of lines extending from 42.08 – 42.12 Å. A comprehensive investigation of the transitions was reported by Wyart *et al.* [63] who measured and identified 47 lines. According to their designations, the upper levels in the table are represented by the symbol $(\mathrm{N})_J$, the index N increasing with energy from the lowest level (N = 1) for each J.

The wavelength of the M1 transition $3d^8\ ^3\mathrm{F}_4 - {}^3\mathrm{F}_3$ was measured in a tokamak discharge by Suckewer *et al.* [51]. The wavelength is in good agreement with that derived from the energy levels of the $3d^8\ ^3\mathrm{F}$ term of Reader and Ryabtsev [61]. The value for the ionization energy was calculated by Carlson *et al.* [59].

Mo XVIII

Mn I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^7\ \ ^4\mathrm{F}_{9/2}$

Ionization energy 5 660 000 cm^{-1} (702 eV)

A group of unresolved lines in the range of 38.7 – 40.0 Å was attributed to $3d^7 - 3d^64p$ transitions by Schwob *et al.* [44].

Four lines, lying at about 67 Å, were measured and identified as $3p^63d^7 - 3p^53d^8$ lines by Burkhalter *et al.* [36]. Wyart *et al.* [64] extended the wavelength range of their measurements to 66 – 83.5 Å and identified about 50 lines as $3p - 3d$ transitions. In the table, the upper levels established by Wyart *et al.* are designated by the symbol $(\mathrm{N})_J$ for each J, the index N increasing with energy from the lowest level(N = 1) for each J. Designations of the $3d^7$ levels are taken from Kubo *et al.* [65] who reported the result of a calculation carried out by means of Cowans's Hartree-Fock program using scaling factors from Ref. [64]. Designations for the $3p^53d^8$ configuration are given in the compilation of Mo energy levels by Sugar and Musgrove [50].

The value for the ionization energy was calculated by Carlson *et al.* [59].

Mo XIX

Cr I isoelectronic sequence

Ground state: $1s^22s^22p^63s^23p^63d^6\ \ ^5\mathrm{D}_4$

Ionization energy 6 190 000 cm^{-1} (767 eV)

No resolved lines are reported for this ion. Schwob *et al.* [44] observed the $3d^6 - 3d^54p$ array in the range of 36.0 – 36.9 Å.

The value for the ionization energy was calculated by Carlson *et al.* [59].

Mo XX

V I isoelectronic sequence

Ground state: $1s^22s^22p^63s^23p^63d^5$ $^6S_{5/2}$

Ionization energy 6 720 000 cm^{-1} (833 eV)

No resolved lines are reported for this ion. Schwob *et al.* [44] observed the $3d^5 - 3d^44f$ array in the range of 25.8 – 26.6 Å.

The value for the ionization energy was calculated by Carlson *et al.* [59].

Mo XXI

Ti I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^4$ $^5D_0$

Ionization energy 7 280 000 cm^{-1} (902 eV)

No resolved lines are reported for this ion. Schwob *et al.* [44] observed the $3d^4 - 3d^34f$ array in the range of 24.5 – 25.2 Å.

The value for the ionization energy was calculated by Carlson *et al.* [59].

Mo XXII

Sc I isoelectronic sequence

Ground state: $1s^22s^22p^63s^23p^63d^3$ $^4F_{3/2}$

Ionization energy 7 810 000 cm^{-1} (968 eV)

No resolved lines are reported for this ion. Schwob *et al.* [44] observed the $3d^3 - 3d^24f$ array in the range of 23.5 – 24.1 Å.

The value for the ionization energy was calculated by Carlson *et al.* [59].

Mo XXIII

Ca I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d^2$ $^3F_2$

Ionization energy 8 230 000 cm^{-1} (1020 eV)

The M1 transition $3d^2$ $^3F_2-$ $^3F_3$ was observed in a tokamak discharge at 3553.3±0.3 Å by Suckewer *et al.* [51]. They also tentatively identified a weak line at 3319.8±0.3 Å as $3d^2$ $^3F_3 - {}^3F_4$. The latter identification was rejected by Wyart *et al.* [66].

Schwob *et al.* [44] observed the unresolved $3d^2 - 3d4f$ array in the range of 22.4 – 22.9 Å.

The value for the ionization energy was calculated by Cowan [22].

Mo XXIV

K I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^63d$ $^2D_{3/2}$

Ionization energy 8 730 000 cm^{-1} (1082 eV)

Schwob *et al.* [44] reported the $3d$ $^2D- 4f$ $^2F^\circ$ doublet with an accuracy of ±0.005 Å.

The ground state ^2D splitting was observed by means of an M1 line at 2686.5±0.3 Å in a tokamak discharge by Suckewer *et al.* [51].

The $3p^63d - 3p^53d^2$ array was classified by Finkenthal *et al.* [67] with a wavelength uncertainty of ±0.2 Å and Kaufman *et al.* [68] with an uncertainty of ±0.005 Å in tokamak plasmas. We give the wavelengths from the latter article. Two of the lines classified by Finkenthal *et al.* at 72.7 Å and 78.9 Å differ from the results of Kaufman *et al.* The latter are based on a study of the K I isoelectronic sequence.

The value for the ionization energy was calculated by Cowan [22].

Mo XXV

Ar I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^6$ $^1S_0$

Ionization energy 10 190 000 cm^{-1} (1263 eV)

Two resonance lines $3p^6$ $^1S_0- 3p^54d$ $^3D^\circ_1$ and $^1P^\circ_1$ were observed by Schwob *et al.* [44] in a tokamak discharge. They report a wavelength uncertainty of ±0.005 Å.

The $3p^6$ $^1S_0 - 3p^53d$ $^1P^\circ_1$ transition was observed by Finkenthal *et al.* [67] with an uncertainty of ±0.2 Å. Sugar *et al.* [69] reobserved this line along with the spin-forbidden $^1S_0 - {}^3D^\circ_1$ line with an uncertainty of ±0.005 Å.

The value for the ionization energy was calculated by Cowan [22].

Mo XXVI

Cl I isoelectronic sequence

Ground state $1s^22s^22p^63s^23p^5$ $^2P^\circ_{3/2}$

Ionization energy 10 670 000 cm^{-1} (1323 eV)

The ground term $^2P^\circ$ splitting was observed by means of an M1 transition observed in a tokamak discharge at 534.0±0.3 Å by Denne *et al.* [70].

Six lines in the range of 72 – 80 Å in a tokamak discharge were identified by Finkenthal *et al.* [67] as $3p^5 - 3p^43d$ transitions with an uncertainty of ±0.2 Å.

Kaufman *et al.* [71] reobserved the spectrum with an uncertainty of ±0.005 Å and disagree with the classifications of Finkenthal *et al.* The results of Kaufman *et al.* are based on a study of the Cl I isoelectronic sequence. We adopt their classifications.

The value for the ionization energy was calculated by Cowan [22].

Mo XXVII

S I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^4$ $^3P_2$

Ionization energy 11 190 000 cm^{-1} (1387 eV)

Four M1 lines were observed in tokamak discharges by Denne *et al.* [70] and Hinnov [72] arising within the $3p^4$ ground configuration. They established all levels but $^3P_0$ of this group.

Three lines of the $3p^4 - 3p^3 3d$ transitions in the range of 78.2 – 80.5 Å were observed by Kaufman *et al.* [73] in a tokamak discharge with an uncertainty of ±0.007 Å. Their classifications are based on a study of the S I isoelectronic sequence.

The value for the ionization energy was calculated by Cowan [22].

Mo XXVIII

P I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^3$ $^4S^\circ_{3/2}$

Ionization energy 11 690 000 cm^{-1} (1449 eV)

Seven M1 lines were observed in tokamak discharges by Denne *et al.* [70,74], arising within the $3p^3$ ground configuration. These lines establish all the levels of the $3p^3$ configuration.

Four lines of the $3p^3 - 3p^2 3d$ array in the range of 83.3 – 91.4 Å were identified by Sugar *et al.* [75] in a tokamak discharge with an uncertainty of ±0.005 Å.

The value for the ionization energy was calculated by Cowan [22].

Mo XXIX

Si I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p^2$ $^3P_0$

Ionization energy 12 380 000 cm^{-1} (1535 eV)

Five M1 lines were observed in tokamak discharges by Denne *et al.* [70] and Hinnov [72] arising within the $3p^2$ ground configuration. These lines establish all the levels of the $3p^2$ configuration.

The $3p^2$ $^3P_2 - 3p3d$ $^3D^\circ_3$ transition was observed by Finkenthal *et al.* [67]. With a tokamak plasma, Sugar *et al.* [76] observed four lines of the $3p^2 - 3p3d$ array in the range of 86.3 – 95.5 Å and the $3s^2 3p^2$ $^3P_2 - 3s3p^3$ $^3S^\circ_1$ line at 108.714 Å. Wavelengths were measured with an uncertainty of ±0.005 Å.

The value for the ionization energy was calculated by Cowan [22].

Mo XXX

Al I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2 3p$ $^2P^\circ_{1/2}$

Ionization energy 12 910 000 cm^{-1} (1601 eV)

Denne *et al.* [70] and Hinnov *et al.* [77] identified the M1 line $3s^2 3p$ $^2P^\circ_{1/2} - {}^2P^\circ_{3/2}$ at 490.1 Å in a tokamak discharge.

Burkhalter *et al.* [78] classified the $3p - 4d$, $3p - 4s$, and $3d - 4f$ lines in the wavelength range from 15.627 – 18.056 Å. The uncertainty of the wavelengths is ±0.010 Å. The $3p - 4d$ lines are not included in this compilation because they do not give the correct ground term splitting.

The $3s^2 3p - 3s3p^2$ and $3s^2 3p - 3s^2 3d$ transitions were observed by Finkenthal *et al.* [67] and Hinnov *et al.* Sugar *et al.* [79] classified six lines of these arrays in an isoelectronic study of the Al I sequence. These results differ from four of the six classifications given by Finkenthal *et al.* Sugar *et al.* derived smoothed wavelengths with an uncertainty of ±0.01 Å for five observed lines and obtained five accurately predicted lines. We give their results here. Three additional lines of the $3s^2 3p - 3s3p^2$ array were given by Jupén *et al.* [80] with a wavelength uncertainty of ±0.02 Å. Their energy level values agree with those of Sugar *et al.* within their estimated uncertainties.

The value for the ionization energy was calculated by Cowan [22].

Mo XXXI

Mg I isoelectronic sequence

Ground state $1s^2 2s^2 2p^6 3s^2$ $^1S_0$

Ionization energy 13 920 000 cm^{-1} (1726 eV)

Two M1 lines $3s3p\ ^3P_1^o - ^3P_2^o$ and $^3P_2^o - ^1P_1^o$ at 577.5±0.3 Å and 609.8±0.3 Å were identified in tokamak discharges by Denne *et al.* [70]. The latter is classified tentatively by Kaufman and Sugar [81].

The resonance line $3s^2\ ^1S_0 - 3s3p\ ^1P_1^o$ was first observed by Hinnov [29] in a tokamak discharge. Burkhalter *et al.* [78] observed two other lines within a few Angstroms of Hinnov's wavelength and identified these as the $3s3p - 3s3d$ lines. Similar observations were made by Mansfield *et al.* [46], Reader [82], and Sugar *et al.* [83]. Mansfield *et al.* also classified the $3s3p\ ^3P_1^o - 3s3d\ ^3D_2$ line. The intercombination line $3s^2\ ^1S_0 - 3s3p\ ^3P_1^o$ was observed by Finkenthal *et al.* [84], Seely *et al.* [85], and Sugar *et al.* [69]. The wavelength value of 190.466±0.005 Å is taken from Ref. [69]. Additional $3s3p - 3s3d$ and $3s3p - 3p^2$ transitions were identified by Jupén *et al.* [80]. An extensive study including new classifications of the $3p^2 - 3p3d$, $3s3d - 3p3d$, and $3p3d - 3d^2$ transitions was made by Ekberg *et al.* [86] with a laser-produced plasma. The wavelengths of Ekberg *et al.* supplemented by those of Jupén *et al.* are quoted. Some lines are blended. The uncertainty of the wavelengths is estimated to be ±0.02 Å. It should be noted that the $3p3d\ ^3F_{2,3}^o$ and $3d^2\ ^3F_{2,3}$ levels are obtained by fitting the differences between observed and calculated level energies.

The $3s^2\ ^1S_0 - 3s4p\ ^3P_1^o$ and $^1P_1^o$ lines at 14.928 Å and 14.745 Å were identified by Burkhalter *et al.* [78]. The latter was observed by Schwob *et al.* [44] and Mansfield *et al.* [46]. Identification of the $3s3d - 3s4f$ array was also given by Burkhalter *et al.*

The value for the ionization energy was calculated by Cowan [22].

Mo XXXII

Na I isoelectronic sequence

Ground state $1s^22s^22p^63s\ ^2S_{1/2}$

Ionization energy 14 445 800 ± 2400 cm^{-1}
(1791.05 ± 0.30 eV)

The first measurements were reported by Hinnov [29], who identified the two resonance lines $3s\ ^2S_{1/2} - 3p\ ^2P_{1/2,3/2}^o$ at 177 Å and 129 Å. Schwob *et al.* [44] observed the $3s\ ^2S_{1/2} - 4p\ ^2P_{3/2}^o$, $3p\ ^2P_{3/2}^o - 4s\ ^2S_{1/2}$, and $3d\ ^2D_{5/2} - 4f\ ^2F_{7/2}^o$ transitions.

Burkhalter *et al.* [78] remeasured the wavelengths of the $3s - 3p$, $3p - 3d$, $3s - 4p$, $3p - (4s$, $4d$, and $5d)$, $3d - (4p$, $4f$, $5p$, and $5f)$, transitions in the 100 – 177 Å and 10 – 19 Å ranges, and established 17 levels on the basis of 22 transitions at about the same time Mansfield *et al.* [46] reported similar results, adding the $3s - 5p$ and $3d - 6f$ transitions. The wavelength uncertainties of Burkhalter *et al.* and Mansfield *et al.* are ±0.010 Å and ±0.005 Å, respectively. Smoothed wavelengths for the $3s - 3p$, $3p - 3d$, and $3d - 4f$ doublets were derived by Reader *et al.* [87] in an isoelectronic comparison of the measured wavelengths with Dirac-Fock calculations for Ar^{7+} to Xe^{43+}. Reader *et al.* [88] obtained more accurate wavelengths in the range of 14 – 40 Å with laser-produced plasmas for 16 lines including the $4d - 5f$ and $4f - 5g$ transitions. The overall uncertainty estimate is ±0.007 Å. We adopt the values of Reader *et al.* and of Refs. [46,78] for a few transitions. However, there appears a deviation of 0.015 Å on the weak line at 37.305 Å, compared with the recalculated one from level difference.

Jupén *et al.* [80] recently observed the $3p\ ^2P_{3/2}^o - 3d\ ^2D_{3/2}^o$ line at 134.62±0.02 Å in good agreement with the prediction of Reader *et al.*

The value for the ionization energy was determined by Reader *et al.* [88] from the polarization treatment of Edlén [89] for the $4f, 5f$, and $5g$ levels.

Mo XXXIII

Ne I isoelectronic sequence

Ground state $1s^22s^22p^6\ ^1S_0$

Ionization energy 34 340 000 cm^{-1} (4257 eV)

The $n = 2{-}3$ transitions in the range of 4.4–5.3 Å were identified by Aglitskii *et al.* [90,91] in vacuum sparks, and by Schwob *et al.* [44] and Gordon *et al.* [92] in tokamak discharges. Improved wavelength measurements were reported by Aglitskii *et al.* [93] for six lines of the $2s^22p^6 - 2s^22p^53s$, $2s^22p^53d$, and $2s2p^63p$ transitions. These lines and the $2p^6\ ^1S_0 - 2p^53d\ ^3P_1^o$ line from Ref. [91] are adopted in this compilation.

Wavelengths of the transitions $2p - 4s$, $4d$ and $2p - nd$ $(n = 5 - 7)$ were reported by Burkhalter *et al.* [94,95].

The value for the ionization energy was calculated by Cowan [22].

Mo XXXIV

F I isoelectronic sequence

Ground state $1s^22s^22p^5\ ^2P_{3/2}^o$

Ionization energy 35 705 800 cm^{-1} (4426.96 eV)

Boiko *et al.* [96] identified the $2p^5 - 2p^43d$ array in the wavelength range of 4.472 – 4.536 Å with an uncertainty of ±0.002 Å.

Reader *et al.* [97] predicted the wavelength of the M1 transition $2s^22p^5\ ^2P_{3/2}^o - ^2P_{1/2}^o$ to be 112.80 Å from the observation of the $2s^22p^5 - 2s2p^6$ lines. Their wavelength uncertainty is ±0.015 Å. A recent observation by Myrnäs *et al.* [98] with a tokamak plasma determined its wavelength value to be 112.828±0.020 Å.

For the ionization energy we use a value calculated by Cheng [99] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [100].

Mo XXXV

O I isoelectronic sequence

Ground state $1s^22s^22p^4\ \ ^3P_2$

Ionization energy 37 233 800 cm^{-1} (4616.40 eV)

Feldman *et al.* [101] identified 13 lines of the $2s^22p^4 - 2s2p^5$ transitions in the range of 37.4 – 71.3 Å in a laser-produced plasma. The estimated wavelength uncertainty is ±0.010 Å.

For the ionization energy we use a value calculated by Cheng [99] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [100].

Mo XXXVI

N I isoelectronic sequence

Ground state $1s^22s^22p^3\ \ ^4S^\circ_{3/2}$

Ionization energy 38 680 800 cm^{-1} (4795.81 eV)

No spectral lines have been identified for this ion.

For the ionization energy we use a value calculated by Cheng [99] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [100].

Mo XXXVII

C I isoelectronic sequence

Ground state $1s^22s^22p^2\ \ ^3P_0$

Ionization energy 41 076 800 cm^{-1} (5092.88 eV)

No spectral lines have been identified for this ion.

For the ionization energy we use a value calculated by Cheng [99] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [100].

Mo XXXVIII

B I isoelectronic sequence

Ground state $1s^22s^22p\ \ ^2P^\circ_{1/2}$

Ionization energy 42 653 000 cm^{-1} (5288.30 eV)

Myrnäs *et al.* [98] identified the M1 line $2s^22p\ (^2P^\circ_{1/2} - {}^2P^\circ_{3/2})$ at 103.696±0.010 Å and two intercombination lines $2s^22p\ ^2P^\circ_{1/2,3/2} - 2s2p^2\ ^4P_{1/2,5/2}$ at 111.85±0.050 Å and 121.098±0.025 Å in tokamak discharges. They also observed four lines of the $2s^22p - 2s2p^2$ array in the range of 45 – 48 Å with an uncertainty of ±0.030 Å for $^2P^\circ_{3/2} - {}^2P_{1/2,3/2}$ and with ±0.020 Å for $^2P^\circ_{1/2} - {}^2S_{1/2}$, $^2D_{3/2}$.

For the ionization energy we use a value calculated by Cheng [99] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [100].

Mo XXXIX

Be I isoelectronic sequence

Ground state $1s^22s^2\ \ ^1S_0$

Ionization energy 44 761 900 cm^{-1} (5549.77 eV)

Denne *et al.* [102] identified the lines at 49.904±0.03 Å and 137.787±0.03 Å in a tokamak discharge as the $2s^2\ ^1S_0 - 2s2p\ ^1P^\circ_1$ and $^3P^\circ_1$ transitions.

For the ionization energy we use a value calculated by Cheng [99] with a Dirac-Fock code, to which we add a correlation correction derived from lower members of the isoelectronic sequence by Martin [100].

Mo XL

Li I isoelectronic sequence

Ground state $1s^22s\ \ ^2S_{1/2}$

Ionization energy 46 081 400 cm^{-1} (5713.37 eV)

Observations of four x-ray lines by Beier and Kunze [103] at 0.6859 Å, 0.6885 Å, 0.6893 Å, and 0.6912 Å are attributed to transitions from doubly excited configurations $1s2s2p$ and $1s2p^2$. Three of these are multiply classified.

Denne *et al.* [102] identified the lines at 143.998±0.02 Å and 58.499±0.02 Å in a tokamak discharge as the $2s\ ^2S_{1/2} - 2p\ \ ^2P^\circ_{1/2,3/2}$ transitions. Smoothed wavelengths, however, are taken from Kim *et al.* [104] for these transitions.

Vainshtein and Safronova [105] calculated energy levels of the $1s^2nl$ configurations with $n = 2 - 5$, and $l = s, p$, and d. Their energy levels are adjusted to the $1s^22p\ ^2P^\circ_{1/2,3/2}$ levels of Kim *et al.* by adding 3290 cm^{-1}. They also calculated wavelengths of the $1s^22s - 1s2s2p$, $1s^22p - 1s2p^2$, and $1s^22p - 1s2s^2$ transitions. We use their results to derive these autoionizing upper levels.

The ionization energy was obtained as follows: total binding energy of the Li-like ion from Chen *et al.* [106] minus the ionization energy of the He-like ion from Cheng [107] minus the binding energy of H-like ion from Kim [108].

Mo XLI

He I isoelectronic sequence

Ground state $1s^2$ $^1S_0$

Ionization energy 192 046 600 cm^{-1} (23 810.75 eV)

Beier and Kunze [103] observed three lines of the $1s^2-1s2p$ multiplet with an uncertainty of ±0.0002 Å.

Energy levels for $1snl$ configurations ($n = 1-5$ and $l = s$ and p) were calculated by Indelicato [109] using a multiconfiguration Dirac-Fock approximation with QED corrections. He estimated the uncertainty to be ±800 cm^{-1}. The $3d$ and $4d$ levels were calculated by Vainshtein and Safronova [105] and were adjusted to the $n = 3, 4$ levels of Indelicato. All wavelengths are calculated from the theoretical energy levels by the Ritz combination principle. The observed wavelengths in Ref. [103] differ at most by 0.006 Å from the calculated ones.

Vainshtein and Safronova [105] also calculated wavelengths for the $1s2l-2l2l'$ transitions, which we quote with no correction. They estimate their own relative uncertainty to be one part in 10^4.

The ionization energy is taken from the calculations of Cheng [107].

Mo XLII

H I isoelectronic sequence

Ground state $1s$ $^2S_{1/2}$

Ionization energy 198 188 100 ± 200 cm^{-1}
(24 572.21 ± 0.01 eV)

Turechek and Kunze [110] measured the $1s\ ^2S-2p, 3p$ transitions with an accuracy of ±0.0005 Å and ±0.001 Å, respectively.

Kim [108] has provided calculations of the binding energies of the H-like orbits for $n = 1$ to 5 and the ionization energy by using the Dirac-Fock code which includes QED and finite nuclear size corrections. All wavelengths are calculated from these level values, whose uncertainty is one part in 10^6.

2.11.2. Spectroscopic Data for Mo VI through Mo XLII

Mo VI

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
6336.04	$4p^6(^1S)4f\ ^2F^o_{5/2}$	$4p^6(^1S)5d\ ^2D_{3/2}$	267 048.8	282 827.1	5				3
6188.67	7/2	5/2	267 458.4	283 612.5	11				3
6035.62	5/2	5/2	267 048.8	283 612.5	1				3
5448.82	$4p^6(^1S)5f\ ^2F^o_{7/2}$	$4p^6(^1S)6d\ ^2D_{5/2}$	368 206.3	386 553.8	8				3
5276.86	$4p^6(^1S)7i\ ^2I$	$4p^6(^1S)8k\ ^2K^o$	474 436.4	493 381.8	45				3
5247.45	$4p^6(^1S)7h\ ^2H^o$	$4p^6(^1S)8i\ ^2I$	474 299.7	493 351.3	35				3
5043.55	$4p^6(^1S)7g\ ^2G_{9/2}$	$4p^6(^1S)8h\ ^2H^o_{11/2}$	473 427.7	493 249.5	10				3
5042.77	7/2	9/2	473 424.6	493 249.5	9				3
4272.95	$4p^6(^1S)7p\ ^2P^o_{3/2}$	$4p^6(^1S)7d\ ^2D_{3/2}$	416 070.2	439 466.6	8				3
4232.04	3/2	5/2	416 070.2	439 692.8	100				3
4062.04	1/2	3/2	414 855.4	439 466.6	60				3
3735.32	$4p^6(^1S)6s\ ^2S_{1/2}$	$4p^6(^1S)6p\ ^2P^o_{1/2}$	313 809.1	340 572.9	90				3
3476.60	1/2	3/2	313 809.1	342 564.6	200				3
3484.77	$4p^6(^1S)6d\ ^2D_{3/2}$	$4p^6(^1S)7p\ ^2P^o_{1/2}$	386 167.3	414 855.4	13				3
3386.98	5/2	3/2	386 553.8	416 070.2	20				3
3343.20	3/2	3/2	386 167.3	416 070.2	2				3
3408.60	$4p^6(^1S)6h\ ^2H^o$	$4p^6(^1S)7i\ ^2I$	445 107.3	474 436.4	200				3
3323.74	$4p^6(^1S)5f\ ^2F^o_{5/2}$	$4p^6(^1S)5g\ ^2G_{7/2}$	365 106.6	395 184.6	22				3
3293.29	$4p^6(^1S)6g\ ^2G_{9/2}$	$4p^6(^1S)7h\ ^2H^o_{11/2}$	443 943.7	474 299.7	50				3
3293.00	7/2	9/2	443 941.0	474 299.7	50				3
3133.32	$4p^6(^1S)7i\ ^2I$	$4p^6(^1S)9k\ ^2K^o$	474 436.4	506 342.2	10				3
3122.43	$4p^6(^1S)7h\ ^2H^o$	$4p^6(^1S)9i\ ^2I$	474 299.7	506 316.7?	10				3
2293.43	$4p^6(^1S)6p\ ^2P^o_{3/2}$	$4p^6(^1S)6d\ ^2D_{3/2}$	342 564.6	386 167.3	10				3
2273.28	3/2	5/2	342 564.6	386 553.8	50				3
2193.25	1/2	3/2	340 572.9	386 167.3	40				3
2003.14	$4p^6(^1S)5g\ ^2G$	$4p^6(^1S)6h\ ^2H^o$	395 185.7	445 107.3	50				3
1820.76	$4p^6(^1S)7p\ ^2P^o_{3/2}$	$4p^6(^1S)8d\ ^2D_{5/2}$	416 070.2	470 991.4	4				3
1785.88	1/2	3/2	414 855.4	470 850.0	4				3
1731.73	$4p^6(^1S)5d\ ^2D_{3/2}$	$4p^6(^1S)6p\ ^2P^o_{1/2}$	282 827.1	340 572.9	50				3
1696.29	5/2	3/2	283 612.5	342 564.6	75				3
1673.99	3/2	3/2	282 827.1	342 564.6	30				3
1718.07	$4p^6(^1S)6p\ ^2P^o_{3/2}$	$4p^6(^1S)7s\ ^2S_{1/2}$	342 564.6	400 769.5	70				3
1661.22	1/2	1/2	340 572.9	400 769.5	40				3
1595.45	$4p^6(^1S)5s\ ^2S_{1/2}$	$4p^6(^1S)5p\ ^2P^o_{1/2}$	119 727.3	182 405.5	70				3
1479.17	1/2	3/2	119 727.3	187 332.8	90				3
1320.33	$4p^6(^1S)5f\ ^2F^o_{7/2}$	$4p^6(^1S)6g\ ^2G_{9/2}$	368 206.3	443 943.7	10				3
1268.51	5/2	7/2	365 106.6	443 941.0	10				3
1264.04	$4p^6(^1S)5g\ ^2G$	$4p^6(^1S)7h\ ^2H^o$	395 185.7	474 299.7	15				3
1227.07	$4p^6(^1S)5d\ ^2D_{5/2}$	$4p^6(^1S)5f\ ^2F^o_{5/2}$	283 612.5	365 106.6	15				3
1215.38	3/2	5/2	282 827.1	365 106.6	40				3
1182.14	5/2	7/2	283 612.5	368 206.3	60				3
1047.18	$4p^6(^1S)5p\ ^2P^o_{3/2}$	$4p^6(^1S)5d\ ^2D_{3/2}$	187 332.8	282 827.1	35				3
1038.64	3/2	5/2	187 332.8	283 612.5	80				3
995.800	1/2	3/2	182 405.5	282 827.1	70				1,3°
1019.76	$4p^6(^1S)5g\ ^2G$	$4p^6(^1S)8h\ ^2H^o$	395 185.7	493 249.5	2				3
1011.20	$4p^6(^1S)6p\ ^2P^o_{1/2}$	$4p^6(^1S)7d\ ^2D_{3/2}$	340 572.9	439 466.6	2				3

Mo VI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
972.930	$4p^6(^1S)5f\ ^2F^o_{7/2}$	$4p^6(^1S)8d\ ^2D_{5/2}$	368 206.3	470 991.4	4				3
945.665	5/2	3/2	365 106.6	470 850.0	4				3
944.410	5/2	5/2	365 106.6	470 991.4	3				3
950.816	$4p^6(^1S)6p\ ^2P^o_{3/2}$	$4p^6(^1S)8s\ ^2S_{1/2}$	342 564.6	447 738.6	10				3
933.125	1/2	1/2	340 572.9	447 738.6	4				3
950.335	$4p^6(^1S)5f\ ^2F^o_{7/2}$	$4p^6(^1S)7g\ ^2G_{9/2}$	368 206.3	473 427.7	10				3
839.655	$4p^6(^1S)4f\ ^2F^o_{7/2}$	$4p^6(^1S)6d\ ^2D_{5/2}$	267 458.4	386 553.8	6				3
804.233	$4p^6(^1S)5f\ ^2F^o_{7/2}$	$4p^6(^1S)8g\ ^2G_{9/2}$	368 206.3	492 548	6				3
784.690	5/2	7/2	365 106.6	492 545	3				3
790.659	$4p^6(^1S)5p\ ^2P^o_{3/2}$	$4p^6(^1S)6s\ ^2S_{1/2}$	187 332.8	313 809.1	75				1, 2, 3°
761.020	1/2	1/2	182 405.5	313 809.1	50				1, 2, 3°
782.912	$4p^6(^1S)4f\ ^2F^o_{7/2}$	$4p^6(^1S)5g\ ^2G_{9/2}$	267 458.4	395 186.7	75				3
780.429	5/2	7/2	267 048.8	395 184.6	60				3
778.670	$4p^6(^1S)6p\ ^2P^o_{3/2}$	$4p^6(^1S)8d\ ^2D_{5/2}$	342 564.6	470 991.4	8				3
767.595	1/2	3/2	340 572.9	470 850.0	3				3
757.396	$4p^6(^1S)5d\ ^2D_{3/2}$	$4p^6(^1S)7p\ ^2P^o_{1/2}$	282 827.1	414 855.4	5				3
750.522	3/2	3/2	282 827.1	416 070.2	5				3
580.616	$4p^6(^1S)4f\ ^2F^o_{7/2}$	$4p^6(^1S)7d\ ^2D_{5/2}$	267 458.4	439 692.8	6				3
566.620	$4p^6(^1S)4f\ ^2F^o_{7/2}$	$4p^6(^1S)6g\ ^2G_{9/2}$	267 458.4	443 943.7	60				3
565.317	5/2	7/2	267 048.8	443 941.0	50				3
548.229	$4p^6(^1S)4d\ ^2D_{3/2}$	$4p^6(^1S)5p\ ^2P^o_{1/2}$	0.0	182 405.5	80				1, 2, 3°, 31
541.286	5/2	3/2	2 584.3	187 332.8	100				1, 2, 3°, 31
533.809	3/2	3/2	0.0	187 332.8	40				1, 2, 3°, 31
501.944	$4p^6(^1S)5p\ ^2P^o_{3/2}$	$4p^6(^1S)6d\ ^2D_{5/2}$	187 332.8	386 553.8	20				3
490.763	1/2	3/2	182 405.5	386 167.3	15				3
491.314	$4p^6(^1S)4f\ ^2F^o_{7/2}$	$4p^6(^1S)8d\ ^2D_{5/2}$	267 458.4	470 991.4	5				3
490.680	5/2	3/2	267 048.8	470 850.0	4				3
485.511	$4p^6(^1S)4f\ ^2F^o_{7/2}$	$4p^6(^1S)7g\ ^2G_{9/2}$	267 458.4	473 427.7	55				3
484.553	5/2	7/2	267 048.8	473 424.6	30				3
468.533	$4p^6(^1S)5p\ ^2P^o_{3/2}$	$4p^6(^1S)7s\ ^2S_{1/2}$	187 332.8	400 769.5	50				3
457.963	1/2	1/2	182 405.5	400 769.5	30				3
452.800	$4p^6(^1S)5s\ ^2S_{1/2}$	$4p^6(^1S)6p\ ^2P^o_{1/2}$	119 727.3	340 572.9	50				3
448.754	1/2	3/2	119 727.3	342 564.6	80				3
444.288	$4p^6(^1S)4f\ ^2F^o_{7/2}$	$4p^6(^1S)8g\ ^2G_{9/2}$	267 458.4	492 548	8				3
396.628	$4p^6(^1S)5p\ ^2P^o_{3/2}$	$4p^6(^1S)7d\ ^2D_{3/2}$	187 332.8	439 466.6	1				3
396.264	3/2	5/2	187 332.8	439 692.8	8				3
384.015	$4p^6(^1S)5p\ ^2P^o_{3/2}$	$4p^6(^1S)8s\ ^2S_{1/2}$	187 332.8	447 738.6	15				3
376.873	1/2	1/2	182 405.5	447 738.6	10				3
378.117	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^6(^1S)4f\ ^2F^o_{5/2}$	2 584.3	267 048.8	30				2, 3°
377.534	5/2	7/2	2 584.3	267 458.4	90				2, 3°, 31
374.463	3/2	5/2	0.0	267 048.8	80				2, 3°
352.541	$4p^6(^1S)5p\ ^2P^o_{3/2}$	$4p^6(^1S)8d\ ^2D_{5/2}$	187 332.8	470 991.4	4				3
351.290	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^5(^2P^o)4d^2(^3F)\ ^4D^o_{3/2}$	2 584.3	287 245	2				5
349.365	3/2	1/2	0.0	286 233	3				5
349.220	5/2	5/2	2 584.3	288 934	15				5
348.135	3/2	3/2	0.0	287 245	15				5
346.102	3/2	5/2	0.0	288 934	2				5
345.478	5/2	7/2	2 584.3	292 038	15				5
338.831	$4p^6(^1S)5s\ ^2S_{1/2}$	$4p^6(^1S)7p\ ^2P^o_{1/2}$	119 727.3	414 855.4	8				3
337.450	1/2	3/2	119 727.3	416 070.2	15				3

Mo VI – Continued

Wavelength (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
335.449	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^5(^2P^o)4d^2(^3P)\ ^4P^o_{5/2}$	2 584.3	300 690	5				5
332.570	3/2	5/2	0.0	300 690	20				5
331.689	5/2	3/2	2 584.3	304 070	15				5
328.872	3/2	3/2	0.0	304 070	2				5
325.328	3/2	1/2	0.0	307 382	10				5
334.080	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^5(^2P^o)4d^2(^3F)\ ^4G^o_{7/2}$	2 584.3	301 913	5				5
313.950	3/2	5/2	0.0	318 522	150				5
332.673	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^5(^2P^o)4d^2(^3F)\ ^4F^o_{5/2}$	2 584.3	303 182	2				5
329.832	3/2	5/2	0.0	303 182	100				5
323.001	5/2	7/2	2 584.3	312 181	40				5
320.141	5/2	3/2	2 584.3	314 947	70				5
317.514	3/2	3/2	0.0	314 947	100				5
328.714	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^5(^2P^o)4d^2(^1D)\ ^2D^o_{3/2}$	2 584.3	306 800	30				5
325.946	3/2	3/2	0.0	306 800	70				5
325.946	5/2	5/2	2 584.3	309 382	70				5
323.225	3/2	5/2	0.0	309 382	40				5
319.933	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^5(^2P^o)4d^2(^1G)\ ^2F^o_{5/2}$	2 584.3	315 151	150				5
317.308	3/2	5/2	0.0	315 151	200				5
252.294	5/2	7/2	2 584.3	398 948	350				5
318.584	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^5(^2P^o)4d^2(^3F)\ ^2F^o_{7/2}$	2 584.3	316 472	150				5
255.443	5/2	5/2	2 584.3	394 060	100				5
253.770	3/2	5/2	0.0	394 060	400				5
316.666	$4p^6(^1S)4d\ ^2D_{3/2}$	$4p^5(^2P^o)4d^2(^1D)\ ^2P^o_{1/2}$	0.0	315 790	40				5
314.961	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^5(^2P^o)4d^2(^1D)\ ^2F^o_{7/2}$	2 584.3	320 084	200				5
298.968	5/2	5/2	2 584.3	337 067	220				5
296.677	3/2	5/2	0.0	337 067	200				5
307.739	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^5(^2P^o)4d^2(^3F)\ ^2G^o_{7/2}$	2 584.3	327 535	50				5
305.544	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^5(^2P^o)4d^2(^3P)\ ^4D^o_{5/2}$	2 584.3	329 869	200				5
304.303	5/2	7/2	2 584.3	331 203	200				5
303.853	5/2	3/2	2 584.3	331 690	100				5
303.150	3/2	5/2	0.0	329 869	60				5
301.487	3/2	3/2	0.0	331 690	120				5
296.677	3/2	1/2	0.0	337 066	200				5
296.743	$4p^6(^1S)5s\ ^2S_{1/2}$	$4p^6(^1S)8p\ ^2P^o_{3/2}$	119 727.3	456 712	15				5
294.139	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^6(^1S)6p\ ^2P^o_{3/2}$	2 584.3	342 564.6	50				3, 5°
293.627	3/2	1/2	0.0	340 572.9	100				3, 5°
291.920	3/2	3/2	0.0	342 564.6	15				3, 5°
293.662	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^5(^2P^o)4d^2(^3P)\ ^2D^o_{3/2}$	2 584.3	343 111	150				5
291.450	3/2	3/2	0.0	343 111	50				5
286.302	3/2	5/2	0.0	349 282	170				5
290.443	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^5(^2P^o)4d^2(^3P)\ ^4S^o_{3/2}$	2 584.3	346 886	80				5
288.279	3/2	3/2	0.0	346 886	25				5
288.921	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^5(^2P^o)4d^2(^1G)\ ^2G^o_{7/2}$	2 584.3	348 700	190				5
288.887	$4p^6(^1S)4d\ ^2D_{3/2}$	$4p^5(^2P^o)4d^2(^3P)\ ^2S^o_{1/2}$	0.0	346 156	120				5
283.403	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^5(^2P^o)4d^2(^1S)\ ^2P^o_{3/2}$	2 584.3	355 437	70				5
281.344	3/2	3/2	0.0	355 437	70				5
271.088	3/2	1/2	0.0	368 884	25				5
276.517	$4p^6(^1S)5s\ ^2S_{1/2}$	$4p^6(^1S)9p\ ^2P^o_{1/2}$	119 727.3	481 363	15				5
276.213	1/2	3/2	119 727.3	481 765	8				5
275.851	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^6(^1S)5f\ ^2F^o_{5/2}$	2 584.3	365 106.6	100				3, 5°
273.898	3/2	5/2	0.0	365 106.6	250				3, 5°
273.511	5/2	7/2	2 584.3	368 206.3	200				3, 5°
264.151	$4p^6(^1S)5s\ ^2S_{1/2}$	$4p^6(^1S)10p\ ^2P^o_{3/2}$	119 727.3	498 293	5				5

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Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
248.060	$4p^6(^1S)4d\ ^2D_{3/2}$	$4p^5(^2P^o)4d^2(^3P)\ ^2P^o_{1/2}$	0.0	403 129	280				5
246.713	5/2	3/2	2 584.3	407 909	300				5
245.153	3/2	3/2	0.0	407 909	150				5
243.772	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^5(^2P^o)4d^2(^3F)\ ^2D^o_{5/2}$	2 584.3	412 803	280				5
243.487	5/2	3/2	2 584.3	413 282	230				5
242.246	3/2	5/2	0.0	412 803	250				5
241.966	3/2	3/2	0.0	413 282	300				5
241.844	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^6(^1S)7p\ ^2P^o_{3/2}$	2 584.3	416 070.2	200				3, 5°
241.047	3/2	1/2	0.0	414 855.4	150				3, 5°
240.344	3/2	3/2	0.0	416 070.2	50				3, 5°
239.411	$4p^6(^1S)4d\ ^2D_{3/2}$	$4p^54d(^3P^o)5s\ ^4P^o_{1/2}$	0.0	417 692	25				5
239.185	5/2	3/2	2 584.3	420 670	40				5
237.716	3/2	3/2	0.0	420 670	18				5
235.900	5/2	5/2	2 584.3	426 490	30				5
234.472	3/2	5/2	0.0	426 490	4				5
234.192	$4p^6(^1S)4d\ ^2D_{3/2}$	$4p^54d(^3P^o)5s\ ^2P^o_{1/2}$	0.0	427 000	70				5
232.239	5/2	3/2	2 584.3	433 174	55				5
230.854	3/2	3/2	0.0	433 174	30				5
233.117	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^54d(^3F^o)5s\ ^4F^o_{7/2}$	2 584.3	431 553	45				5
231.731	5/2	5/2	2 584.3	434 119	9				5
230.352	3/2	5/2	0.0	434 119	55				5
229.726	5/2	3/2	2 584.3	437 885	20				5
228.370	3/2	3/2	0.0	437 885	35				5
230.633	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^6(^1S)6f\ ^2F^o_{5/2}$	2 584.3	436 174	30				5
230.437	5/2	7/2	2 584.3	436 541	100				3, 5°
229.266	3/2	5/2	0.0	436 174	50				3, 5°
229.680	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^54d(^3F^o)5s\ ^2F^o_{7/2}$	2 584.3	437 970	85				5
227.804	5/2	5/2	2 584.3	441 558	33				5
226.471	3/2	5/2	0.0	441 558	50				5
224.483	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^54d(^3D^o)5s\ ^4D^o_{7/2}$	2 584.3	448 050	35				5
220.641	5/2	3/2	2 584.3	455 807	3				5
219.846	3/2	1/2	0.0	454 863	2				5
219.391	3/2	3/2	0.0	455 807	11				5
217.395	5/2	5/2	2 584.3	462 574	45				5
216.182	3/2	5/2	0.0	462 574	3				5
222.593	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^54d(^3D^o)5s\ ^2D^o_{5/2}$	2 584.3	451 835	50				5
221.319	3/2	5/2	0.0	451 835	1				5
215.600	5/2	3/2	2 584.3	466 399	55				5
214.409	3/2	3/2	0.0	466 399	25				5
220.202	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^6(^1S)8p\ ^2P^o_{3/2}$	2 584.3	456 712	25				5
219.062	3/2	1/2	0.0	456 491	20				5
218.954	3/2	3/2	0.0	456 712	3				5
219.476	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^54d(^1D^o)5s\ ^2D^o_{5/2}$	2 584.3	458 214	3				5
219.125	5/2	3/2	2 584.3	458 943	2				5
218.238	3/2	5/2	0.0	458 214	55				5
217.892	3/2	3/2	0.0	458 943	40				5
215.600	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^54d(^1F^o)5s\ ^2F^o_{7/2}$	2 584.3	466 405	55				5
214.196	5/2	5/2	2 584.3	469 446	50				5
213.017	3/2	5/2	0.0	469 446	10				5
214.942	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^6(^1S)7f\ ^2F^o_{5/2}$	2 584.3	467 823	14				5
214.890	5/2	7/2	2 584.3	467 934	60				5
213.756	3/2	5/2	0.0	467 823	55				5
208.691	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^6(^1S)9p\ ^2P^o_{3/2}$	2 584.3	481 765	8				5
207.745	3/2	1/2	0.0	481 363	6				5
207.571	3/2	3/2	0.0	481 765	2				5
205.691	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^6(^1S)8f\ ^2F^o_{7/2}$	2 584.3	488 750	40				5
204.620	3/2	5/2	0.0	488 710	25				5
201.733	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^6(^1S)10p\ ^2P^o_{3/2}$	2 584.3	498 293	3				5
200.794	3/2	1/2	0.0	498 024	2				5

Mo VI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
199.835	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^6(^1S)9f\ ^2F^o_{7/2}$	2 584.3	502 996	12				5
198.817	$_{3/2}$	$_{5/2}$	0.0	502 976	7				5
197.163	$4p^6(^1S)4d\ ^2D_{5/2}$	$4p^6(^1S)11p\ ^2P^o_{3/2}$	2 584.3	509 779	1				5
196.233	$_{3/2}$	$_{1/2}$	0.0	509 597	1				5

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Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2273.428	$4p^5(^2P^o_{1/2})4f\ [\frac{5}{2}]_2$	$4p^5(^2P^o_{1/2})5d\ [\frac{3}{2}]^o_1$	645 811.86	689 784.69	80				9
1991.915	3	2	635 910.5	686 113.49	80				9
2248.554	$4p^5(^2P^o_{3/2})4f\ [\frac{5}{2}]_2$	$4p^5(^2P^o_{3/2})5d\ [\frac{3}{2}]^o_1$	624 603.86	669 063.09	120				9
2151.039	3	2	615 203.92	661 678.46	160				9
2204.859	$4p^5(^2P^o_{3/2})4f\ [\frac{7}{2}]_4$	$4p^5(^2P^o_{3/2})5d\ [\frac{7}{2}]^o_4$	616 148.25	661 488.47	40				9
2200.862	$4p^5(^2P^o_{3/2})4f\ [\frac{3}{2}]_2$	$4p^5(^2P^o_{3/2})5d\ [\frac{1}{2}]^o_1$	613 593.09	659 015.62	100				9
2179.154	1	0	611 727.25	657 602.91	60				9
2114.018	1	1	611 727.25	659 015.62	50				9
2175.449	$4p^5(^2P^o_{3/2})4f\ [\frac{7}{2}]_3$	$4p^5(^2P^o_{3/2})5d\ [\frac{3}{2}]^o_2$	615 725.35	661 678.46	40				9
2150.819	$4p^5(^2P^o_{3/2})4f\ [\frac{5}{2}]_3$	$4p^5(^2P^o_{3/2})5d\ [\frac{7}{2}]^o_3$	615 203.92	661 683.19	10				9
2078.973	$4p^5(^2P^o_{3/2})4f\ [\frac{3}{2}]_2$	$4p^5(^2P^o_{3/2})5d\ [\frac{3}{2}]^o_2$	613 593.09	661 678.46	60				9
2055.376	$4p^5(^2P^o_{3/2})4f\ [\frac{7}{2}]_3$	$4p^5(^2P^o_{3/2})5d\ [\frac{5}{2}]^o_2$	615 725.35	664 362.66					9
2016.880	4	3	616 148.25	665 713.78	160				9
2033.572	$4p^5(^2P^o_{3/2})4f\ [\frac{5}{2}]_3$	$4p^5(^2P^o_{3/2})5d\ [\frac{5}{2}]^o_2$	615 203.92	664 362.66	200				9
1979.814	3	3	615 203.92	665 713.78	40				9
1969.475	$4p^5(^2P^o_{3/2})4f\ [\frac{9}{2}]_4$	$4p^5(^2P^o_{3/2})5d\ [\frac{7}{2}]^o_3$	610 908.23	661 683.19	120				9
1963.730	5	4	610 564.98	661 488.47	40				9
1960.154	$4p^5(^2P^o_{1/2})4f\ [\frac{7}{2}]_3$	$4p^5(^2P^o_{1/2})5d\ [\frac{5}{2}]^o_2$	633 788.9	684 805.34	60				9
1946.563	4	3	635 262.4	686 635.0	100				9
1834.721	$4p^5(^2P^o_{1/2})5s\ [\frac{1}{2}]^o_1$	$4p^5(^2P^o_{3/2})5p\ [\frac{3}{2}]_2$	502 933.27	557 437.49	120				9
1640.158	$4p^5(^2P^o_{3/2})5s\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{3/2})5p\ [\frac{1}{2}]_1$	481 295.99	542 265.29	200				9
1550.435	2	1	477 767.89	542 265.29	100				9
1183.323	1	0	481 295.99	565 803.85	160				9
1590.568	$4p^5(^2P^o_{1/2})5s\ [\frac{1}{2}]^o_1$	$4p^5(^2P^o_{3/2})5p\ [\frac{1}{2}]_0$	502 933.27	565 803.85	120				9
1497.421	$4p^5(^2P^o_{3/2})5s\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{3/2})5p\ [\frac{5}{2}]_2$	481 295.99	548 077.57	100				9
1422.278	2	2	477 767.89	548 077.57	400				9
1341.162	2	3	477 767.89	552 329.97	800				9
1476.458	$4p^5(^2P^o_{1/2})5s\ [\frac{1}{2}]^o_1$	$4p^5(^2P^o_{1/2})5p\ [\frac{3}{2}]_1$	502 933.27	570 658.75	60				9
1427.755	0	1	500 618.75	570 658.75	400				9
1338.494	1	2	502 933.27	577 644.10	1000				9
1467.588	$4s^24p^5(^2P^o_{3/2})5s\ [\frac{3}{2}]^o_2$	$4s4p^64d\ ^3D_2$	477 767.89	545 906.83	20				9
1421.413	2	3	477 767.89	548 120.43	400				9
1367.897	$4p^5(^2P^o_{3/2})5s\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{3/2})5p\ [\frac{3}{2}]_1$	481 295.99	554 401.01	600				9
1313.339	1	2	481 295.99	557 437.49	600				9
1304.917	2	1	477 767.89	554 401.01	200				9
1255.186	2	2	477 767.89	557 437.49	600				9
1336.317	$4p^5(^2P^o_{1/2})5s\ [\frac{1}{2}]^o_1$	$4p^5(^2P^o_{1/2})5p\ [\frac{1}{2}]_1$	502 933.27	577 765.90	400				9
1296.225	0	1	500 618.75	577 765.90	400				9
1218.134	1	0	502 933.27	585 026.11	200				9
1215.483	$4s^24p^5(^2P^o_{3/2})5s\ [\frac{3}{2}]^o_1$	$4s4p^64d\ ^1D_2$	481 295.99	563 567.72	120				9
1165.508	2	2	477 767.89	563 567.72	180				9
1189.952	$4p^5(^2P^o_{1/2})5p\ [\frac{1}{2}]_0$	$4p^5(^2P^o_{3/2})5d\ [\frac{3}{2}]^o_1$	585 026.11	669 063.09					9
1119.037	$4p^5(^2P^o_{3/2})5s\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{1/2})5p\ [\frac{3}{2}]_1$	481 295.99	570 658.75	20				9
1037.905	1	2	481 295.99	577 644.10	80				9
1001.237	2	2	477 767.89	577 644.10	80				9
1019.257	$4s4p^64d\ ^1D_2$	$4s^24p^5(^2P^o_{3/2})5d\ [\frac{3}{2}]^o_2$	563 567.72	661 678.46	100				9
1019.216	$4s4p^64d\ ^1D_2$	$4s^24p^5(^2P^o_{3/2})5d\ [\frac{7}{2}]^o_3$	563 567.72	661 683.19	80				9
1000.019	$4p^5(^2P^o_{3/2})5s\ [\frac{3}{2}]^o_2$	$4p^5(^2P^o_{1/2})5p\ [\frac{1}{2}]_1$	477 767.89	577 765.90	160				9
964.039	1	0	481 295.99	585 026.11	160				9

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Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
984.462	$4p^5(^2P^o_{3/2})5p\ [\frac{3}{2}]_2$	$4p^5(^2P^o_{3/2})5d\ [\frac{1}{2}]^o_1$	557 437.49	659 015.62	200				9
968.986	1	0	554 401.01	657 602.91	10				9
978.985	$4s4p^64d\ ^1D_2$	$4s^24p^5(^2P^o_{3/2})5d\ [\frac{5}{2}]^o_3$	563 567.72	665 713.78	120				9
968.436	$4p^5(^2P^o_{3/2})5p\ [\frac{1}{2}]_0$	$4p^5(^2P^o_{3/2})5d\ [\frac{3}{2}]^o_1$	565 803.85	669 063.09	200				9
837.429	1	2	542 265.29	661 678.46	200				9
959.316	$4p^5(^2P^o_{3/2})5p\ [\frac{3}{2}]_2$	$4p^5(^2P^o_{3/2})5d\ [\frac{3}{2}]^o_2$	557 437.49	661 678.46	300				9
932.162	1	2	554 401.01	661 678.46	160				9
872.130	1	1	554 401.01	669 063.09	200				9
954.576	$4p^5(^2P^o_{1/2})5p\ [\frac{1}{2}]_0$	$4p^5(^2P^o_{1/2})5d\ [\frac{3}{2}]^o_1$	585 026.11	689 784.69	300				9
922.955	1	2	577 765.90	686 113.49	300				9
892.709	1	1	577 765.90	689 784.69	150				9
952.684	$4p^5(^2P^o_{1/2})5d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{1/2})5f\ [\frac{5}{2}]_2$	689 784.69	794 751.2	30				9
893.798	2	3	686 113.49	797 995.4	150				9
933.176	$4p^5(^2P^o_{1/2})5p\ [\frac{3}{2}]_2$	$4p^5(^2P^o_{1/2})5d\ [\frac{5}{2}]^o_2$	577 644.10	684 805.34	200				9
917.506	2	3	577 644.10	686 635.0	400				9
876.064	1	2	570 658.75	684 805.34	300				9
929.485	$4p^5(^2P^o_{3/2})5d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{3/2})5f\ [\frac{5}{2}]_2$	669 063.09	776 649.6	60				9
876.405	2	3	661 678.46	775 781.0					9
923.560	$4p^5(^2P^o_{3/2})5p\ [\frac{3}{2}]_2$	$4p^5(^2P^o_{3/2})5d\ [\frac{5}{2}]^o_3$	557 437.49	665 713.78	400				9
909.405	1	2	554 401.01	664 362.66	400				9
921.920	$4p^5(^2P^o_{1/2})5p\ [\frac{3}{2}]_2$	$4p^5(^2P^o_{1/2})5d\ [\frac{3}{2}]^o_2$	577 644.10	686 113.49	120				9
839.451	1	1	570 658.75	689 784.69	150				9
916.099	$4p^5(^2P^o_{3/2})5p\ [\frac{5}{2}]_3$	$4p^5(^2P^o_{3/2})5d\ [\frac{7}{2}]^o_4$	552 329.97	661 488.47	400				9
914.461	3	3	552 329.97	661 683.19	400				9
880.244	2	3	548 077.57	661 683.19	400				9
914.507	$4p^5(^2P^o_{3/2})5p\ [\frac{5}{2}]_3$	$4p^5(^2P^o_{3/2})5d\ [\frac{3}{2}]^o_2$	552 329.97	661 678.46					9
880.275	2	2	548 077.57	661 678.46					9
826.546	2	1	548 077.57	669 063.09	80				9
908.536	$4p^5(^2P^o_{3/2})5d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})5f\ [\frac{5}{2}]_3$	665 713.78	775 781.0	40				9
901.404	$4p^5(^2P^o_{3/2})5p\ [\frac{5}{2}]_2$	$4p^5(^2P^o_{3/2})5d\ [\frac{1}{2}]^o_1$	548 077.57	659 015.62	100				9
899.560	$4p^5(^2P^o_{1/2})5d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{1/2})5f\ [\frac{7}{2}]_3$	686 635.0	797 800.5	80				9
884.994	2	3	684 805.34	797 800.5	150				9
880.555	3	4	686 635.0	800 199.7	150				9
898.030	$4p^5(^2P^o_{3/2})5d\ [\frac{3}{2}]^o_2$	$4p^5(^2P^o_{3/2})5f\ [\frac{3}{2}]_2$	661 678.46	773 033.3	80				9
892.597	$4p^5(^2P^o_{3/2})5p\ [\frac{5}{2}]_3$	$4p^5(^2P^o_{3/2})5d\ [\frac{5}{2}]^o_2$	552 329.97	664 362.66	80				9
881.960	3	3	552 329.97	665 713.78	200				9
859.956	2	2	548 077.57	664 362.66	200				9
887.930	$4p^5(^2P^o_{3/2})5d\ [\frac{7}{2}]^o_4$	$4p^5(^2P^o_{3/2})5f\ [\frac{9}{2}]_5$	661 488.47	774 110.0	200				9
879.332	3	4	661 683.19	775 406.0	200				9
877.817	4	4	661 488.47	775 406.0	90				9
887.370	$4p^5(^2P^o_{3/2})5d\ [\frac{1}{2}]^o_1$	$4p^5(^2P^o_{3/2})5f\ [\frac{3}{2}]_1$	659 015.62	771 708.2	80				9
877.057	1	2	659 015.62	773 033.3	100				9
876.378	0	1	657 602.91	771 708.2					9
886.537	$4p^5(^2P^o_{3/2})5d\ [\frac{5}{2}]^o_2$	$4p^5(^2P^o_{3/2})5f\ [\frac{7}{2}]_3$	664 362.66	777 161.1	125				9
879.819	3	4	665 713.78	779 373.6	150				9
885.438	$4s4p^64d\ ^3D_1$	$4s^24p^5(^2P^o_{3/2})5d\ [\frac{1}{2}]^o_0$	544 663.1	657 602.91	70				9
874.485	1	1	544 663.1	659 015.62	70				9
883.472	$4p^5(^2P^o_{1/2})5d\ [\frac{5}{2}]^o_2$	$4p^5(^2P^o_{1/2})5f\ [\frac{5}{2}]_3$	684 805.34	797 995.4	70				9
882.083	$4s4p^64d\ ^3D_3$	$4s^24p^5(^2P^o_{3/2})5d\ [\frac{7}{2}]^o_4$	548 120.43	661 488.47					9
867.030	$4p^5(^2P^o_{3/2})5p\ [\frac{1}{2}]_1$	$4p^5(^2P^o_{3/2})5d\ [\frac{1}{2}]^o_0$	542 265.29	657 602.91	150				9
856.531	1	1	542 265.29	659 015.62	200				9

Mo VII – Continued

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
865.967	$4p^5(^2P^o_{3/2})5d\ [\frac{7}{2}]^o_3$	$4p^5(^2P^o_{3/2})5f\ [\frac{7}{2}]_3$	661 683.19	777 161.1	80				9
849.687	3	4	661 683.19	779 373.6	70				9
848.282	4	4	661 488.47	779 373.6	50				9
863.763	$4s4p^64d\ ^3D_2$	$4s^24p^5(^2P^o_{3/2})5d\ [\frac{3}{2}]^o_2$	545 906.83	661 678.46	40				9
860.274	$4s4p^64d\ ^3D_3$	$4s^24p^5(^2P^o_{3/2})5d\ [\frac{5}{2}]^o_2$	548 120.43	664 362.66	30				9
850.388	3	3	548 120.43	665 713.78	100				9
844.198	2	2	545 906.83	664 362.66	40				9
824.826	$4s4p^64d\ ^1D_2$	$4s^24p^5(^2P^o_{1/2})5d\ [\frac{5}{2}]^o_2$	563 567.72	684 805.34	20				9
812.564	2	3	563 567.72	686 635.0	70				9
819.019	$4p^5(^2P^o_{3/2})5p\ [\frac{1}{2}]_1$	$4p^5(^2P^o_{3/2})5d\ [\frac{5}{2}]^o_2$	542 265.29	664 362.66	70				9
806.573	$4p^5(^2P^o_{3/2})5p\ [\frac{1}{2}]_0$	$4p^5(^2P^o_{1/2})5d\ [\frac{3}{2}]^o_1$	565 803.85	689 784.69	70				9
695.170	1	2	542 265.29	686 113.49	30				9
795.621	$4p^5(^2P^o_{3/2})5d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{1/2})5f\ [\frac{5}{2}]_2$	669 063.09	794 751.2	30				9
792.282	$4s4p^64d\ ^1D_2$	$4s^24p^5(^2P^o_{1/2})5d\ [\frac{3}{2}]^o_1$	563 567.72	689 784.69	40				9
778.946	$4s^24p^5(^2P^o_{1/2})4d\ [\frac{3}{2}]^o_1$	$4s4p^64d\ ^3D_2$	417 528.6	545 906.83	80				9
507.023	2	1	347 433.4	544 663.1	5				9
503.845	2	2	347 433.4	545 906.83	100				9
498.286	2	3	347 433.4	548 120.43	120				9
777.147	$4p^5(^2P^o_{3/2})5p\ [\frac{3}{2}]_2$	$4p^5(^2P^o_{1/2})5d\ [\frac{3}{2}]^o_2$	557 437.49	686 113.49	60				9
755.586	2	1	557 437.49	689 784.69	20				9
766.847	$4p^5(^2P^o_{3/2})5p\ [\frac{3}{2}]_1$	$4p^5(^2P^o_{1/2})5d\ [\frac{5}{2}]^o_2$	554 401.01	684 805.34	20				9
765.995	$4p^5(^2P^o_{1/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{3/2})5p\ [\frac{5}{2}]_2$	417 528.6	548 077.57	40				9
498.398	2	2	347 433.4	548 077.57	40				9
488.050	2	3	347 433.4	552 329.97	80				9
744.575	$4p^5(^2P^o_{3/2})5p\ [\frac{5}{2}]_3$	$4p^5(^2P^o_{1/2})5d\ [\frac{5}{2}]^o_3$	552 329.97	686 635.0	10				9
730.614	$4p^5(^2P^o_{1/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{3/2})5p\ [\frac{3}{2}]_1$	417 528.6	554 401.01	150				9
714.754	1	2	417 528.6	557 437.49	5				9
483.166	2	1	347 433.4	554 401.01	50				9
476.181	2	2	347 433.4	557 437.49	200				9
724.677	$4s4p^64d\ ^3D_3$	$4s^24p^5(^2P^o_{1/2})5d\ [\frac{3}{2}]^o_2$	548 120.43	686 113.49	40				9
695.027	2	1	545 906.83	689 784.69	2				9
693.169	$4p^5(^2P^o_{3/2})5p\ [\frac{1}{2}]_0$	$4p^5(^2P^o_{3/2})6s\ [\frac{3}{2}]^o_1$	565 803.85	710 068.9	70				9°,112
600.320	1	2	542 265.29	708 843.6	90				9°,112
595.932	1	1	542 265.29	710 068.9	10				9°,112
684.748	$4s^24p^5(^2P^o_{1/2})4d\ [\frac{3}{2}]^o_1$	$4s4p^64d\ ^1D_2$	417 528.6	563 567.72					9
462.675	2	2	347 433.4	563 567.72	80				9
682.586	$4s4p^64d\ ^1D_2$	$4s^24p^5(^2P^o_{3/2})6s\ [\frac{3}{2}]^o_1$	563 567.72	710 068.9	3				9
677.709	$4p^5(^2P^o_{1/2})5p\ [\frac{1}{2}]_0$	$4p^5(^2P^o_{1/2})6s\ [\frac{1}{2}]^o_1$	585 026.11	732 582.5	40				9°,112
648.934	1	0	577 765.90	731 864.9	60				9°,112
645.925	1	1	577 765.90	732 582.5					9
674.944	$4p^4(^3P)4d^2(^3F)\ ^5D_4$	$4p^5(^2P^o_{3/2})5g\ [\frac{9}{2}]^o_5$	648 282.6	796 442.6	50				9
674.419	$4p^5(^2P^o_{1/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{3/2})5p\ [\frac{1}{2}]_0$	417 528.6	565 803.85	90				9
513.260	2	1	347 433.4	542 265.29	8				9
666.191	$4p^5(^2P^o_{1/2})4f\ [\frac{5}{2}]_2$	$4p^5(^2P^o_{3/2})5g\ [\frac{7}{2}]^o_3$	645 811.86	795 918.6	3				9
660.477	$4p^5(^2P^o_{3/2})5p\ [\frac{3}{2}]_2$	$4p^5(^2P^o_{3/2})6s\ [\frac{3}{2}]^o_2$	557 437.49	708 843.6	90				9°,112
655.174	2	1	557 437.49	710 068.9	70				9°,112
647.484	1	2	554 401.01	708 843.6	5				9°,112
642.394	1	1	554 401.01	710 068.9	80				9°,112
653.037	$4p^5(^2P^o_{1/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{1/2})5p\ [\frac{3}{2}]_1$	417 528.6	570 658.75	80				9
447.983	2	1	347 433.4	570 658.75	10				9

Mo VII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
645.417	$4p^5(^2P^o_{1/2})5p\ [\frac{3}{2}]_2$	$4p^5(^2P^o_{1/2})6s\ [\frac{1}{2}]^o_1$	577 644.10	732 582.5	80				9°, 112
620.324	1	0	570 658.75	731 864.9	50				9°, 112
617.573	1	1	570 658.75	732 582.5	70				9°, 112
638.922	$4p^5(^2P^o_{3/2})5p\ [\frac{5}{2}]_3$	$4p^5(^2P^o_{3/2})6s\ [\frac{3}{2}]^o_2$	552 329.97	708 843.6	90				9°, 112
622.020	2	2	548 077.57	708 843.6	80				9°, 112
617.315	2	1	548 077.57	710 068.9	90				9°, 112
624.069	$4p^5(^2P^o_{1/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{1/2})5p\ [\frac{1}{2}]_1$	417 528.6	577 765.90	80				9
597.024	1	0	417 528.6	585 026.11	200				9
434.156	2	1	347 433.4	577 765.90	500				9
622.187	$4s4p^64d\ ^3D_3$	$4s^24p^5(^2P^o_{3/2})6s\ [\frac{3}{2}]^o_2$	548 120.43	708 843.6	30				9
615.002	$4p^5(^2P^o_{1/2})4f\ [\frac{7}{2}]_3$	$4p^5(^2P^o_{3/2})5g\ [\frac{9}{2}]^o_4$	633 788.9	796 389.5	10				9
599.60	$4p^5(^2P^o_{3/2})5p\ [\frac{1}{2}]_0$	$4p^5(^2P^o_{1/2})6s\ [\frac{1}{2}]^o_1$	565 803.85	732 582.5	bl				112
525.435	1	1	542 265.29	732 582.5	2				112
590.650	$4p^5(^2P^o_{3/2})4f\ [\frac{5}{2}]_2$	$4p^5(^2P^o_{3/2})5g\ [\frac{5}{2}]^o_3$	624 603.86	793 909.1	50				9
559.569	3	3	615 203.92	793 909.1	10				9
587.147	$4p^4(^3P)4d^2(^3F)\ ^5D_4$	$4p^5(^2P^o_{1/2})5g\ [\frac{9}{2}]^o_5$	648 282.6	818 597.8	40				9
583.723	$4p^5(^2P^o_{3/2})4f\ [\frac{5}{2}]_2$	$4p^5(^2P^o_{3/2})5g\ [\frac{7}{2}]^o_3$	624 603.86	795 918.6	60				9
554.135	3	4	615 203.92	795 665.2					9
578.800	$4p^5(^2P^o_{1/2})4f\ [\frac{5}{2}]_2$	$4p^5(^2P^o_{1/2})5g\ [\frac{7}{2}]^o_3$	645 811.86	818 583.4	60				9
548.343	3	4	635 910.5	818 278.1	90				9
547.426	3	3	635 910.5	818 583.4	5				9
561.221	$4p^5(^2P^o_{3/2})5p\ [\frac{3}{2}]_1$	$4p^5(^2P^o_{1/2})6s\ [\frac{1}{2}]^o_1$	554 401.01	732 582.5	5				112
560.157	$4p^5(^2P^o_{3/2})4f\ [\frac{7}{2}]_4$	$4p^5(^2P^o_{3/2})5g\ [\frac{11}{2}]^o_5$	616 148.25	794 669.8	9				9
557.052	$4p^5(^2P^o_{3/2})4f\ [\frac{7}{2}]_4$	$4p^5(^2P^o_{3/2})5g\ [\frac{7}{2}]^o_4$	616 148.25	795 665.2	50				9
555.742	3	4	615 725.35	795 665.2	90				9
555.224	$4p^5(^2P^o_{3/2})4f\ [\frac{3}{2}]_2$	$4p^5(^2P^o_{3/2})5g\ [\frac{5}{2}]^o_2$	613 593.09	793 700.5					9
554.582	2	3	613 593.09	793 909.1					9
549.553	1	2	611 727.25	793 700.5	50				9
554.650	$4p^5(^2P^o_{3/2})4f\ [\frac{7}{2}]_4$	$4p^5(^2P^o_{3/2})5g\ [\frac{9}{2}]^o_5$	616 148.25	796 442.6	120				9
553.514	3	4	615 725.35	796 389.5	90				9
551.922	$4p^5(^2P^o_{3/2})4f\ [\frac{5}{2}]_3$	$4p^5(^2P^o_{3/2})5g\ [\frac{9}{2}]^o_4$	615 203.92	796 389.5	70				9
548.470	$4p^5(^2P^o_{3/2})4f\ [\frac{3}{2}]_2$	$4p^5(^2P^o_{3/2})5g\ [\frac{7}{2}]^o_3$	613 593.09	795 918.6					9
545.448	$4p^5(^2P^o_{1/2})4f\ [\frac{7}{2}]_4$	$4p^5(^2P^o_{1/2})5g\ [\frac{9}{2}]^o_5$	635 262.4	818 597.8	70				9
541.374	3	4	633 788.9	818 504.1	90				9
544.183	$4p^5(^2P^o_{3/2})4f\ [\frac{9}{2}]_4$	$4p^5(^2P^o_{3/2})5g\ [\frac{11}{2}]^o_5$	610 908.23	794 669.8	80				9
543.522	5	6	610 564.98	794 550.2	90				9
537.990	$4p^5(^2P^o_{3/2})4f\ [\frac{9}{2}]_5$	$4p^5(^2P^o_{3/2})5g\ [\frac{9}{2}]^o_5$	610 564.98	796 442.6	50				9
515.518	$4p^5(^2P^o_{3/2})4f\ [\frac{5}{2}]_2$	$4p^5(^2P^o_{1/2})5g\ [\frac{7}{2}]^o_3$	624 603.86	818 583.4					9
513.395	$4s^24p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_3$	$4s4p^64d\ ^3D_2$	351 126.6	545 906.83	50				9
507.630	3	3	351 126.6	548 120.43	20				9
492.225	2	1	341 503.8	544 663.1	100				9
489.231	2	2	341 503.8	545 906.83	150				9
507.740	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})5p\ [\frac{5}{2}]_2$	351 126.6	548 077.57	80				9
497.009	3	3	351 126.6	552 329.97	80				9
484.090	2	2	341 503.8	548 077.57	200				9
498.623	$4p^5(^2P^o_{3/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{3/2})5p\ [\frac{1}{2}]_1$	341 713.0	542 265.29	10				9
446.248	1	0	341 713.0	565 803.85	300				9
434.377	2	1	312 048.4	542 265.29	400				9
498.099	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_2$	$4p^5(^2P^o_{3/2})5p\ [\frac{1}{2}]_1$	341 503.8	542 265.29	2				9

Mo VII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
492.731	$4s^24p^5(^2P^o_{3/2})4d\ [\frac{3}{2}]^o_1$	$4s4p^64d\ ^3D_1$	341 713.0	544 663.1	100				9
489.731	1	2	341 713.0	545 906.83	100				9
427.611	2	2	312 048.4	545 906.83	200				9
423.601	2	3	312 048.4	548 120.43	400				9
484.581	$4p^5(^2P^o_{3/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{3/2})5p\ [\frac{5}{2}]_2$	341 713.0	548 077.57	90				9
423.677	2	2	312 048.4	548 077.57	150				9
416.179	2	3	312 048.4	552 329.97	150				9
482.917	$4p^5(^2P^o_{1/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{3/2})4f\ [\frac{5}{2}]_2$	417 528.6	624 603.86	80				9
373.455	2	3	347 433.4	615 203.92	60				9
470.719	$4s^24p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_3$	$4s4p^64d\ ^1D_2$	351 126.6	563 567.72	250				9
450.321	2	2	341 503.8	563 567.72	150				9
470.173	$4p^5(^2P^o_{3/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{3/2})5p\ [\frac{3}{2}]_1$	341 713.0	554 401.01	250				9
463.553	1	2	341 713.0	557 437.49	50				9
412.623	2	1	312 048.4	554 401.01	300				9
407.515	2	2	312 048.4	557 437.49	400				9
469.711	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_2$	$4p^5(^2P^o_{3/2})5p\ [\frac{3}{2}]_1$	341 503.8	554 401.01	90				9
463.105	2	2	341 503.8	557 437.49	70				9
466.290	$4p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})5p\ [\frac{5}{2}]_2$	333 618.9	548 077.57	150				9
457.223	3	3	333 618.9	552 329.97	300				9
444.087	2	2	322 896.0	548 077.57	400				9
435.856	2	3	322 896.0	552 329.97	100				9
466.198	$4s^24p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_3$	$4s4p^64d\ ^3D_3$	333 618.9	548 120.43	125				9
450.922	2	1	322 896.0	544 663.1	300				9
448.411	2	2	322 896.0	545 906.83	60				9
455.852	$4p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_2$	$4p^5(^2P^o_{3/2})5p\ [\frac{1}{2}]_1$	322 896.0	542 265.29	100				9
450.742	$4s^24p^5(^2P^o_{3/2})4d\ [\frac{3}{2}]^o_1$	$4s4p^64d\ ^1D_2$	341 713.0	563 567.72	40				9
446.790	$4p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})5p\ [\frac{3}{2}]_2$	333 618.9	557 437.49	300				9
431.956	2	1	322 896.0	554 401.01	300				9
441.466	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{1/2})5p\ [\frac{3}{2}]_2$	351 126.6	577 644.10	400				9
436.388	2	1	341 503.8	570 658.75	400				9
423.478	2	2	341 503.8	577 644.10	200				9
438.976	$4s^24p^5(^2P^o_{3/2})4d\ [\frac{7}{2}]^o_3$	$4s4p^64d\ ^3D_2$	318 103.9	545 906.83	500				9
434.754	3	3	318 103.9	548 120.43	200				9
429.873	4	3	315 491.8	548 120.43	400				9
438.052	$4p^5(^2P^o_{1/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{1/2})4f\ [\frac{5}{2}]_2$	417 528.6	645 811.86	200				9
346.647	2	3	347 433.4	635 910.5	400				9
335.142	2	2	347 433.4	645 811.86	70				9
436.786	$4p^5(^2P^o_{3/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{1/2})5p\ [\frac{3}{2}]_1$	341 713.0	570 658.75	100				9
423.856	1	2	341 713.0	577 644.10	20				9
386.683	2	1	312 048.4	570 658.75	40				9
376.513	2	2	312 048.4	577 644.10	200				9
434.881	$4s^24p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_3$	$4s4p^64d\ ^1D_2$	333 618.9	563 567.72	300				9
415.504	2	2	322 896.0	563 567.72	250				9
434.835	$4p^5(^2P^o_{3/2})4d\ [\frac{7}{2}]^o_3$	$4p^5(^2P^o_{3/2})5p\ [\frac{5}{2}]_2$	318 103.9	548 077.57	200				9
426.939	3	3	318 103.9	552 329.97	300				9
422.232	4	3	315 491.8	552 329.97	900				9
423.634	$4p^5(^2P^o_{3/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{1/2})5p\ [\frac{1}{2}]_1$	341 713.0	577 765.90	150				9
410.994	1	0	341 713.0	585 026.11	200				9
376.341	2	1	312 048.4	577 765.90	200				9
423.259	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_2$	$4p^5(^2P^o_{1/2})5p\ [\frac{1}{2}]_1$	341 503.8	577 765.90	80				9
422.465	$4p^5(^2P^o_{3/2})4d\ [\frac{1}{2}]^o_1$	$4p^5(^2P^o_{3/2})5p\ [\frac{1}{2}]_1$	305 558.9	542 265.29	500				9
416.805	0	1	302 343.7	542 265.29	400				9
384.255	1	0	305 558.9	565 803.85	200				9

Mo VII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
418.227	$4s^2 4p^5(^2P^o_{3/2})4d\ [\frac{1}{2}]^o_1$	$4s4p^6 4d\ ^3D_1$	305 558.9	544 663.1	150				9
416.064	1	2	305 558.9	545 906.83	300				9
412.679	0	1	302 343.7	544 663.1	150				9
417.828	$4p^5(^2P^o_{3/2})4d\ [\frac{7}{2}]^o_3$	$4p^5(^2P^o_{3/2})5p\ [\frac{3}{2}]_2$	318 103.9	557 437.49	200				9
412.340	$4p^5(^2P^o_{3/2})4d\ [\frac{1}{2}]^o_1$	$4p^5(^2P^o_{3/2})5p\ [\frac{5}{2}]_2$	305 558.9	548 077.57	200				9
409.797	$4p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{1/2})5p\ [\frac{3}{2}]_2$	333 618.9	577 644.10	60				9
403.608	2	1	322 896.0	570 658.75	200				9
392.546	2	2	322 896.0	577 644.10	100				9
407.393	$4s^2 4p^5(^2P^o_{3/2})4d\ [\frac{7}{2}]^o_3$	$4s4p^6 4d\ ^1D_2$	318 103.9	563 567.72	200				9
403.963	$4s4p^6 4d\ ^3D_3$	$4s^2 4p^5(^2P^o_{3/2})5g\ [\frac{7}{2}]^o_4$	548 120.43	795 665.2	50				9
401.543	$4s4p^6 4d\ ^3D_1$	$4s^2 4p^5(^2P^o_{3/2})5g\ [\frac{5}{2}]^o_2$	544 663.1	793 700.5	30				9
397.016	$4p^5(^2P^o_{3/2})4d\ [\frac{1}{2}]^o_1$	$4p^5(^2P^o_{3/2})5p\ [\frac{3}{2}]_2$	305 558.9	557 437.49	400				9
396.734	0	1	302 343.7	554 401.01	150				9
392.359	$4p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_2$	$4p^5(^2P^o_{1/2})5p\ [\frac{1}{2}]_1$	322 896.0	577 765.90	60				9
387.585	$4s^2 4p^5(^2P^o_{3/2})4d\ [\frac{1}{2}]^o_1$	$4s4p^6 4d\ ^1D_2$	305 558.9	563 567.72	100				9
386.442	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_3$	$4p^4(^3P)4d^2(^3F)\ ^5D_2$	351 126.6	609 898.9	6				9
336.520	3	4	351 126.6	648 282.6	200				9
385.298	$4p^5(^2P^o_{3/2})4d\ [\frac{7}{2}]^o_3$	$4p^5(^2P^o_{1/2})5p\ [\frac{3}{2}]_2$	318 103.9	577 644.10	200				9
384.939	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})4f\ [\frac{9}{2}]_4$	351 126.6	610 908.23	100				9
384.219	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_3$	$4p^4(^3P)4d^2(^3F)\ ^5F_4$	351 126.6	611 395.8	90				9
381.005	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})4f\ [\frac{3}{2}]_2$	351 126.6	613 593.09	70				9
370.063	2	1	341 503.8	611 727.25	15				9
367.526	2	2	341 503.8	613 593.09	60				9
381.005	$4p^5(^2P^o_{1/2})4d\ [\frac{3}{2}]^o_2$	$4p^4(^3P)4d^2(^3F)\ ^5D_2$	347 433.4	609 898.9	70				9
378.679	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})4f\ [\frac{5}{2}]_3$	351 126.6	615 203.92	80				9
365.659	3	2	351 126.6	624 603.86	100				9
353.234	2	2	341 503.8	624 603.86	20				9
378.366	$4p^5(^2P^o_{1/2})4d\ [\frac{3}{2}]^o_2$	$4p^5(^2P^o_{3/2})4f\ [\frac{3}{2}]_1$	347 433.4	611 727.25	50				9
375.715	2	2	347 433.4	613 593.09	100				9
377.934	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})4f\ [\frac{7}{2}]_3$	351 126.6	615 725.35	20				9
377.330	3	4	351 126.6	616 148.25	80				9
364.666	2	3	341 503.8	615 725.35	90				9
377.217	$4p^5(^2P^o_{3/2})4d\ [\frac{1}{2}]^o_1$	$4p^5(^2P^o_{1/2})5p\ [\frac{3}{2}]_1$	305 558.9	570 658.75	100				9
372.702	0	1	302 343.7	570 658.75	70				9
370.351	$4p^5(^2P^o_{3/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{3/2})4f\ [\frac{3}{2}]_1$	341 713.0	611 727.25	90				9
333.687	2	1	312 048.4	611 727.25	80				9
331.623	2	2	312 048.4	613 593.09	300				9
367.366	$4p^5(^2P^o_{3/2})4d\ [\frac{1}{2}]^o_1$	$4p^5(^2P^o_{1/2})5p\ [\frac{1}{2}]_1$	305 558.9	577 765.90	90				9
363.077	0	1	302 343.7	577 765.90	100				9
357.824	1	0	305 558.9	585 026.11	100				9
366.734	$4s4p^6 4d\ ^3D_2$	$4s^2 4p^5(^2P^o_{1/2})5g\ [\frac{7}{2}]^o_3$	545 906.83	818 583.4	5				9
360.635	$4p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})4f\ [\frac{9}{2}]_4$	333 618.9	610 908.23	100				9
360.003	$4p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_3$	$4p^4(^3P)4d^2(^3F)\ ^5F_4$	333 618.9	611 395.8	100				9
357.175	$4p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})4f\ [\frac{3}{2}]_2$	333 618.9	613 593.09	100				9
346.222	2	1	322 896.0	611 727.25	150				9
343.998	2	2	322 896.0	613 593.09	100				9

Mo VII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
355.132	$4p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})4f\ [\frac{5}{2}]_3$	333 618.9	615 203.92	300				9
343.659	3	2	333 618.9	624 603.86	50				9
342.102	2	3	322 896.0	615 203.92	200				9
331.444	2	2	322 896.0	624 603.86	150				9
354.474	$4p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})4f\ [\frac{7}{2}]_3$	333 618.9	615 725.35	150				9
353.945	3	4	333 618.9	616 148.25	500				9
341.494	2	3	322 896.0	615 725.35	400				9
353.777	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{1/2})4f\ [\frac{7}{2}]_3$	351 126.6	633 788.9	100				9
351.944	3	4	351 126.6	635 262.4	400				9
342.131	2	3	341 503.8	633 788.9	400				9
353.494	$4p^5(^2P^o_{3/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{3/2})4f\ [\frac{5}{2}]_2$	341 713.0	624 603.86	300				9
329.861	2	3	312 048.4	615 203.92	500				9
319.938	2	2	312 048.4	624 603.86	90				9
351.143	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{1/2})4f\ [\frac{5}{2}]_3$	351 126.6	635 910.5	100				9
339.664	2	3	341 503.8	635 910.5	150				9
339.351	3	2	351 126.6	645 811.86	200				9
328.611	2	2	341 503.8	645 811.86	80				9
349.217	$4p^5(^2P^o_{1/2})4d\ [\frac{3}{2}]^o_2$	$4p^5(^2P^o_{1/2})4f\ [\frac{7}{2}]_3$	347 433.4	633 788.9	100				9
342.705	$4p^5(^2P^o_{3/2})4d\ [\frac{7}{2}]^o_3$	$4p^4(^3P)4d^2(^3F)\ ^5D_2$	318 103.9	609 898.9	30				9
300.488	4	4	315 491.8	648 282.6	200				9
341.524	$4p^5(^2P^o_{3/2})4d\ [\frac{7}{2}]^o_3$	$4p^5(^2P^o_{3/2})4f\ [\frac{9}{2}]_4$	318 103.9	610 908.23	400				9
338.899	4	5	315 491.8	610 564.98	500				9
338.504	4	4	315 491.8	610 908.23	200				9
340.955	$4p^5(^2P^o_{3/2})4d\ [\frac{7}{2}]^o_3$	$4p^4(^3P)4d^2(^3F)\ ^5F_4$	318 103.9	611 395.8	400				9
337.946	4	4	315 491.8	611 395.8	100				9
338.420	$4p^5(^2P^o_{3/2})4d\ [\frac{7}{2}]^o_3$	$4p^5(^2P^o_{3/2})4f\ [\frac{3}{2}]_2$	318 103.9	613 593.09	100				9
336.584	$4p^5(^2P^o_{3/2})4d\ [\frac{7}{2}]^o_3$	$4p^5(^2P^o_{3/2})4f\ [\frac{5}{2}]_3$	318 103.9	615 203.92	200				9
333.652	4	3	315 491.8	615 203.92	90				9
326.263	3	2	318 103.9	624 603.86	30				9
335.995	$4p^5(^2P^o_{3/2})4d\ [\frac{7}{2}]^o_3$	$4p^5(^2P^o_{3/2})4f\ [\frac{7}{2}]_3$	318 103.9	615 725.35	150				9
335.516	3	4	318 103.9	616 148.25	150				9
333.069	4	3	315 491.8	615 725.35	30				9
332.604	4	4	315 491.8	616 148.25	200				9
335.737	$4p^5(^2P^o_{3/2})4d\ [\frac{3}{2}]^o_2$	$4p^4(^3P)4d^2(^3F)\ ^5D_2$	312 048.4	609 898.9	100				9
331.511	$4p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{1/2})4f\ [\frac{7}{2}]_4$	333 618.9	635 262.4	300				9
321.661	2	3	322 896.0	633 788.9	80				9
329.294	$4p^5(^2P^o_{3/2})4d\ [\frac{3}{2}]^o_2$	$4p^5(^2P^o_{3/2})4f\ [\frac{7}{2}]_3$	312 048.4	615 725.35	400				9
328.838	$4p^5(^2P^o_{3/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{1/2})4f\ [\frac{5}{2}]_2$	341 713.0	645 811.86	150				9
308.770	2	3	312 048.4	635 910.5	150				9
328.577	$4p^5(^2P^o_{3/2})4d\ [\frac{1}{2}]^o_1$	$4p^4(^3P)4d^2(^3F)\ ^5D_2$	305 558.9	609 898.9	200				9
327.266	$4p^6\ ^1S_0$	$4p^5(^2P^o_{3/2})4d\ [\frac{1}{2}]^o_1$	0	305 558.9	500				9
326.616	$4p^5(^2P^o_{3/2})4d\ [\frac{1}{2}]^o_1$	$4p^5(^2P^o_{3/2})4f\ [\frac{3}{2}]_1$	305 558.9	611 727.25	250				9
324.638	1	2	305 558.9	613 593.09	400				9
323.221	0	1	302 343.7	611 727.25	300				9
319.473	$4p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_2$	$4p^5(^2P^o_{1/2})4f\ [\frac{5}{2}]_3$	322 896.0	635 910.5	90				9
317.798	$4p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_3$	$4p^4(^3P)4d^2(^3F)\ ^5D_4$	333 618.9	648 282.6	400				9
316.772	$4p^5(^2P^o_{3/2})4d\ [\frac{7}{2}]^o_3$	$4p^5(^2P^o_{1/2})4f\ [\frac{7}{2}]_3$	318 103.9	633 788.9	100				9
315.300	3	4	318 103.9	635 262.4	70				9
312.722	4	4	315 491.8	635 262.4	30				9

Mo VII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
314.656	$4p^5(^2P^o_{3/2})4d\ [\frac{7}{2}]^o_3$	$4p^5(^2P^o_{1/2})4f\ [\frac{5}{2}]_3$	318 103.9	635 910.5	30				9
312.090	4	3	315 491.8	635 910.5	70				9
305.149	3	2	318 103.9	645 811.86	60				9
313.432	$4p^5(^2P^o_{3/2})4d\ [\frac{1}{2}]^o_1$	$4p^5(^2P^o_{3/2})4f\ [\frac{5}{2}]_2$	305 558.9	624 603.86	120				9
310.807	$4p^5(^2P^o_{3/2})4d\ [\frac{3}{2}]^o_2$	$4p^5(^2P^o_{1/2})4f\ [\frac{7}{2}]_3$	312 048.4	633 788.9	20				9
292.644	$4p^6\ ^1S_0$	$4p^5(^2P^o_{3/2})4d\ [\frac{3}{2}]^o_1$	0	341 713.0	900				9
278.458	$4p^5(^2P^o_{1/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{3/2})5f\ [\frac{5}{2}]_2$	417 528.6	776 649.6	20				9
233.453	2	3	347 433.4	775 781.0	80				9
265.096	$4p^5(^2P^o_{1/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{1/2})5f\ [\frac{5}{2}]_2$	417 528.6	794 751.2	40				9
223.556	2	2	347 433.4	794 751.2	20				9
221.946	2	3	347 433.4	797 995.4	150				9
239.504	$4p^6\ ^1S_0$	$4p^5(^2P^o_{1/2})4d\ [\frac{3}{2}]^o_1$	0	417 528.6	1000				9
237.020	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})5f\ [\frac{3}{2}]_2$	351 126.6	773 033.3	30				9
235.694	$4p^5(^2P^o_{1/2})4d\ [\frac{3}{2}]^o_2$	$4p^5(^2P^o_{3/2})5f\ [\frac{3}{2}]_1$	347 433.4	771 708.2	80				9
234.962	2	2	347 433.4	773 033.3	150				9
235.694	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})5f\ [\frac{9}{2}]_4$	351 126.6	775 406.0	80				9
235.486	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})5f\ [\frac{5}{2}]_3$	351 126.6	775 781.0	150				9
235.007	3	2	351 126.6	776 649.6	10				9
230.268	2	3	341 503.8	775 781.0	25				9
229.808	2	2	341 503.8	776 649.6	150				9
234.722	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})5f\ [\frac{7}{2}]_3$	351 126.6	777 161.1	25				9
233.510^C	3	4	351 126.6	779 373.6					9
229.538	2	3	341 503.8	777 161.1	20				9
232.558	$4p^5(^2P^o_{3/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{3/2})5f\ [\frac{3}{2}]_1$	341 713.0	771 708.2	50				9
231.842	1	2	341 713.0	773 033.3	10				9
216.928	2	2	312 048.4	773 033.3	25				9
229.919	$4p^5(^2P^o_{3/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{3/2})5f\ [\frac{5}{2}]_2$	341 713.0	776 649.6	80				9
215.642	2	3	312 048.4	775 781.0	100				9
227.576	$4p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})5f\ [\frac{3}{2}]_2$	333 618.9	773 033.3	10				9
226.163	$4p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})5f\ [\frac{5}{2}]_3$	333 618.9	775 781.0	80				9
220.385	2	2	322 896.0	776 649.6	20				9
224.340	$4p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{3/2})5f\ [\frac{7}{2}]_4$	333 618.9	779 373.6	200				9
220.137	2	3	322 896.0	777 161.1	200				9
223.878	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_3$	$4p^5(^2P^o_{1/2})5f\ [\frac{7}{2}]_3$	351 126.6	797 800.5	20				9
222.685	3	4	351 126.6	800 199.7	150				9
219.157	2	3	341 503.8	797 800.5	100				9
222.043	$4p^5(^2P^o_{1/2})4d\ [\frac{3}{2}]^o_2$	$4p^5(^2P^o_{1/2})5f\ [\frac{7}{2}]_3$	347 433.4	797 800.5	50				9
220.734	$4p^5(^2P^o_{3/2})4d\ [\frac{3}{2}]^o_1$	$4p^5(^2P^o_{1/2})5f\ [\frac{5}{2}]_2$	341 713.0	794 751.2	60				9
220.632	$4p^5(^2P^o_{1/2})4d\ [\frac{5}{2}]^o_2$	$4p^5(^2P^o_{1/2})5f\ [\frac{5}{2}]_2$	341 503.8	794 751.2	20				9
219.062	2	3	341 503.8	797 995.4					9
218.675	$4p^5(^2P^o_{3/2})4d\ [\frac{7}{2}]^o_3$	$4p^5(^2P^o_{3/2})5f\ [\frac{9}{2}]_4$	318 103.9	775 406.0	150				9
218.048	4	5	315 491.8	774 110.0	200				9
217.432	4	4	315 491.8	775 406.0	25				9
217.838	$4p^5(^2P^o_{3/2})4d\ [\frac{7}{2}]^o_3$	$4p^5(^2P^o_{3/2})5f\ [\frac{7}{2}]_3$	318 103.9	777 161.1	30				9
214.524	$4p^5(^2P^o_{3/2})4d\ [\frac{1}{2}]^o_1$	$4p^5(^2P^o_{3/2})5f\ [\frac{3}{2}]_1$	305 558.9	771 708.2	30				9
213.916	1	2	305 558.9	773 033.3	25				9
213.056	0	1	302 343.7	771 708.2	30				9
210.571	$4p^5(^2P^o_{3/2})4d\ [\frac{5}{2}]^o_2$	$4p^5(^2P^o_{1/2})5f\ [\frac{7}{2}]_3$	322 896.0	797 800.5	25				9

Mo VII – Continued

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
207.776	$4p^6\ ^1S_0$	$4p^5(^2P^o_{3/2})5s\ [\frac{3}{2}]^o_1$	0	481 295.99	1000				9
207.435	$4p^5(^2P^o_{3/2})4d\ [\frac{7}{2}]^o_3$	$4p^5(^2P^o_{1/2})5f\ [\frac{7}{2}]_4$	318 103.9	800 199.7	10				9
204.418	$4p^5(^2P^o_{3/2})4d\ [\frac{1}{2}]^o_1$	$4p^5(^2P^o_{1/2})5f\ [\frac{5}{2}]_2$	305 558.9	794 751.2	40				9
198.834	$4p^6\ ^1S_0$	$4p^5(^2P^o_{1/2})5s\ [\frac{1}{2}]^o_1$	0	502 933.27	1000				9
151.747	$4p^6\ ^1S_0$	$4p^5(^2P^o_{3/2})5d\ [\frac{1}{2}]^o_1$	0	659 015.62	5				9
149.462	$4p^6\ ^1S_0$	$4p^5(^2P^o_{3/2})5d\ [\frac{3}{2}]^o_1$	0	669 063.09	90				9
144.973	$4p^6\ ^1S_0$	$4p^5(^2P^o_{1/2})5d\ [\frac{3}{2}]^o_1$	0	689 784.69	70				9
140.833	$4p^6\ ^1S_0$	$4p^5(^2P^o_{3/2})6s\ [\frac{3}{2}]^o_1$	0	710 068.9	80				9
136.507	$4p^6\ ^1S_0$	$4p^5(^2P^o_{1/2})6s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	732 563	20				6, 7°
128.141	$4s^24p^6\ ^1S_0$	$4s4p^65p\ ^3P^o_1$	0	780 390	1				7
126.631	$4s^24p^6\ ^1S_0$	$4s4p^65p\ ^1P^o_1$	0	789 696	5				7
125.704	$4p^6\ ^1S_0$	$4p^56d\ ^3D^o_1$	0	795 532	1				7
122.487	$4p^6\ ^1S_0$	$4p^5(^2P^o_{3/2})7s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	816 413	4				7
119.141	$4p^6\ ^1S_0$	$4p^5(^2P^o_{1/2})7s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	839 342	2				7
114.286	$4p^6\ ^1S_0$	$4p^5(^2P^o_{3/2})8s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	874 998	2				7
111.347	$4p^6\ ^1S_0$	$4p^5(^2P^o_{1/2})8s\ (\frac{1}{2},\frac{1}{2})^o_1$	0	898 093					7
109.790	$4p^6\ ^1S_0$	$4p^5(^2P^o_{3/2})9s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	910 830	1				7
107.005	$4p^6\ ^1S_0$	$4p^5(^2P^o_{3/2})10s\ (\frac{3}{2},\frac{1}{2})^o_1$	0	934 536	1				7

Mo VIII

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
474.941	$4s^24p^5\ ^2P^o_{1/2}$	$4s4p^6\ ^2S_{1/2}$	23 274	233 830	100				2°, 10△
427.660	3/2	1/2	0	233 830	160				2°, 10△, 31
325.176	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1D)4d\ ^2P_{1/2}$	23 274	330 800?	8				10, 11°
307.166	1/2	3/2	23 274	348 832	5				10, 11°
286.670	3/2	3/2	0	348 832	2				10, 11°
323.940	$4p^5\ ^2P^o_{3/2}$	$4p^4(^3P)4d\ ^4D_{5/2}$	0	308 699	30				11
322.645	3/2	3/2	0	309 938	10				11
318.822	$4p^5\ ^2P^o_{1/2}$	$4p^4(^3P)4d\ ^4P_{1/2}$	23 274	336 936	3				10, 11°
316.210	1/2	3/2	23 274	339 525	2				11
296.786	3/2	1/2	0	336 936	50				10, 11°
294.526	3/2	3/2	0	339 525	60				11
288.838	3/2	5/2	0	346 215	100				10, 11°
314.379	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1D)4d\ ^2D_{3/2}$	23 274	341 362	35				10, 11°
292.943	3/2	3/2	0	341 362	75				10, 11°
283.167	3/2	5/2	0	353 148	85				11
297.918	$4p^5\ ^2P^o_{3/2}$	$4p^4(^3P)4d\ ^4F_{3/2}$	0	335 663	75				10, 11°
295.910	3/2	5/2	0	337 941	150				10, 11°
279.477	$4p^5\ ^2P^o_{3/2}$	$4p^4(^3P)4d\ ^2F_{5/2}$	0	357 811	75				10, 11°
269.352	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1S)4d\ ^2D_{3/2}$	23 274	394 545	15				10, 11°
253.457	3/2	3/2	0	394 545	30				10, 11°
246.973	3/2	5/2	0	404 903	50				10, 11°
269.294	$4p^5\ ^2P^o_{3/2}$	$4p^4(^1D)4d\ ^2F_{5/2}$	0	371 341	50				10, 11°
257.597	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1D)4d\ ^2S_{1/2}$	23 274	411 512	30				10, 11°
243.006	3/2	1/2	0	411 512	200				10, 11°
251.085	$4p^5\ ^2P^o_{1/2}$	$4p^4(^3P)4d\ ^2P_{3/2}$	23 274	421 559	2				11
245.276	1/2	1/2	23 274	430 969	100				11
237.215	3/2	3/2	0	421 559	700				11
232.040	3/2	1/2	0	430 969	50				11
235.510	$4p^5\ ^2P^o_{1/2}$	$4p^4(^3P)4d\ ^2D_{3/2}$	23 274	447 876	500				11
234.314	3/2	5/2	0	426 778	900				10, 11°
223.280	3/2	3/2	0	447 876	15				11
198.367	$4p^5\ ^2P^o_{1/2}$	$4p^4(^3P_2)5s\ (2,\frac{1}{2})_{3/2}$	23 274	527 389	4				10, 11°
191.769	3/2	5/2	0	521 461	90				10, 11°
189.614	3/2	3/2	0	527 389	100				10, 11°
192.286	$4p^5\ ^2P^o_{1/2}$	$4p^4(^3P_1)5s\ (1,\frac{1}{2})_{3/2}$	23 274	543 336	5				10, 11°
190.241	1/2	1/2	23 274	548 923	25				10, 11°
184.047	3/2	3/2	0	543 336	75				10, 11°
182.175	3/2	1/2	0	548 923	20				10, 11°
186.377	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1D_2)5s\ (2,\frac{1}{2})_{3/2}$	23 274	559 813	75				10, 11°
178.951	3/2	5/2	0	558 812	100				10, 11°
178.634	3/2	3/2	0	559 813	3				11
185.621	$4p^5\ ^2P^o_{3/2}$	$4p^4(^3P_0)5s\ (0,\frac{1}{2})_{1/2}$	0	538 732	25				10, 11°
174.656	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1S_0)5s\ (0,\frac{1}{2})_{1/2}$	23 274	595 829	75				10, 11°
167.833	3/2	1/2	0	595 829	20				11
141.287	$4p^5\ ^2P^o_{1/2}$	$4p^4(^3P)5d\ ^2D_{3/2}$	23 274	731 073	1				12
136.782	3/2	3/2	0	731 073	4				12
136.357	3/2	5/2	0	733 372	6				12
138.520	$4p^5\ ^2P^o_{1/2}$	$4p^4(^3P)5d\ ^4P_{3/2}$	23 274	745 165	3				12
136.898	3/2	1/2	0	730 472	2				12
134.203	3/2	3/2	0	745 165	11				12
133.661	3/2	5/2	0	748 161	2				12
137.425	$4p^5\ ^2P^o_{1/2}$	$4p^4(^3P)5d\ ^2P_{3/2}$	23 274	750 937	6				12
133.168	3/2	3/2	0	750 937	1				12

Mo VIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
135.902	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1D)5d\ ^2S_{1/2}$	23 274	759 112	1				12
131.730	3/2	1/2	0	759 112	1				12
135.378	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1D)5d\ ^2P_{3/2}$	23 274	761 941	1				12
133.854	1/2	1/2	23 274	770 370	1				12
131.245	3/2	3/2	0	761 941	1				12
129.806	3/2	1/2	0	770 370	4				12
134.852	$4p^5\ ^2P^o_{3/2}$	$4p^4(^3P)5d\ ^4F_{3/2}$	0	741 552	1				12
134.362	3/2	5/2	0	744 258	1				12
134.428	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1D)5d\ ^2D_{3/2}$	23 274	767 167	9				12
131.059	3/2	5/2	0	763 015	1				12
133.417	$4p^5\ ^2P^o_{3/2}$	$4p^4(^3P)5d\ ^2F_{5/2}$	0	749 531	1				12
130.758	$4p^5\ ^2P^o_{3/2}$	$4p^4(^1D)5d\ ^2F_{5/2}$	0	764 770	1				12
130.111	$4p^5\ ^2P^o_{1/2}$	$4p^4(^3P_2)6s\ (2, \frac{1}{2})_{3/2}$	23 274	791 823	1				12
126.634	3/2	5/2	0	789 754	8				12
126.296	3/2	3/2	0	791 823	10				12
128.688	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1S)5d\ ^2D_{3/2}$	23 274	800 351	5				12
125.191	3/2	5/2	0	798 781	1				12
127.662	$4p^5\ ^2P^o_{1/2}$	$4p^4(^3P_0)6s\ (0, \frac{1}{2})_{1/2}$	23 274	806 614	1				12
123.973	3/2	1/2	0	806 614	3				12
127.058	$4p^5\ ^2P^o_{1/2}$	$4p^4(^3P_1)6s\ (1, \frac{1}{2})_{3/2}$	23 274	810 363	3				12
126.747	1/2	1/2	23 274	812 274	6				12
123.394	3/2	3/2	0	810 363	5				12
123.108	3/2	1/2	0	812 274	4				12
124.561	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1D_2)6s\ (2, \frac{1}{2})_{3/2}$	23 274	826 096	4				12, 13°
121.080	3/2	5/2	0	825 900	7				12, 13°
119.114	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1S_0)6s\ (0, \frac{1}{2})_{1/2}$	23 274	862 803	5				12
115.902	3/2	1/2	0	862 803	1				12
115.109	$4p^5\ ^2P^o_{1/2}$	$4p^4(^3P)6d\ ^2D_{3/2}$	23 274	891 999	1				12
112.254	3/2	5/2	0	890 834	5				12
112.110	3/2	3/2	0	891 999	2				12
113.205	$4p^5\ ^2P^o_{1/2}$	$4p^4(^3P)6d\ ^4P_{3/2}$	23 274	906 608	1				12
110.304	3/2	3/2	0	906 608	1				12
110.189	3/2	5/2	0	907 534	1				12
112.746	$4p^5\ ^2P^o_{1/2}$	$4p^4(^3P)6d\ ^2P_{3/2}$	23 274	910 220	1				12
109.864	3/2	3/2	0	910 220	1				12
111.461	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1D)6d\ ^2S_{1/2}$	23 274	920 428	1				12
108.648	3/2	1/2	0	920 428	1				12
111.383	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1D)6d\ ^2P_{3/2}$	23 274	921 068	3				12
111.012	1/2	1/2	23 274	924 105	1				12
108.571	3/2	3/2	0	921 068	1				12
108.210	3/2	1/2	0	924 105	3				12
110.573	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1D)6d\ ^2D_{3/2}$	23 274	927 660	1				12
108.255	3/2	5/2	0	923 747	1				12
107.797	3/2	3/2	0	927 660	1				12
109.904	$4p^5\ ^2P^o_{3/2}$	$4p^4(^3P)6d\ ^2F_{5/2}$	0	909 889	2				12
109.760	$4p^5\ ^2P^o_{1/2}$	$4p^4(^3P_1)7s\ (1, \frac{1}{2})_{1/2}$	23 274	934 364	3				12
107.203	3/2	3/2	0	932 812	4				12
107.024	3/2	1/2	0	934 364	3				12
109.095	$4p^5\ ^2P^o_{3/2}$	$4p^4(^3P_2)7s\ (2, \frac{1}{2})_{5/2}$	0	916 634	2				12
108.796	3/2	3/2	0	919 154	4				12
107.652	$4p^5\ ^2P^o_{3/2}$	$4p^4(^3P_0)7s\ (0, \frac{1}{2})_{1/2}$	0	928 921	1				12

Mo VIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
107.380	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1D_2)7s\ (2,\frac{1}{2})_{3/2}$	23 274	948 153	3				12
105.423	$_{3/2}$	$_{5/2}$	0	948 129	6				12
106.259	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1S)6d\ ^2D_{3/2}$	23 274	964 373	5				12
104.306	$4p^5\ ^2P^o_{1/2}$	$4p^4(^1S_0)7s\ (0,\frac{1}{2})_{1/2}$	23 274	982 044	1				12
101.823	$_{3/2}$	$_{1/2}$	0	982 044	1				12

Mo IX

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
577.272	$4s^24p^4\ ^1S_0$	$4s4p^5\ ^3P^o_1$	72 884.6	246 113.0	8				15
506.462	$4s^24p^4\ ^1D_2$	$4s4p^5\ ^3P^o_2$	35 674.5	233 122.9	30				15
475.197	2	1	35 674.5	246 113.0	1				15
470.484	$4s^24p^4\ ^3P_1$	$4s4p^5\ ^3P^o_2$	20 576.3	233 122.9	40				15
443.388	1	1	20 576.3	246 113.0	18				15
435.684	0	1	16 588.8	246 113.0	20				15
428.959	2	2	0.0	233 122.9	100				15°, 31
423.800	1	0	20 576.3	256 536.7	25				15
406.319	2	1	0.0	246 113.0	50				15
448.956	$4s^24p^4\ ^1S_0$	$4s4p^5\ ^1P^o_1$	72 884.6	295 624.1	3				15
384.691	$4s^24p^4\ ^1D_2$	$4s4p^5\ ^1P^o_1$	35 674.5	295 624.1	75				15
363.764	$4p^4\ ^1S_0$	$4p^3(^2D^o)4d\ ^3D^o_1$	72 884.6	347 777	2				16
338.264	$4s^24p^4\ ^3P_2$	$4s4p^5\ ^1P^o_1$	0.0	295 624.1	15				15
325.188	$4p^4\ ^1S_0$	$4p^3(^2P^o)4d\ ^3D^o_1$	72 884.6	380 383	7				16
320.416	$4p^4\ ^1D_2$	$4p^3(^2D^o)4d\ ^3D^o_1$	35 674.5	347 777	6				16
317.704	$4p^4\ ^1D_2$	$4p^3(^2D^o)4d\ ^3F^o_2$	35 674.5	350 444	6				16
314.446	2	3	35 674.5	353 696	2				16
306.182	$4p^4\ ^1D_2$	$4p^3(^2D^o)4d\ ^3G^o_3$	35 674.5	362 277	5				16
305.634	$4p^4\ ^3P_1$	$4p^3(^2D^o)4d\ ^3D^o_1$	20 576.3	347 777	3				16
301.939	0	1	16 588.8	347 777	2				16
287.537	2	1	0.0	347 777	9				16
303.148	$4p^4\ ^3P_1$	$4p^3(^2D^o)4d\ ^3F^o_2$	20 576.3	350 444	9				16
285.346	2	2	0.0	350 444	3				16
282.728	2	3	0.0	353 696	8				16
290.108	$4p^4\ ^1D_2$	$4p^3(^2P^o)4d\ ^3D^o_1$	35 674.5	380 383	10				16
280.133	2	2	35 674.5	392 634	2				16
272.543	2	3	35 674.5	402 590	12				16
289.140	$4p^4\ ^1D_2$	$4p^3(^2P^o)4d\ ^1D^o_2$	35 674.5	381 528	3				16
287.291	$4p^4\ ^1S_0$	$4p^3(^2D^o)4d\ ^1P^o_1$	72 884.6	420 947	9				16
283.169	$4p^4\ ^1D_2$	$4p^3(^2P^o)4d\ ^3P^o_1$	35 674.5	388 801	25				16
270.262	2	2	35 674.5	405 684	3				16
278.019	$4p^4\ ^1D_2$	$4p^3(^2P^o)4d\ ^3F^o_3$	35 674.5	395 360	14				16
276.978	2	2	35 674.5	396 711	22				16
277.914	$4p^4\ ^3P_1$	$4p^3(^2P^o)4d\ ^3D^o_1$	20 576.3	380 383	2				16
274.885	0	1	16 588.8	380 383	18				16
268.771	1	2	20 576.3	392 634	7				16
262.894	2	1	0.0	380 383	8				16
254.702	2	2	0.0	392 634	3				16
248.391	2	3	0.0	402 590	24				16
277.347	$4p^4\ ^1S_0$	$4p^3(^2D^o)4d\ ^3P^o_1$	72 884.6	433 445	9				16
276.032	$4p^4\ ^3P_2$	$4p^3(^2D^o)4d\ ^3G^o_3$	0.0	362 277	24				16
271.572	$4p^4\ ^3P_1$	$4p^3(^2P^o)4d\ ^3P^o_1$	20 576.3	388 801	6				16
259.667	1	2	20 576.3	405 684	6				16
257.202	2	1	0.0	388 801	8				16
246.499	2	2	0.0	405 684	12				16
265.860	$4p^4\ ^3P_1$	$4p^3(^2P^o)4d\ ^3F^o_2$	20 576.3	396 711	24				16
252.936	2	3	0.0	395 360	20				16
252.077	2	2	0.0	396 711	12				16
262.413	$4p^4\ ^1D_2$	$4p^3(^2D^o)4d\ ^3S^o_1$	35 674.5	416 746	24				16
262.103	$4p^4\ ^3P_2$	$4p^3(^2P^o)4d\ ^1D^o_2$	0.0	381 528	14				16
260.792	$4p^4\ ^1D_2$	$4p^3(^2D^o)4d\ ^3P^o_2$	35 674.5	419 123	14				16
251.405	2	1	35 674.5	433 445	16				16

Mo IX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
259.569	$4p^4\ ^1D_2$	$4p^3(^2D^\circ)4d\ ^1P^\circ_1$	35 674.5	420 947	25				16
257.503	$4p^4\ ^1D_2$	$4p^3(^2P^\circ)4d\ ^1F^\circ_3$	35 674.5	424 009	6				16
252.638	$4p^4\ ^1D_2$	$4p^3(^4S^\circ)4d\ ^3D^\circ_3$	35 674.5	431 498	2				16
246.718	2	2	35 674.5	441 012	25				16
242.817	2	1	35 674.5	447 509	11				16
252.418	$4p^4\ ^3P_1$	$4p^3(^2D^\circ)4d\ ^3S^\circ_1$	20 576.3	416 746	13				16
249.906	0	1	16 588.8	416 746	14				16
239.953	2	1	0.0	416 746	24				16
250.912	$4p^4\ ^3P_1$	$4p^3(^2D^\circ)4d\ ^3P^\circ_2$	20 576.3	419 123	20				16
242.211	1	1	20 576.3	433 445	20				16
239.886	0	1	16 588.8	433 445	18				16
238.591	2	2	0.0	419 123	25				16
230.708	2	1	0.0	433 445	12				16
249.769	$4p^4\ ^3P_1$	$4p^3(^2D^\circ)4d\ ^1P^\circ_1$	20 576.3	420 947	20				16
247.304	0	1	16 588.8	420 947	22				16
237.560	2	1	0.0	420 947	20				16
240.958	$4p^4\ ^1S_0$	$4p^3(^2P^\circ)4d\ ^1P^\circ_1$	72 884.6	487 905	25				16
237.843	$4p^4\ ^1D_2$	$4p^3(^2D^\circ)4d\ ^1D^\circ_2$	35 674.5	456 111	25				16
237.843	$4p^4\ ^3P_1$	$4p^3(^4S^\circ)4d\ ^3D^\circ_2$	20 576.3	441 012	25				16
234.228	1	1	20 576.3	447 509	20				16
232.056	0	1	16 588.8	447 509	25				16
231.751	2	3	0.0	431 498	24				16
226.747	2	2	0.0	441 012	25				16
223.458	2	1	0.0	447 509	10				16
235.850	$4p^4\ ^3P_2$	$4p^3(^2P^\circ)4d\ ^1F^\circ_3$	0.0	424 009	16				16
231.991	$4p^4\ ^1D_2$	$4p^3(^2D^\circ)4d\ ^1F^\circ_3$	35 674.5	466 718	25				16
229.607	$4p^4\ ^3P_1$	$4p^3(^2D^\circ)4d\ ^1D^\circ_2$	20 576.3	456 111	14				16
221.127	$4p^4\ ^1D_2$	$4p^3(^2P^\circ)4d\ ^1P^\circ_1$	35 674.5	487 905	2				16
214.266	$4p^4\ ^3P_2$	$4p^3(^2D^\circ)4d\ ^1F^\circ_3$	0.0	466 718	10				16
213.980	$4p^4\ ^3P_1$	$4p^3(^2P^\circ)4d\ ^1P^\circ_1$	20 576.3	487 905	9				16
212.168	0	1	16 588.8	487 905	6				16
178.010	$4p^4\ ^3P_1$	$4p^3(^4S^\circ_{3/2})5s\ (\frac{3}{2},\frac{1}{2})^\circ_1$	20 576.3	582 356	7				14°, 16
176.750	0	1	16 588.8	582 356	6				14°, 16
174.887	2	2	0.0	571 798	11				14°, 16
171.713	2	1	0.0	582 356	12				14°, 16
176.682	$4p^4\ ^1D_2$	$4p^3(^2D^\circ_{3/2})5s\ (\frac{3}{2},\frac{1}{2})^\circ_2$	35 674.5	601 678	4				14°, 16
176.432	2	1	35 674.5	602 468	4				14°, 16
174.346	$4p^4\ ^1D_2$	$4p^3(^2D^\circ_{5/2})5s\ (\frac{5}{2},\frac{1}{2})^\circ_3$	35 674.5	609 234	6				14°, 16
173.091	2	2	35 674.5	613 394	15				14°, 16
174.019	$4p^4\ ^1S_0$	$4p^3(^2P^\circ_{3/2})5s\ (\frac{3}{2},\frac{1}{2})^\circ_1$	72 884.6	647 535	7				14°, 16
172.083	$4p^4\ ^3P_1$	$4p^3(^2D^\circ_{3/2})5s\ (\frac{3}{2},\frac{1}{2})^\circ_2$	20 576.3	601 678	6				14°, 16
171.862	1	1	20 576.3	602 468	11				14°, 16
170.674	0	1	16 588.8	602 468	3				14°, 16
166.201	2	2	0.0	601 678	12				14°, 16
168.683	$4p^4\ ^3P_1$	$4p^3(^2D^\circ_{5/2})5s\ (\frac{5}{2},\frac{1}{2})^\circ_2$	20 576.3	613 394	6				14°, 16
164.144	2	3	0.0	609 234	20				14°, 16
163.033	2	2	0.0	613 394	5				14°, 16
168.144	$4p^4\ ^1D_2$	$4p^3(^2P^\circ_{1/2})5s\ (\frac{1}{2},\frac{1}{2})^\circ_1$	35 674.5	630 384	6				14°, 16
164.454	$4p^4\ ^3P_1$	$4p^3(^2P^\circ_{1/2})5s\ (\frac{1}{2},\frac{1}{2})^\circ_0$	20 576.3	628 649	6				14°, 16
163.986	1	1	20 576.3	630 384	4				14°, 16
162.918	0	1	16 588.8	630 384	7				14°, 16
158.641	2	1	0.0	630 384	3				14°, 16

Mo IX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
164.355	$4p^4\ ^1D_2$	$4p^3(^2P^o_{3/2})5s\ (\frac{3}{2},\frac{1}{2})^o_2$	35 674.5	644 114	7				14°, 16
163.436	2	1	35 674.5	647 535	7				14°, 16
160.375	$4p^4\ ^3P_1$	$4p^3(^2P^o_{3/2})5s\ (\frac{3}{2},\frac{1}{2})^o_2$	20 576.3	644 114	9				14°, 16
155.246	2	2	0.0	644 114	5				14°, 16
132.908	$4p^4\ ^1S_0$	$4p^3(^2P^o)5d\ ^3D^o_1$	72 884.6	825 266	1				17
132.077	$4p^4\ ^1S_0$	$4p^3(^2P^o)5d\ ^3P^o_1$	72 884.6	830 015					17
128.878	$4p^4\ ^1S_0$	$4p^3(^2D^o)5d\ ^3P^o_1$	72 884.6	848 809					17
128.740	$4p^4\ ^3P_1$	$4p^3(^2D^o)5d\ ^3D^o_1$	20 576.3	797 355	1				17
128.076	0	1	16 588.8	797 355	1				17
128.200	$4p^4\ ^3P_1$	$4p^3(^2D^o)5d\ ^3F^o_2$	20 576.3	800 579	1				17
124.914	2	2	0.0	800 579	2				17
127.086	$4p^4\ ^1D_2$	$4p^3(^2D^o)5d\ ^3G^o_3$	35 674.5	822 534	1				17
126.187	$4p^4\ ^1S_0$	$4p^3(^4S^o)5d\ ^3D^o_1$	72 884.6	865 366	2				17
126.100	$4p^4\ ^1D_2$	$4p^3(^2P^o)5d\ ^1D^o_2$	35 674.5	828 728	4				17
124.408	$4p^4\ ^1D_2$	$4p^3(^2P^o)5d\ ^3D^o_3$	35 674.5	839 507	5				17
124.369	$4p^4\ ^1D_2$	$4p^3(^2P^o)5d\ ^3P^o_2$	35 674.5	839 713	2				17
124.266	$4p^4\ ^3P_1$	$4p^3(^2P^o)5d\ ^3D^o_1$	20 576.3	825 266	2				17
123.660	0	1	16 588.8	825 266					17
121.180	2	1	0.0	825 266	1				17
119.114	2	3	0.0	839 507	10				17
124.221	$4p^4\ ^1D_2$	$4p^3(^2D^o)5d\ ^3P^o_2$	35 674.5	840 654					17
122.984	2	1	35 674.5	848 809	1				17
123.778	$4p^4\ ^1D_2$	$4p^3(^2D^o)5d\ ^1P^o_1$	35 674.5	843 565					17
123.738	$4p^4\ ^3P_1$	$4p^3(^2P^o)5d\ ^1D^o_2$	20 576.3	828 728	5				17
120.663	2	2	0.0	828 728					17
123.545	$4p^4\ ^3P_1$	$4p^3(^2P^o)5d\ ^3P^o_1$	20 576.3	830 015	8				17
122.084	1	2	20 576.3	839 713	3				17
120.478	2	1	0.0	830 015	3				17
119.087	2	2	0.0	839 713					17
123.485	$4p^4\ ^1D_2$	$4p^3(^2P^o)5d\ ^1F^o_3$	35 674.5	845 474	4				17
123.178	$4p^4\ ^1D_2$	$4p^3(^4S^o)5d\ ^3D^o_3$	35 674.5	847 507	6				17
120.528	2	1	35 674.5	865 366					17
122.897	$4p^4\ ^1S_0$	$4p^3(^2P^o)5d\ ^1P^o_1$	72 884.6	886 605	2				17
121.941	$4p^4\ ^3P_1$	$4p^3(^2D^o)5d\ ^3P^o_2$	20 576.3	840 654	6				17
120.156	0	1	16 588.8	848 809	4				17
118.959	2	2	0.0	840 654	5				17
117.814	2	1	0.0	848 809	5				17
121.577	$4p^4\ ^3P_2$	$4p^3(^2D^o)5d\ ^3G^o_3$	0.0	822 534	6				17
121.517	$4p^4\ ^3P_1$	$4p^3(^2D^o)5d\ ^1P^o_1$	20 576.3	843 565	1				17
118.537	2	1	0.0	843 565					17
119.913	$4p^4\ ^1D_2$	$4p^3(^2D^o)5d\ ^1D^o_2$	35 674.5	869 633	1				17
118.373	$4p^4\ ^3P_1$	$4p^3(^4S^o)5d\ ^3D^o_1$	20 576.3	865 366	4				17
117.814	0	1	16 588.8	865 366	5				17
118.279	$4p^4\ ^3P_2$	$4p^3(^2P^o)5d\ ^1F^o_3$	0.0	845 474	4				17
117.775	$4p^4\ ^3P_1$	$4p^3(^2D^o)5d\ ^1D^o_2$	20 576.3	869 633	1				17
116.248	$4p^4\ ^3P_1$	$4p^3(^4S^o_{3/2})6s\ (\frac{3}{2},\frac{1}{2})^o_1$	20 576.3	880 843					17
114.212	2	2	0.0	875 565	1				17
113.523	2	1	0.0	880 843	5				17

Mo IX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
116.088	$4p^4\ ^1S_0$	$4p^3(^2P^o_{1/2})6s\ (\frac{1}{2},\frac{1}{2})^o_1$	72 884.6	934 288	2				17
115.471	$4p^4\ ^3P_1$	$4p^3(^2P^o)5d\ ^1P^o_1$	20 576.3	886 605					17
114.935	0	1	16 588.8	886 605	4				17
114.920	$4p^4\ ^1D_2$	$4p^3(^2D^o_{3/2})6s\ (\frac{3}{2},\frac{1}{2})^o_2$	35 674.5	905 858	4				17
114.854	2	1	35 674.5	906 239					17
114.042	$4p^4\ ^1D_2$	$4p^3(^2D^o_{5/2})6s\ (\frac{5}{2},\frac{1}{2})^o_3$	35 674.5	912 477					17
113.663	2	2	35 674.5	915 504	10				17
113.932	$4p^4\ ^1S_0$	$4p^3(^2P^o_{3/2})6s\ (\frac{3}{2},\frac{1}{2})^o_1$	72 884.6	950 649	4				17
112.916	$4p^4\ ^3P_1$	$4p^3(^2D^o_{3/2})6s\ (\frac{3}{2},\frac{1}{2})^o_1$	20 576.3	906 239	12				17
112.411	0	1	16 588.8	906 239	1				17
110.391	2	2	0.0	905 858	8				17
111.739	$4p^4\ ^3P_1$	$4p^3(^2D^o_{5/2})6s\ (\frac{5}{2},\frac{1}{2})^o_2$	20 576.3	915 504	2				17
109.600	2	3	0.0	912 477	5				17
109.227	2	2	0.0	915 504	1				17
111.286	$4p^4\ ^1D_2$	$4p^3(^2P^o_{1/2})6s\ (\frac{1}{2},\frac{1}{2})^o_1$	35 674.5	934 288	4				17
109.650	$4p^4\ ^1D_2$	$4p^3(^2P^o_{3/2})6s\ (\frac{3}{2},\frac{1}{2})^o_2$	35 674.5	947 617	4				17
109.287	2	1	35 674.5	950 649	4				17
109.552	$4p^4\ ^3P_1$	$4p^3(^2P^o_{1/2})6s\ (\frac{1}{2},\frac{1}{2})^o_0$	20 576.3	933 385	1				17
109.444	1	1	20 576.3	934 288	4				17
108.966	0	1	16 588.8	934 288	1				17
107.876	$4p^4\ ^3P_1$	$4p^3(^2P^o_{3/2})6s\ (\frac{3}{2},\frac{1}{2})^o_2$	20 576.3	947 617	1				17
106.080	$4p^4\ ^1S_0$	$4p^3(^2P^o)6d\ ^3D^o_1$	72 884.6	1 015 585	5				17
104.752	$4p^4\ ^1D_2$	$4p^3(^2D^o)6d\ ^3F^o_2$	35 674.5	990 382	3				17
103.415	$4p^4\ ^3P_1$	$4p^3(^2D^o)6d\ ^3D^o_1$	20 576.3	987 579	2				17
102.985	0	1	16 588.8	987 579	2				17
103.110	$4p^4\ ^3P_1$	$4p^3(^2D^o)6d\ ^3F^o_2$	20 576.3	990 382	4				17
100.967	2	2	0.0	990 382	2				17
102.152	$4p^4\ ^1D_2$	$4p^3(^2D^o)6d\ ^3G^o_3$	35 674.5	1 014 603	3				17
102.056	$4p^4\ ^1D_2$	$4p^3(^2P^o)6d\ ^3D^o_1$	35 674.5	1 015 585					17
101.164	2	3	35 674.5	1 024 196	5				17
101.744	$4p^4\ ^1D_2$	$4p^3(^2P^o)6d\ ^3P^o_1$	35 674.5	1 018 148	1				17
101.069	2	2	35 674.5	1 025 122	4				17
101.675	$4p^4\ ^1S_0$	$4p^3(^4S^o)6d\ ^3D^o_1$	72 884.6	1 056 382	2				17
100.742	$4p^4\ ^1S_0$	$4p^3(^2P^o)6d\ ^1P^o_1$	72 884.6	1 065 491	4				17
100.437	$4p^4\ ^1D_2$	$4p^3(^2P^o)6d\ ^1F^o_3$	35 674.5	1 031 317	2				17
100.370	$4p^4\ ^3P_1$	$4p^3(^2P^o)6d\ ^1D^o_2$	20 576.3	1 016 860	1				17
98.345	2	2	0.0	1 016 860	1				17
100.246	$4p^4\ ^1D_2$	$4p^3(^2D^o)6d\ ^3P^o_2$	35 674.5	1 033 227	4				17
99.566	2	1	35 674.5	1 040 059	1				17
100.246	$4p^4\ ^3P_1$	$4p^3(^2P^o)6d\ ^3P^o_1$	20 576.3	1 018 148	4				17
99.852	0	1	16 588.8	1 018 148					17
99.545	1	2	20 576.3	1 025 122					17
98.217	2	1	0.0	1 018 148					17
100.099	$4p^4\ ^3P_0$	$4p^3(^2P^o)6d\ ^3D^o_1$	16 588.8	1 015 585	4				17
98.460	2	1	0.0	1 015 585	4				17
97.635	2	3	0.0	1 024 196	1				17
99.194	$4p^4\ ^3P_1$	$4p^3(^4S^o_{3/2})7s\ (\frac{3}{2},\frac{1}{2})^o_1$	20 576.3	1 028 743	4				17
98.795	0	1	16 588.8	1 028 743					17
97.494	2	2	0.0	1 025 704	1				17
97.206	2	1	0.0	1 028 743	1				17

Mo IX – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
98.977	$4p^4\ ^1S_0$	$4p^3(^2P^o_{1/2})7s\ (\frac{1}{2},\frac{1}{2})^o_1$	72 884.6	1 083 142	1				17
98.750	$4p^4\ ^3P_1$	$4p^3(^2D^o)6d\ ^3P^o_2$	20 576.3	1 033 227	2				17
98.087	1	1	20 576.3	1 040 059	1				17
97.710	0	1	16 588.8	1 040 059	4				17
96.145	2	1	0.0	1 040 059	4				17
98.561	$4p^4\ ^3P_2$	$4p^3(^2D^o)6d\ ^3G^o_3$	0.0	1 014 603	5				17
98.097	$4p^4\ ^1D_2$	$4p^3(^2D^o_{3/2})7s\ (\frac{3}{2},\frac{1}{2})^o_1$	35 674.5	1 055 089	1				17
98.077	2	2	35 674.5	1 055 312	1				17
97.885	$4p^4\ ^1D_2$	$4p^3(^2D^o)6d\ ^1D^o_2$	35 674.5	1 057 289	4				17
97.416	$4p^4\ ^1D_2$	$4p^3(^2D^o_{5/2})7s\ (\frac{5}{2},\frac{1}{2})^o_3$	35 674.5	1 062 162	1				17
97.206	2	2	35 674.5	1 064 357	1				17
97.416	$4p^4\ ^1S_0$	$4p^3(^2P^o_{3/2})7s\ (\frac{3}{2},\frac{1}{2})^o_1$	72 884.6	1 099 412	4				17
96.964	$4p^4\ ^3P_2$	$4p^3(^2P^o)6d\ ^1F^o_3$	0.0	1 031 317					17
96.660	$4p^4\ ^3P_1$	$4p^3(^2D^o_{3/2})7s\ (\frac{3}{2},\frac{1}{2})^o_1$	20 576.3	1 055 089	4				17
96.295	0	1	16 588.8	1 055 089					17
94.756	2	2	0.0	1 055 312	5				17
96.546	$4p^4\ ^3P_1$	$4p^3(^4S^o)6d\ ^3D^o_1$	20 576.3	1 056 382	2				17
96.458	$4p^4\ ^3P_1$	$4p^3(^2D^o)6d\ ^1D^o_2$	20 576.3	1 057 289	1				17
95.811	$4p^4\ ^3P_1$	$4p^3(^2D^o_{5/2})7s\ (\frac{5}{2},\frac{1}{2})^o_2$	20 576.3	1 064 357	5				17
94.151	2	3	0.0	1 062 162	4				17
95.703	$4p^4\ ^3P_1$	$4p^3(^2P^o)6d\ ^1P^o_1$	20 576.3	1 065 491	4				17
95.339	0	1	16 588.8	1 065 491	5				17
95.464	$4p^4\ ^1D_2$	$4p^3(^2P^o_{1/2})7s\ (\frac{1}{2},\frac{1}{2})^o_1$	35 674.5	1 083 142	1				17
94.216	$4p^4\ ^1D_2$	$4p^3(^2P^o_{3/2})7s\ (\frac{3}{2},\frac{1}{2})^o_2$	35 674.5	1 097 040	3				17
94.008	2	1	35 674.5	1 099 412	6				17
94.172	$4p^4\ ^3P_1$	$4p^3(^2P^o_{1/2})7s\ (\frac{1}{2},\frac{1}{2})^o_0$	20 576.3	1 082 463	1				17
94.120	1	1	20 576.3	1 083 142	5				17
93.763	0	1	16 588.8	1 083 142	2				17
92.899	$4p^4\ ^3P_1$	$4p^3(^2P^o_{3/2})7s\ (\frac{3}{2},\frac{1}{2})^o_2$	20 576.3	1 097 040	1				17

Mo x

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
473.955	$4s^24p^3\ ^2P^o_{3/2}$	$4s4p^4\ ^2D_{5/2}$	70 544	281 535	7000				19
444.565	$4s^24p^3\ ^4S^o_{3/2}$	$4s4p^4\ ^4P_{5/2}$	0	224 939	100000				19
416.856	3/2	3/2	0	239 891	70000				19
409.070	3/2	1/2	0	244 457	40000				19
406.480	$4s^24p^3\ ^2D^o_{5/2}$	$4s4p^4\ ^2D_{5/2}$	35 522	281 535	300000				19
400.502	3/2	3/2	26 886	276 573	250000				19
403.419	$4s^24p^3\ ^2P^o_{3/2}$	$4s4p^4\ ^2P_{3/2}$	70 544	318 423	5000				19
380.070	1/2	3/2	55 313	318 423	2000				19
368.869	3/2	1/2	70 544	341 642	70000				19
385.816	$4s^24p^3\ ^2P^o_{1/2}$	$4s4p^4\ ^2S_{1/2}$	55 313	314 504	50000				19
353.483	$4s^24p^3\ ^2D^o_{5/2}$	$4s4p^4\ ^2P_{3/2}$	35 522	318 423	600000				19
343.007	3/2	3/2	26 886	318 423	5000				19
317.709	3/2	1/2	26 886	341 642	10000				19
349.426	$4s^24p^3\ ^2P^o_{3/2}$	$4s^24p^2(^3P)4d\ ^4F_{3/2}$	70 544	356 732	7				20
344.569	3/2	5/2	70 544	360 764	5				20
331.683	1/2	3/2	55 313	356 732	1				20
347.683	$4s^24p^3\ ^2D^o_{3/2}$	$4s4p^4\ ^2S_{1/2}$	26 886	314 504	100000				19
331.072	$4s^24p^3\ ^2P^o_{3/2}$	$4s^24p^2(^3P)4d\ ^4D_{1/2}$	70 544	372 595	6				20
326.255	3/2	3/2	70 544	377 099	2				16
319.630	3/2	5/2	70 544	383 440	3				16
315.162	1/2	1/2	55 313	372 595	2				20
310.774	1/2	3/2	55 313	377 099	2				16
314.049	$4s^24p^3\ ^4S^o_{3/2}$	$4s4p^4\ ^2P_{3/2}$	0	318 423	1000				19
311.209	$4s^24p^3\ ^2D^o_{5/2}$	$4s^24p^2(^3P)4d\ ^4F_{3/2}$	35 522	356 732	5				20
307.467	5/2	5/2	35 522	360 764	6				20
303.066	3/2	3/2	26 886	356 732	16				20
300.746	5/2	7/2	35 522	368 028	9				20
299.505	3/2	5/2	26 886	360 764	10				20
299.122	$4s^24p^3\ ^2D^o_{5/2}$	$4s^24p^2(^3P)4d\ ^2F_{5/2}$	35 522	369 830	8				20
294.271	5/2	7/2	35 522	375 345	3				20
291.576	3/2	5/2	26 886	369 830	5				20
299.081	$4s^24p^3\ ^2P^o_{3/2}$	$4s^24p^2(^3P)4d\ ^2P_{3/2}$	70 544	404 950	2				16
286.748	3/2	1/2	70 544	419 322	4				20
274.743	1/2	1/2	55 313	419 322	1				16
292.748	$4s^24p^3\ ^2D^o_{5/2}$	$4s^24p^2(^3P)4d\ ^4D_{3/2}$	35 522	377 099	4				16
289.255	3/2	1/2	26 886	372 595	12				20
287.417	5/2	5/2	35 522	383 440	2				16
285.534	3/2	3/2	26 886	377 099	4				16
280.466	3/2	5/2	26 886	383 440	1				16
277.593	5/2	7/2	35 522	395 762	5				20
289.495	$4s^24p^3\ ^2P^o_{3/2}$	$4s^24p^2(^3P)4d\ ^4P_{5/2}$	70 544	416 017	15				20
285.933	3/2	3/2	70 544	420 260	2				16
280.253	3/2	1/2	70 544	427 397	6				16
268.771	1/2	1/2	55 313	427 397	7				16
280.269	$4s^24p^3\ ^4S^o_{3/2}$	$4s^24p^2(^3P)4d\ ^4F_{3/2}$	0	356 732	13				20
277.168	3/2	5/2	0	360 764	10				20
278.485	$4s^24p^3\ ^2P^o_{3/2}$	$4s^24p^2(^3P)4d\ ^2D_{3/2}$	70 544	429 661	7				20
270.954	3/2	5/2	70 544	439 671	10				16
267.085	1/2	3/2	55 313	429 661	5				20
270.707	$4s^24p^3\ ^2D^o_{5/2}$	$4s^24p^2(^3P)4d\ ^2P_{3/2}$	35 522	404 950	8				16
264.512	3/2	3/2	26 886	404 950	8				16
254.821	3/2	1/2	26 886	419 322	4				16
270.413	$4s^24p^3\ ^4S^o_{3/2}$	$4s^24p^2(^3P)4d\ ^2F_{5/2}$	0	369 830	6				20

Mo X – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
268.402	$4s^24p^3\ ^4S^o_{3/2}$	$4s^24p^2(^3P)4d\ ^4D_{1/2}$	0	372 595	5				20
265.157	3/2	3/2	0	377 099	3				16
260.777	3/2	5/2	0	383 440	12				16
267.896	$4s^24p^3\ ^2D^o_{5/2}$	$4s^24p^2(^1D)4d\ ^2G_{7/2}$	35 522	408 801	8				16
265.597	$4s^24p^3\ ^2P^o_{3/2}$	$4s^24p^2(^1D)4d\ ^2D_{3/2}$	70 544	446 930	9				20
264.403	3/2	5/2	70 544	448 779	8				16
255.355	1/2	3/2	55 313	446 930	10				16
261.557	$4s^24p^3\ ^2P^o_{3/2}$	$4s^24p^2(^1D)4d\ ^2P_{1/2}$	70 544	452 877	8				16
255.156	3/2	3/2	70 544	462 467	24				16
251.530	1/2	1/2	55 313	452 877	14				16
245.602	1/2	3/2	55 313	462 467	16				16
259.898	$4s^24p^3\ ^2D^o_{5/2}$	$4s^24p^2(^3P)4d\ ^4P_{3/2}$	35 522	420 260	2				16
256.989	3/2	5/2	26 886	416 017	5				16
254.201	3/2	3/2	26 886	420 260	4				16
249.668	3/2	1/2	26 886	427 397	20				16
257.854	$4s^24p^3\ ^2P^o_{3/2}$	$4s^24p^2(^1D)4d\ ^2F_{5/2}$	70 544	458 371	11				16
254.474	$4s^24p^3\ ^2P^o_{3/2}$	$4s^24p^2(^1D)4d\ ^2S_{1/2}$	70 544	463 532	20				16
244.959	1/2	1/2	55 313	463 532	9				16
253.731	$4s^24p^3\ ^2D^o_{5/2}$	$4s^24p^2(^3P)4d\ ^2D_{3/2}$	35 522	429 661	8				16
248.282	3/2	3/2	26 886	429 661	2				16
247.441	5/2	5/2	35 522	439 671	12				16
242.258	3/2	5/2	26 886	439 671	16				16
246.924	$4s^24p^3\ ^4S^o_{3/2}$	$4s^24p^2(^3P)4d\ ^2P_{3/2}$	0	404 950	2				16
238.459	3/2	1/2	0	419 322	5				16
243.071	$4s^24p^3\ ^2D^o_{5/2}$	$4s^24p^2(^1D)4d\ ^2D_{3/2}$	35 522	446 930	6				16
241.969	5/2	5/2	35 522	448 779	22				16
238.064	3/2	3/2	26 886	446 930	25				16
237.023	3/2	5/2	26 886	448 779	2				16
240.370	$4s^24p^3\ ^4S^o_{3/2}$	$4s^24p^2(^3P)4d\ ^4P_{5/2}$	0	416 017	25				16
237.909	3/2	3/2	0	420 260	25				16
233.957	3/2	1/2	0	427 397	21				16
239.998	$4s^24p^3\ ^2P^o_{3/2}$	$4s^24p^2(^1S)4d\ ^2D_{3/2}$	70 544	487 241	12				16
239.017	3/2	5/2	70 544	488 950	24				16
231.522	1/2	3/2	55 313	487 241	24				16
236.492	$4s^24p^3\ ^2D^o_{5/2}$	$4s^24p^2(^1D)4d\ ^2F_{5/2}$	35 522	458 371	14				16
231.751	3/2	5/2	26 886	458 371	24				16
231.110	5/2	7/2	35 522	468 216	25				16
234.744	$4s^24p^3\ ^2D^o_{3/2}$	$4s^24p^2(^1D)4d\ ^2P_{1/2}$	26 886	452 877	6				16
232.726	$4s^24p^3\ ^4S^o_{3/2}$	$4s^24p^2(^3P)4d\ ^2D_{3/2}$	0	429 661	16				16
227.436	3/2	5/2	0	439 671	4				16
229.014	$4s^24p^3\ ^2D^o_{3/2}$	$4s^24p^2(^1D)4d\ ^2S_{1/2}$	26 886	463 532	8				16
221.361	$4s^24p^3\ ^2D^o_{5/2}$	$4s^24p^2(^1S)4d\ ^2D_{3/2}$	35 522	487 241	2				16
220.530	5/2	5/2	35 522	488 950	4				16
166.831	$4s^24p^3\ ^2P^o_{3/2}$	$4s^24p^25s\ ^2P_{3/2}$	70 544	669 948	6000				19
165.106	1/2	1/2	55 313	660 981	15000				18, 19°
162.698	1/2	3/2	55 313	669 948	40000				18, 19°
163.369	$4s^24p^3\ ^2D^o_{3/2}$	$4s^24p^25s\ ^4P_{1/2}$	26 886	638 999	6000				18, 19°
161.442	5/2	3/2	35 522	654 947	6000				18, 19°
159.219	3/2	3/2	26 886	654 947	8000				18, 19°
159.049	5/2	5/2	35 522	664 258	50000				18, 19°
160.745	$4s^24p^3\ ^2P^o_{3/2}$	$4s^24p^25s\ ^2D_{5/2}$	70 544	692 660	30000				18, 19°
160.075	3/2	3/2	70 544	695 263	100000				18, 19°
156.257	1/2	3/2	55 313	695 263	1500				19

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Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
157.706	$4s^24p^3\ ^2D^o_{3/2}$	$4s^24p^25s\ ^2P_{1/2}$	26 886	660 981	100000				18, 19°
157.624	5/2	3/2	35 522	669 948	120000				18, 19°
155.506	3/2	3/2	26 886	669 948	20000				19
156.494	$4s^24p^3\ ^4S^o_{3/2}$	$4s^24p^25s\ ^4P_{1/2}$	0	638 999	100000				18, 19°
152.683	3/2	3/2	0	654 947	100000				18, 19°
150.544	3/2	5/2	0	664 258	100000				18, 19°
153.242	$4s^24p^3\ ^2P^o_{3/2}$	$4s^24p^25s\ ^2S_{1/2}$	70 544	723 115	20000				18, 19°
149.743	1/2	1/2	55 313	723 115	10000				18, 19°
152.175	$4s^24p^3\ ^2D^o_{5/2}$	$4s^24p^25s\ ^2D_{5/2}$	35 522	692 660	100000				19
151.575	5/2	3/2	35 522	695 263	8000				19
150.201	3/2	5/2	26 886	692 660	30000				19
149.618	3/2	3/2	26 886	695 263	10000				19
144.370	$4s^24p^3\ ^4S^o_{3/2}$	$4s^24p^25s\ ^2D_{5/2}$	0	692 660	2000				19
143.631	$4s^24p^3\ ^2D^o_{3/2}$	$4s^24p^25s\ ^2S_{1/2}$	26 886	723 115	200				19

Mo XI

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
432.429	$4s^24p^2\ ^3P_2$	$4s4p^3\ ^3D^o_3$	27 144	258 396	300				21
427.785	1	2	17 634	251 396	300				21
399.406	0	1	0	250 372	700				21
381.284	$4s^24p^2\ ^3P_2$	$4s4p^3\ ^3P^o_2$	27 144	289 416	1000				21
375.464	1	0	17 634	283 971	100				21
371.979	1	1	17 634	286 470	800				21
349.077	0	1	0	286 470	100				21
376.913	$4s^24p^2\ ^1D_2$	$4s4p^3\ ^1D^o_2$	54 744	320 056	1000				21
356.729	$4s^24p^2\ ^1S_0$	$4s4p^3\ ^1P^o_1$	84 828	365 151	300				16, 21°
341.400	$4s^24p^2\ ^3P_2$	$4s4p^3\ ^1D^o_2$	27 144	320 056	400				21
325.220	$4s^24p^2\ ^3P_2$	$4s4p^3\ ^3S^o_1$	27 144	334 629	1300				16, 21°
315.458	1	1	17 634	334 629	1000				16, 21°
298.839	0	1	0	334 629	150				16, 21°
322.158	$4s^24p^2\ ^1D_2$	$4s4p^3\ ^1P^o_1$	54 744	365 151	1000				16, 21°
306.637	$4s^24p^2\ ^1D_2$	$4s^24p4d\ ^3F^o_2$	54 744	380 857	2				16
298.242	2	3	54 744	390 034	2				16
287.756	$4s^24p^2\ ^3P_1$	$4s4p^3\ ^1P^o_1$	17 634	365 151	400				16, 21°
282.728	$4s^24p^2\ ^3P_2$	$4s^24p4d\ ^3F^o_2$	27 144	380 857	8				16
275.572	2	3	27 144	390 034	6				16
275.305	1	2	17 634	380 857	3				16
277.103	$4s^24p^2\ ^1D_2$	$4s^24p4d\ ^1D^o_2$	54 744	415 627	5				16
270.497	$4s^24p^2\ ^1D_2$	$4s^24p4d\ ^3P^o_1$	54 744	424 418	7				16
266.365	2	2	54 744	430 171	12				16
258.410	$4s^24p^2\ ^1D_2$	$4s^24p4d\ ^3D^o_1$	54 744	441 704	4				16
256.749	2	3	54 744	444 212	6				16
256.015	2	2	54 744	445 358	18				16
257.418	$4s^24p^2\ ^3P_2$	$4s^24p4d\ ^1D^o_2$	27 144	415 627	23				16
251.250	1	2	17 634	415 627	24				16
251.725	$4s^24p^2\ ^3P_2$	$4s^24p4d\ ^3P^o_1$	27 144	424 418	8				16
248.134	2	2	27 144	430 171	8				16
245.817	1	1	17 634	424 418	8				16
242.390	1	2	17 634	430 171	16				16
239.253	1	0	17 634	435 602	8				16
235.629	0	1	0	424 418	12				16
251.351	$4s^24p^2\ ^1S_0$	$4s^24p4d\ ^1P^o_1$	84 828	482 674	14				16
241.228	$4s^24p^2\ ^3P_2$	$4s^24p4d\ ^3D^o_1$	27 144	441 704	8				16
239.778	2	3	27 144	444 212	25				16
239.121	2	2	27 144	445 358	22				16
235.802	1	1	17 634	441 704	12				16
233.780	1	2	17 634	445 358	16				16
226.406	0	1	0	441 704	2				16
237.765	$4s^24p^2\ ^1D_2$	$4s^24p4d\ ^1F^o_3$	54 744	475 316	24				16
233.684	$4s^24p^2\ ^1D_2$	$4s^24p4d\ ^1P^o_1$	54 744	482 674	3				16
223.134	$4s^24p^2\ ^3P_2$	$4s^24p4d\ ^1F^o_3$	27 144	475 316	8				16
219.526	$4s^24p^2\ ^3P_2$	$4s^24p4d\ ^1P^o_1$	27 144	482 674	3				16
207.179	0	1	0	482 674	8				16
160.188	$4s^24p^2\ ^1S_0$	$4s^24p(^2P^o_{1/2})5s\ (\frac{1}{2},\frac{1}{2})^o_1$	84 828	709 077	2				16, 18°
152.818	$4s^24p^2\ ^1D_2$	$4s^24p(^2P^o_{1/2})5s\ (\frac{1}{2},\frac{1}{2})^o_1$	54 744	709 077	3				16, 18°
152.723	$4s^24p^2\ ^1S_0$	$4s^24p(^2P^o_{3/2})5s\ (\frac{3}{2},\frac{1}{2})^o_1$	84 828	739 589	10				16, 18°
146.955	$4s^24p^2\ ^1D_2$	$4s^24p(^2P^o_{3/2})5s\ (\frac{3}{2},\frac{1}{2})^o_2$	54 744	735 196	15				16, 18°
146.016	2	1	54 744	739 589	22				16, 18°

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Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
146.641	$4s^24p^2\ ^3P_2$	$4s^24p(^2P^\circ_{1/2})5s\ (\frac{1}{2},\frac{1}{2})^\circ_1$	27 144	709 077	18				16, 18°
145.009	1	0	17 634	707 202	12				16, 18°
144.616	1	1	17 634	709 077	10				16, 18°
141.030	0	1	0	709 077	15				16, 18°
141.231	$4s^24p^2\ ^3P_2$	$4s^24p(^2P^\circ_{3/2})5s\ (\frac{3}{2},\frac{1}{2})^\circ_2$	27 144	735 196	20				16, 18°
140.357	2	1	27 144	739 589	5				16, 18°
139.353	1	2	17 634	735 196	18				16, 18°

Mo XII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
590.563	$4s^24p\ ^2P^o_{3/2}$	$4s4p^2\ ^4P_{1/2}$	28 464	197 794					27
546.081	$_{3/2}$	$_{3/2}$	28 464	211 589					27
510.798	$_{3/2}$	$_{5/2}$	28 464	224 236	5				26, 27°
505.571	$_{1/2}$	$_{1/2}$	0	197 794					27
508.80	$4s4p^2\ ^2S_{1/2}$	$4p^3\ ^2D^o_{3/2}$	297 054	493 598	4				26
452.64	$4s4p^2\ ^2P_{1/2}$	$4p^3\ ^2P^o_{1/2}$	325 519	546 449	4				26
415.458	$4s^24p\ ^2P^o_{3/2}$	$4s4p^2\ ^2D_{5/2}$	28 464	269 162	200				26
381.125	$_{1/2}$	$_{3/2}$	0	262 381	500				26
414.764	$4s4p^2\ ^2D_{5/2}$	$4p^3\ ^2D^o_{5/2}$	269 162	510 263	100				26
371.244	$4s4p^2\ ^4P_{5/2}$	$4p^3\ ^2D^o_{3/2}$	224 236	493 598	400				26
354.594	$_{3/2}$	$_{3/2}$	211 589	493 598	300				26
338.061	$_{1/2}$	$_{3/2}$	197 794	493 598	100				26
352.738	$4s4p^2\ ^4P_{5/2}$	$4p^3\ ^4S^o_{3/2}$	224 236	507 733	200				26
337.674	$_{3/2}$	$_{3/2}$	211 589	507 733	100				26
352.028	$4s4p^2\ ^2D_{3/2}$	$4p^3\ ^2P^o_{1/2}$	262 381	546 449	100				26
344.093	$_{5/2}$	$_{3/2}$	269 162	559 781	300				26
336.639	$4s^24p\ ^2P^o_{3/2}$	$4s4p^2\ ^2P_{1/2}$	28 464	325 519	800				25
329.414	$_{3/2}$	$_{3/2}$	28 464	332 036	1000				25
307.202	$_{1/2}$	$_{1/2}$	0	325 519	100				25
301.170	$_{1/2}$	$_{3/2}$	0	332 036	200				25
336.639	$4s^24p\ ^2P^o_{1/2}$	$4s4p^2\ ^2S_{1/2}$	0	297 054	800				26
252.819	$4s^24p\ ^2P^o_{3/2}$	$4s^24d\ ^2D_{3/2}$	28 464	424 004	40				26
250.112	$_{3/2}$	$_{5/2}$	28 464	428 285	500				26
235.847	$_{1/2}$	$_{3/2}$	0	424 004	400				26
136.499	$4s^24p\ ^2P^o_{3/2}$	$4s^25s\ ^2S_{1/2}$	28 464	761 070	200				25
131.394	$_{1/2}$	$_{1/2}$	0	761 070	100				25

Mo XIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
518.92	$4s4p\ ^1P^o_1$	$4p^2\ ^1D_2$	293 333	486 036	200				32, 34°
480.820	$4s^2\ ^1S_0$	$4s4p\ ^3P^o_1$	0	207 982	100				27°, 31, 32, 34
474.619	$4s4d\ ^3D_2$	$4p4d\ ^3F^o_2$	628 707	839 402	30				35
470.487	1	2	626 853	839 402	200bl				35
451.585	3	3	631 755	853 198	100				35
445.450	2	3	628 707	853 198	150				35
416.031	3	4	631 755	872 164	300bl				35
453.09	$4s4p\ ^1P^o_1$	$4p^2\ ^3P_2$	293 333	514 034	150				32, 34°
404.357	$4s4d\ ^1D_2$	$4p4d\ ^1F^o_3$	676 590	923 898	150				35
395.400	$4s4p\ ^3P^o_2$	$4p^2\ ^3P_1$	230 642	483 549	500				32, 34°
389.929	1	0	207 982	464 439	500				31, 32, 34°
362.889	1	1	207 982	483 549	150				31, 32, 34°
352.994	0	1	200 259	483 549	200				32, 34°
352.868	2	2	230 642	514 034	800				31, 32, 34°
326.741	1	2	207 982	514 034	100				32, 34°
391.552	$4s4p\ ^3P^o_2$	$4p^2\ ^1D_2$	230 642	486 036	750				32, 34°
359.643	1	2	207 982	486 036	200				32, 34°
375.243	$4s4p\ ^1P^o_1$	$4p^2\ ^1S_0$	293 333	559 827	75				34
340.909	$4s^2\ ^1S_0$	$4s4p\ ^1P^o_1$	0	293 333	4000				28, 29, 30, 31, 34°
260.923	$4s4p\ ^1P^o_1$	$4s4d\ ^1D_2$	293 333	676 590	300				34
249.306	$4s4p\ ^3P^o_2$	$4s4d\ ^3D_3$	230 642	631 755	100				34
238.737	1	1	207 982	626 853	100				34
237.685	1	2	207 982	628 707	250				34
234.415	0	1	200 259	626 853	200				34
243.983	$4p^2\ ^3P_2$	$4p4d\ ^1F^o_3$	514 034	923 898	200				35
228.382	$4p^2\ ^1D_2$	$4p4d\ ^1F^o_3$	486 036	923 898	100				35
213.397	$4s4p\ ^3P^o_1$	$4s4d\ ^1D_2$	207 982	676 590	200				34
204.137^L	$4s4f\ ^3F^o_4$	$4s5g\ ^3G_5$			100				34
204.059^L	3	4			70				34
204.017^L	2	3			50				34
134.763	$4p^2\ ^1S_0$	$4p5s\ (\frac{3}{2},\frac{1}{2})^o_1$	559 827	1 301 864	15				34
134.428	$4s4p\ ^1P^o_1$	$4s5s\ ^1S_0$	293 333	1 037 226	500				34
128.028	$4p^2\ ^3P_1$	$4p5s\ (\frac{1}{2},\frac{1}{2})^o_0$	483 549	1 264 629	50				34
127.575	1	1	483 549	1 267 402	35				34
124.541	0	1	464 439	1 267 402	30p			34	
127.983	$4p^2\ ^3P_2$	$4p5s\ (\frac{3}{2},\frac{1}{2})^o_2$	514 034	1 295 364	300				34
126.930	2	1	514 034	1 301 864	150				34
123.182	1	2	483 549	1 295 364	30				34
127.983	$4p^2\ ^1D_2$	$4p5s\ (\frac{1}{2},\frac{1}{2})^o_1$	486 036	1 267 402	300				34
126.258	$4s4p\ ^3P^o_2$	$4s5s\ ^3S_1$	230 642	1 022 664	500				34
122.746	1	1	207 982	1 022 664	300				34
121.597	0	1	200 259	1 022 664	150				34
123.558	$4p^2\ ^1D_2$	$4p5s\ (\frac{3}{2},\frac{1}{2})^o_2$	486 036	1 295 364	30				34
122.577	2	1	486 036	1 301 864	30				34
93.696	$4s4p\ ^3P^o_2$	$4s5d\ ^3D_2$	230 642	1 297 901	6				34
93.493	2	3	230 642	1 300 240	75				34
91.834	1	1	207 982	1 296 905	15				34
91.752	1	2	207 982	1 297 901	40				34
91.187	0	1	200 259	1 296 905	10				34
88.756	$4s^2\ ^1S_0$	$4s5p\ (\frac{1}{2},\frac{1}{2})^o_1$	0	1 126 684	50				23, 34°
87.770	$4s^2\ ^1S_0$	$4s5p\ (\frac{1}{2},\frac{3}{2})^o_1$	0	1 139 342	100				23, 34°

Mo XIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
54.101	$3d^{10}4s^2\ ^1S_0$	$3d^9 4s^2 4p\ ^1P^\circ_1$	0	1 848 400	20				36, 37°
53.551	$3d^{10}4s^2\ ^1S_0$	$3d^9 4s^2 4p\ ^3D^\circ_1$	0	1 867 400	10				36, 37°

Mo XIV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
423.576	$4s\ ^2S_{1/2}$	$4p\ ^2P^o_{1/2}$	0	236 085	2000				29, 30°, 31, 39
373.647	$1/2$	$3/2$	0	267 632	10000				29, 30°, 31, 39
295.366	$4f\ ^2F^o_{5/2}$	$5d\ ^2D_{3/2}$	1 033 850	1 372 413	10				39
293.374	$7/2$	$5/2$	1 033 968	1 374 830	15				39
264.126	$4d\ ^2D_{5/2}$	$4f\ ^2F^o_{5/2}$	655 242	1 033 850	40				39
264.043	$5/2$	$7/2$	655 242	1 033 968	400				39
260.501	$3/2$	$5/2$	649 976	1 033 850	300				39
261.544	$4p\ ^2P^o_{3/2}$	$4d\ ^2D_{3/2}$	267 632	649 976	200				39
257.993	$3/2$	$5/2$	267 632	655 242	800				39
241.609	$1/2$	$3/2$	236 085	649 976	800				39
184.481	$4d\ ^2D_{3/2}$	$5p\ ^2P^o_{1/2}$	649 976	1 192 036	300				38, 39°
181.817	$5/2$	$3/2$	655 242	1 205 254	600				38, 39°
180.087	$3/2$	$3/2$	649 976	1 205 254	85				38, 39°
183.949	$4f\ ^2F^o_{7/2}$	$5g\ ^2G_{7/2}$	1 033 968	1 577 546	1200				38, 39°
183.949	$7/2$	$9/2$	1 033 968	1 577 546	1200				38, 39°
123.902	$4f\ ^2F^o_{7/2}$	$6g\ ^2G_{7/2}$	1 033 968	1 841 006	150				38, 39°
123.902	$7/2$	$9/2$	1 033 968	1 841 006	150				38, 39°
123.902	$5/2$	$7/2$	1 033 850	1 841 006	150				38, 39°
121.647	$4p\ ^2P^o_{3/2}$	$5s\ ^2S_{1/2}$	267 632	1 089 691	1500				23, 30, 39°
117.149	$1/2$	$1/2$	236 085	1 089 691	1000				23, 30, 39°
112.973	$4d\ ^2D_{5/2}$	$5f\ ^2F^o_{5/2}$	655 242	1 540 440	30				39
112.952	$5/2$	$7/2$	655 242	1 540 574	300				23, 39°
112.300	$3/2$	$5/2$	649 976	1 540 440	150				23, 39°
103.500	$4f\ ^2F^o_{7/2}$	$7g\ ^2G_{7/2}$	1 033 968	2 000 101	40				39
103.500	$7/2$	$9/2$	1 033 968	2 000 101	40				39
103.500	$5/2$	$7/2$	1 033 850	2 000 101	40				39
101.699	$4d\ ^2D_{3/2}$	$6p\ ^2P^o_{1/2}$	649 976	1 633 270	15				39, 40°
101.543	$5/2$	$3/2$	655 242	1 640 046	70				39
101.004	$3/2$	$3/2$	649 976	1 640 046	5				39
90.519	$4p\ ^2P^o_{3/2}$	$5d\ ^2D_{3/2}$	267 632	1 372 413	70				39
90.319	$3/2$	$5/2$	267 632	1 374 830	400				23, 39°
88.000	$1/2$	$3/2$	236 085	1 372 413	150				23, 39°
85.979	$4d\ ^2D_{5/2}$	$6f\ ^2F^o_{5/2}$	655 242	1 818 317	100				39
85.597	$3/2$	$7/2$	649 976	1 818 244	70				39
83.890	$4s\ ^2S_{1/2}$	$5p\ ^2P^o_{1/2}$	0	1 192 036	400				23, 39°
82.971	$1/2$	$3/2$	0	1 205 254	600				23, 39°
76.216	$4p\ ^2P^o_{3/2}$	$6s\ ^2S_{1/2}$	267 632	1 579 705	50				38, 39°
74.425	$1/2$	$1/2$	236 085	1 579 705	20				38, 39°
72.50	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^9(^2D)4s^2\ ^2D_{5/2}$	267 632	1 647 000					43
71.3	$3/2$	$3/2$	267 632	1 673 000					43
69.5	$1/2$	$3/2$	236 085	1 673 000					43
63.45	$4p\ ^2P^o_{3/2}$	$7s\ ^2S_{1/2}$	267 632	1 843 580					38
62.21	$1/2$	$1/2$	236 085	1 843 580					38
61.229	$4s\ ^2S_{1/2}$	$6p\ ^2P^o_{1/2}$	0	1 633 270	40				23, 40°
60.975	$1/2$	$3/2$	0	1 640 046	60				23, 39, 40°
57.65	$4p\ ^2P^o_{3/2}$	$8s\ ^2S_{1/2}$	267 632	2 002 340					38
56.61	$1/2$	$1/2$	236 085	2 002 340					38
53.729	$3d^{10}4s\ ^2S_{1/2}$	$3d^9(^2D)4s4p(^3P^o)\ ^4P^o_{3/2}$	0	1 861 190	5				36, 37, 42°
53.100	$1/2$	$1/2$	0	1 883 240	3				36, 37, 42°
53.341	$4s\ ^2S_{1/2}$	$7p\ ^2P^o_{1/2}$	0	1 874 730	3				37, 38, 42°
53.228	$1/2$	$3/2$	0	1 878 710					37, 38, 42°
53.341	$3d^{10}4s\ ^2S_{1/2}$	$3d^9(^2D)4s4p(^3P^o)\ ^4F^o_{3/2}$	0	1 874 730	3				36, 37, 41, 42°

Mo XIV – Continued

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
53.048	$3d^{10}4s\ ^2S_{1/2}$	$3d^9(^2D)4s4p(^3P^o)\ ^2D^o_{3/2}$	0	1 885 090	10				36, 37, 41, 42°
52.753	$3d^{10}4s\ ^2S_{1/2}$	$3d^9(^2D)4s4p(^3P^o)\ ^2P^o_{3/2}$	0	1 895 630	20				36, 37, 41, 42°
52.690	1/2	1/2	0	1 897 890	10				36, 37, 41, 42°
52.476	$3d^{10}4s\ ^2S_{1/2}$	$3d^9(^2D)4s4p(^3P^o)\ ^4D^o_{1/2}$	0	1 905 630	5				36, 37, 41, 42°
52.228	1/2	3/2	0	1 914 680	5				36, 37, 41, 42°
52.476	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^9(^2D)4p^2(^3P)\ ^4F_{5/2}$	267 632	2 173 140	5				42
51.668	1/2	3/2	236 085	2 171 600	5				37, 42°
52.460	$3d^{10}4p\ ^2P^o_{1/2}$	$3d^9(^2D)4p^2(^1D)\ ^2S_{1/2}$	236 085	2 142 670	2				37, 42°
52.420	$3d^{10}4p\ ^2P^o_{1/2}$	$3d^9(^2D)4p^2(^1D)\ ^2P_{3/2}$	236 085	2 143 750	2				37, 42°
52.024	$3d^{10}4p\ ^2P^o_{1/2}$	$3d^9(^2D)4p^2(^3P)\ ^2D_{3/2}$	236 085	2 158 460	8				37, 42°
52.015	3/2	5/2	267 632	2 190 210	10				37, 42°
52.00	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^9(^2D)4p^2(^3P)\ ^2P_{1/2}$	267 632	2 190 700	2				37, 42°
51.895	3/2	3/2	267 632	2 194 630	8				37, 42°
51.161	1/2	1/2	236 085	2 190 700	1				37, 42°
51.531	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^9(^2D)4p^2(^1D)\ ^2F_{5/2}$	267 632	2 208 270	1				37, 42°
51.434	$3d^{10}4p\ ^2P^o_{1/2}$	$3d^9(^2D)4p^2(^1D)\ ^2D_{3/2}$	236 085	2 180 320	1				37, 42°
51.398	$3d^{10}4s\ ^2S_{1/2}$	$3d^9(^2D)4s4p(^1P^o)\ ^2P^o_{3/2}$	0	1 945 600	20				36, 37, 41, 42°
50.788	1/2	1/2	0	1 968 970	10				36, 37, 41, 42°
50.956	$3d^{10}4p\ ^2P^o_{3/2}$	$3d^9(^2D)4p^2(^1S)\ ^2D_{5/2}$	267 632	2 230 110	1				37, 42°

Mo XV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
424.184	$3d^9(^2D_{3/2})4s\ (\frac{3}{2},\frac{1}{2})_2$	$3d^9(^2D_{3/2})4p\ (\frac{3}{2},\frac{1}{2})^\circ_2$	1 726 410	1 962 160	10				48
421.581	2	1	1 726 410	1 963 620	20				48
415.994	1	2	1 721 770	1 962 160	70				48
420.270	$3d^9(^2D_{5/2})4s\ (\frac{5}{2},\frac{1}{2})_3$	$3d^9(^2D_{5/2})4p\ (\frac{5}{2},\frac{1}{2})^\circ_2$	1 694 910	1 932 860	70				48
417.373	2	3	1 699 860	1 939 450	65				48
408.943	3	3	1 694 910	1 939 450	40				48
397.450	$3d^9(^2D_{3/2})4s\ (\frac{3}{2},\frac{1}{2})_2$	$3d^9(^2D_{5/2})4p\ (\frac{5}{2},\frac{3}{2})^\circ_2$	1 726 410	1 978 020	25				48
390.837	2	1	1 726 410	1 982 270	20				48
379.959	$3d^9(^2D_{3/2})4s\ (\frac{3}{2},\frac{1}{2})_1$	$3d^9(^2D_{3/2})4p\ (\frac{3}{2},\frac{3}{2})^\circ_0$	1 721 770	1 984 950	25				48
365.680	2	3	1 726 410	1 999 880	60				48
355.054	1	1	1 721 770	2 003 420	15				48
354.892	2	2	1 726 410	2 008 190	30				48
349.128	1	2	1 721 770	2 008 190	30				48
379.133	$3d^9(^2D_{5/2})4s\ (\frac{5}{2},\frac{1}{2})_2$	$3d^9(^2D_{3/2})4p\ (\frac{3}{2},\frac{1}{2})^\circ_1$	1 699 860	1 963 620	30				48
365.924	$3d^9(^2D_{5/2})4s\ (\frac{5}{2},\frac{1}{2})_3$	$3d^9(^2D_{5/2})4p\ (\frac{5}{2},\frac{3}{2})^\circ_4$	1 694 910	1 968 200	100				48
359.500	2	2	1 699 860	1 978 020	40				48
354.100	2	1	1 699 860	1 982 270	25				48
353.421	2	3	1 699 860	1 982 810	30				48
347.339	3	3	1 694 910	1 982 810	45				48
58.832	$3d^{10}\ ^1S_0$	$3d^9(^2D_{5/2})4s\ (\frac{5}{2},\frac{1}{2})_2$	0	1 699 860		E2			45°, 46
57.927	$3d^{10}\ ^1S_0$	$3d^9(^2D_{3/2})4s\ (\frac{3}{2},\frac{1}{2})_2$	0	1 726 410		E2			45°, 46
50.928	$3d^{10}\ ^1S_0$	$3d^9(^2D_{3/2})4p\ (\frac{3}{2},\frac{1}{2})^\circ_1$	0	1 963 620	2				23, 36, 37, 42°, 47
50.448	$3d^{10}\ ^1S_0$	$3d^9(^2D_{5/2})4p\ (\frac{5}{2},\frac{3}{2})^\circ_1$	0	1 982 270	150				23, 36, 37, 42°, 44, 45,46,47
49.914	$3d^{10}\ ^1S_0$	$3d^9(^2D_{3/2})4p\ (\frac{3}{2},\frac{3}{2})^\circ_1$	0	2 003 420	100				23, 36, 37, 42°, 44, 45,46,47
36.376	$3d^{10}\ ^1S_0$	$3d^94f\ ^3P^\circ_1$	0	2 749 060	3				47
36.060	$3d^{10}\ ^1S_0$	$3d^94f\ ^3D^\circ_1$	0	2 773 230	7				36, 47°
35.368	$3d^{10}\ ^1S_0$	$3d^94f\ ^1P^\circ_1$	0	2 827 410	12				36, 44, 46, 47°
29.774	$3d^{10}\ ^1S_0$	$3d^95f\ ^3D^\circ_1$	0	3 358 600	1				47
29.458	$3d^{10}\ ^1S_0$	$3d^95f\ ^1P^\circ_1$	0	3 394 700	2				47

Mo XVI

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3708.1	$3p^63d^9\ ^2D_{5/2}$	$3p^63d^9\ ^2D_{3/2}$	0	26 960		M1			51
77.456	$3p^63d^9\ ^2D_{3/2}$	$3p^53d^{10}\ ^2P^o_{3/2}$	26 960	1 318 040	8				23, 36, 46, 55°
75.869	$5/2$	$3/2$	0	1 318 040	25				23, 36, 46, 55°
69.596	$3/2$	$1/2$	26 960	1 463 860	15				23, 36, 46, 55°
54.348	$3d^9\ ^2D_{5/2}$	$3d^8(^3F_4)4s\ (4,\frac{1}{2})_{9/2}$	0	1 839 990	70	E2			56, 57°
54.088	$5/2$	$7/2$	0	1 848 840	100	E2			46, 56, 57°
53.484	$3d^9\ ^2D_{5/2}$	$3d^8(^3F_3)4s\ (3,\frac{1}{2})_{7/2}$	0	1 869 720	50	E2			46, 56, 57°
52.644	$3d^9\ ^2D_{3/2}$	$3d^8(^1G_4)4s\ (4,\frac{1}{2})_{7/2}$	26 960	1 926 510	40	E2			46, 56, 57°
51.909	$5/2$	$9/2$	0	1 926 450	70	E2			46, 56, 57°
47.959	$3d^9\ ^2D_{5/2}$	$3d^8(^3F)4p\ ^4D^o_{7/2}$	0	2 085 110	90				36, 53, 54, 55°
47.382	$5/2$	$5/2$	0	2 110 510	30				55
47.871	$3d^9\ ^2D_{3/2}$	$3d^84p\ (1)^o_{3/2}$	26 960	2 115 910	150				46, 53, 54, 55°
47.165	$3/2$	$5/2$	26 960	2 147 170	170				36, 53, 54, 55°
46.573	$5/2$	$5/2$	0	2 147 170	750				23, 36, 46, 54, 55°
46.352	$5/2$	$7/2$	0	2 157 400	450				36, 54, 55°
47.302	$3d^9\ ^2D_{5/2}$	$3d^8(^3F)4p\ ^4G^o_{7/2}$	0	2 114 080	20				53, 55°
47.262	$5/2$	$5/2$	0	2 115 860	180				23, 36, 53, 54, 55°
47.186	$3d^9\ ^2D_{3/2}$	$3d^84p\ (2)^o_{3/2}$	26 960	2 146 260	140				23, 36, 46, 53, 54, 55°
47.068	$3/2$	$5/2$	26 960	2 151 550	90				36, 46, 53, 54, 55°
46.592	$5/2$	$3/2$	0	2 146 260	80				36, 55°
46.478	$5/2$	$5/2$	0	2 151 550	1000				23, 36, 46, 54, 55°
46.877	$3d^9\ ^2D_{3/2}$	$3d^8(^3F)4p\ ^2F^o_{5/2}$	26 960	2 160 220	150				55
46.859	$5/2$	$7/2$	0	2 134 060	1000				23, 46, 54, 55°
46.291	$5/2$	$5/2$	0	2 160 220	650				23, 36, 46, 54, 55°
46.841	$3d^9\ ^2D_{5/2}$	$3d^8(^3F)4p\ ^2D^o_{5/2}$	0	2 134 880	900				36, 54, 55°
46.478	$3/2$	$3/2$	26 960	2 178 520	1000				36, 54, 55°
46.781	$3d^9\ ^2D_{3/2}$	$3d^8(^3F)4p\ ^4F^o_{3/2}$	26 960	2 164 610	120				36, 46, 54, 55°
46.378	$5/2$	$7/2$	0	2 156 190	260				23, 36, 46, 54, 55°
46.197	$5/2$	$3/2$	0	2 164 610	110				54, 55°
46.712	$3d^9\ ^2D_{3/2}$	$3d^84p\ (3)^o_{5/2}$	26 960	2 167 740	130				23, 36, 46, 54, 55°
46.623	$3/2$	$3/2$	26 960	2 171 850	250				36, 46, 54, 55°
46.131	$5/2$	$5/2$	0	2 167 740	600				23, 36, 46, 54, 55°
46.043	$5/2$	$3/2$	0	2 171 850	1000				23, 36, 46, 54, 55°
46.573	$3d^9\ ^2D_{3/2}$	$3d^8(^3P)4p\ ^4D^o_{1/2}$	26 960	2 174 130	750				36, 54, 55°
45.938	$3/2$	$5/2$	26 960	2 203 810	500				23, 36, 46, 54, 55°
45.809	$5/2$	$7/2$	0	2 182 980	500				23, 36, 46, 54, 55°
46.463	$3d^9\ ^2D_{3/2}$	$3d^84p\ (4)^o_{5/2}$	26 960	2 179 240	440				36, 54, 55°
46.043	$3/2$	$3/2$	26 960	2 198 620	1000				36, 55°
45.887	$5/2$	$5/2$	0	2 179 240	200				36, 54, 55°
45.483	$5/2$	$3/2$	0	2 198 620	220				23, 36, 46, 54, 55°
46.229	$3d^9\ ^2D_{3/2}$	$3d^8(^1D)4p\ ^2P^o_{3/2}$	26 960	2 190 130	220				23, 36, 46, 54, 55°
45.659	$5/2$	$3/2$	0	2 190 130	300				23, 36, 46, 54, 55°
45.553	$3/2$	$1/2$	26 960	2 222 200	300				23, 36, 46, 54, 55°
46.113	$3d^9\ ^2D_{3/2}$	$3d^84p\ (5)^o_{5/2}$	26 960	2 195 590	300				36, 54, 55°
45.545	$5/2$	$5/2$	0	2 195 590	250				23, 46, 54, 55°
46.024	$3d^9\ ^2D_{5/2}$	$3d^8(^1G)4p\ ^2F^o_{7/2}$	0	2 172 780	1600				23, 36, 46, 54, 55°
45.756	$3/2$	$5/2$	26 960	2 212 460	700				36, 54, 55°
45.867	$3d^9\ ^2D_{3/2}$	$3d^8(^3P)4p\ ^2S^o_{1/2}$	26 960	2 207 180	150				46, 54, 55°
45.853	$3d^9\ ^2D_{3/2}$	$3d^8(^3P)4p\ ^2D^o_{3/2}$	26 960	2 207 920	170				36, 54, 55°
45.290	$5/2$	$3/2$	0	2 207 920	60				36, 46, 54, 55°
45.250	$3d^9\ ^2D_{5/2}$	$3d^8(^1D)4p\ ^2F^o_{7/2}$	0	2 209 940	30				36, 55°
45.000	$3d^9\ ^2D_{5/2}$	$3d^8(^1G)4p\ ^2G^o_{7/2}$	0	2 222 220	220				23, 36, 46, 54, 55°

Mo XVI – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
44.509	$3d^9\ ^2D_{3/2}$	$3d^8(^1S)4p\ ^2P^o_{1/2}$	26 960	2 273 700	100				36,46,54,55°
43.837	3/2	3/2	26 960	2 308 160	30				36,55°
43.324	5/2	3/2	0	2 308 160	60				36,54,55°
33.992	$3d^9\ ^2D_{3/2}$	$3d^8(^3F_2)4f\ ^2[1]^o_{3/2}$	26 960	2 968 800	60				36,58°
33.982	$3d^9\ ^2D_{5/2}$	$3d^8(^3F_4)4f\ ^2[3]^o_{5/2}$	0	2 942 700	40				58
33.853	$3d^9\ ^2D_{3/2}$	$3d^8(^3F_2)4f\ ^2[2]^o_{5/2}$	26 960	2 981 100	10				58
33.543	5/2	5/2	0	2 981 100	50				36,58°
33.812	$3d^9\ ^2D_{5/2}$	$3d^8(^3F_3)4f\ ^2[4]^o_{7/2}$	0	2 957 500	20				58
33.800	$3d^9\ ^2D_{3/2}$	$3d^8(^3P_2)4f\ ^2[2]^o_{3/2}$	26 960	2 985 500	30				36,58°
33.760	$3d^9\ ^2D_{5/2}$	$3d^8(^3F_3)4f\ ^2[3]^o_{7/2}$	0	2 962 100	20				58
33.740	$3d^9\ ^2D_{5/2}$	$3d^8(^3F_3)4f\ ^2[1]^o_{3/2}$	0	2 963 800	35				58
33.680	$3d^9\ ^2D_{5/2}$	$3d^8(^3F_3)4f\ ^2[2]^o_{5/2}$	0	2 969 100	35				36,58°
33.591	$3d^9\ ^2D_{5/2}$	$3d^8(^3P_2)4f\ ^2[4]^o_{7/2}$	0	2 977 000	45				36,58°
33.479	$3d^9\ ^2D_{5/2}$	$3d^8(^3F_2)4f\ ^2[3]^o_{7/2}$	0	2 986 900	25				58
33.429	$3d^9\ ^2D_{5/2}$	$3d^8(^3P_2)4f\ ^2[3]^o_{5/2}$	0	2 991 400	20				58
33.347	5/2	7/2	0	2 998 800	40				36,58°
33.293	$3d^9\ ^2D_{5/2}$	$3d^8(^3P_0)4f\ ^2[3]^o_{7/2}$	0	3 003 600	45				36,58°
33.264	$3d^9\ ^2D_{5/2}$	$3d^8(^3P_1)4f\ ^2[2]^o_{5/2}$	0	3 006 200	10				58
33.235	$3d^9\ ^2D_{5/2}$	$3d^8(^3P_1)4f\ ^2[4]^o_{7/2}$	0	3 008 900	10				36,58°
33.211	$3d^9\ ^2D_{3/2}$	$3d^8(^1G_4)4f\ ^2[1]^o_{3/2}$	26 960	3 038 000	15				36,58°
33.100	3/2	1/2	26 960	3 048 100	35				36,58°
32.916	5/2	3/2	0	3 038 000	50				36,44,46,58°
33.185	$3d^9\ ^2D_{5/2}$	$3d^8(^3P_1)4f\ ^2[3]^o_{5/2}$	0	3 013 400	25				58
33.161	$3d^9\ ^2D_{3/2}$	$3d^8(^1G_4)4f\ ^2[2]^o_{5/2}$	26 960	3 042 600	25				58
32.981	3/2	3/2	26 960	3 058 900	70				36,44,46,58°
32.691	5/2	3/2	0	3 058 900	20				36,46,58°
33.120	$3d^9\ ^2D_{5/2}$	$3d^8(^1D_2)4f\ ^2[3]^o_{7/2}$	0	3 019 300	35				58
33.067	$3d^9\ ^2D_{5/2}$	$3d^8(^1D_2)4f\ ^2[1]^o_{3/2}$	0	3 024 200	25				58
32.860	$3d^9\ ^2D_{5/2}$	$3d^8(^1G_4)4f\ ^2[3]^o_{7/2}$	0	3 043 200	75				36,44,46,58°
32.323	$3d^9\ ^2D_{3/2}$	$3d^8(^1S_0)4f\ ^2[3]^o_{5/2}$	26 960	3 120 700	40				36,46,58°
32.078	5/2	7/2	0	3 117 400	30				36,46,58°
32.061	5/2	5/2	0	3 120 700	15				58

Mo XVII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4123.5	$3d^8\ ^3F_4$	$3d^8\ ^3F_3$	0	24 250		M1			51
83.079	$3p^63d^8\ ^1D_2$	$3p^53d^9\ ^1D^o_2$	77 960	1 281 600	50				60, 61°
82.556	$3p^63d^8\ ^3P_1$	$3p^53d^9\ ^1D^o_2$	70 310	1 281 600	20				61
81.261	2	2	51 000	1 281 600	100				60, 61°
82.317	$3p^63d^8\ ^1S_0$	$3p^53d^9\ ^3D^o_1$	176 680	1 391 470	10				61, 62°
81.382	$3p^63d^8\ ^1G_4$	$3p^53d^9\ ^3F^o_3$	82 420	1 311 160	20				61
81.080	$3p^63d^8\ ^1D_2$	$3p^53d^9\ ^3F^o_3$	77 960	1 311 160	20				61
73.122	2	2	77 960	1 445 570	150				36, 60, 61°
80.734	$3p^63d^8\ ^3F_3$	$3p^53d^9\ ^3F^o_4$	24 250	1 262 860	30				61
79.186	4	4	0	1 262 860	1500				36, 60, 61°
77.706	3	3	24 250	1 311 160	20				61
76.269	4	3	0	1 311 160	600				36, 60, 61°
70.494	2	2	27 030	1 445 570	5				61
70.367	3	2	24 250	1 445 570	3				61
79.711	$3p^63d^8\ ^3F_2$	$3p^53d^9\ ^1D^o_2$	27 030	1 281 600	700				36, 60, 61°
79.532	3	2	24 250	1 281 600	5				61
79.359	$3p^63d^8\ ^3P_2$	$3p^53d^9\ ^3F^o_3$	51 000	1 311 160	5				61
71.705	2	2	51 000	1 445 570	7				61
79.062	$3p^63d^8\ ^1D_2$	$3p^53d^9\ ^3D^o_2$	77 960	1 342 800	100				60, 61°
77.396	2	3	77 960	1 370 010	5				61
78.019	$3p^63d^8\ ^3P_1$	$3p^53d^9\ ^3P^o_1$	70 310	1 352 050	40				60, 61°
77.898	0	1	68 350	1 352 050	15				61
77.727	1	0	70 310	1 356 860	30				61
76.863	2	1	51 000	1 352 050	200				60, 61°
71.359	1	2	70 310	1 471 690	30				36, 60, 61°
70.386	2	2	51 000	1 471 690	15				36, 60, 61°
77.666	$3p^63d^8\ ^1G_4$	$3p^53d^9\ ^3D^o_3$	82 420	1 370 010	30				60, 61°
77.410	$3p^63d^8\ ^3P_2$	$3p^53d^9\ ^3D^o_2$	51 000	1 342 800	20				60, 61°
75.816	2	3	51 000	1 370 010	15				61
75.580	0	1	68 350	1 391 470	15				61
74.600	2	1	51 000	1 391 470	5				61
75.840	$3p^63d^8\ ^3F_3$	$3p^53d^9\ ^3D^o_2$	24 250	1 342 800	150				60, 61°
74.306	3	3	24 250	1 370 010	200				36, 60, 61°
73.289	2	1	27 030	1 391 470	200				36, 60, 61°
72.990	4	3	0	1 370 010	300				36, 60, 61°
72.092	$3p^63d^8\ ^1S_0$	$3p^53d^9\ ^1P^o_1$	176 680	1 563 830	20				61, 62°
71.750	$3p^63d^8\ ^1D_2$	$3p^53d^9\ ^3P^o_2$	77 960	1 471 690	5				61
69.088	$3p^63d^8\ ^3F_3$	$3p^53d^9\ ^3P^o_2$	24 250	1 471 690	30				61
68.390	$3p^63d^8\ ^1G_4$	$3p^53d^9\ ^1F^o_3$	82 420	1 544 660	800				36, 60, 61°
68.188	$3p^63d^8\ ^1D_2$	$3p^53d^9\ ^1F^o_3$	77 960	1 544 660	3				61
67.302	$3p^63d^8\ ^1D_2$	$3p^53d^9\ ^1P^o_1$	77 960	1 563 830	15				36, 60, 61°
66.100	$3p^63d^8\ ^3P_2$	$3p^53d^9\ ^1P^o_1$	51 000	1 563 830	3				61
65.891	$3p^63d^8\ ^3F_2$	$3p^53d^9\ ^1F^o_3$	27 030	1 544 660	1				61
65.770	3	3	24 250	1 544 660	4				61
44.045	$3d^8\ ^3F_4$	$3d^74p\ (1)^o_4$	0	2 270 430	5				63
43.992	$3d^8\ ^3P_2$	$3d^74p\ (3)^o_3$	51 000	2 324 090	10				63
43.802	$3d^8\ ^3P_2$	$3d^74p\ (4)^o_3$	51 000	2 334 250	5				63
43.553	$3d^8\ ^3P_1$	$3d^74p\ (9)^o_2$	70 310	2 366 360	10				63
43.198	2	2	51 000	2 366 360	20				63
43.144	1	1	70 310	2 388 150	5				63

Mo XVII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
43.529	$3d^8\ ^3F_4$	$3d^74p\ (2)^{\circ}_{4}$	0	2 297 320	15				63
43.256	$_{4}$	$_{5}$	0	2 311 790	20				63
43.510	$3d^8\ ^3P_2$	$3d^74p\ (6)^{\circ}_{3}$	51 000	2 349 350	8				63
43.446	$3d^8\ ^1G_4$	$3d^74p\ (7)^{\circ}_{5}$	82 420	2 383 840	15				63
43.362	$3d^8\ ^3P_1$	$3d^74p\ (10)^{\circ}_{2}$	70 310	2 376 490	15				63
43.340	$3d^8\ ^3F_2$	$3d^74p\ (4)^{\circ}_{3}$	27 030	2 334 250	5				63
42.980	$_{2}$	$_{1}$	27 030	2 353 690	5				63
42.846	$_{4}$	$_{3}$	0	2 334 250	30				63
42.767	$_{4}$	$_{5}$	0	2 338 250	5				63
43.285	$3d^8\ ^1G_4$	$3d^74p\ (11)^{\circ}_{4}$	82 420	2 393 213	25				63
43.224	$3d^8\ ^3P_1$	$3d^74p\ (8)^{\circ}_{1}$	70 310	2 383 830	5				63
43.105	$3d^8\ ^3F_4$	$3d^74p\ (3)^{\circ}_{4}$	0	2 319 900	25				63
43.029	$_{4}$	$_{3}$	0	2 324 090	5				63
42.939	$3d^8\ ^1G_4$	$3d^74p\ (9)^{\circ}_{5}$	82 420	2 411 280	15				63
42.891	$3d^8\ ^1G_4$	$3d^74p\ (13)^{\circ}_{4}$	82 420	2 413 910	50				63
42.817	$3d^8\ ^1D_2$	$3d^74p\ (16)^{\circ}_{3}$	77 960	2 413 480	5				63
42.802	$3d^8\ ^3F_3$	$3d^74p\ (8)^{\circ}_{3}$	24 250	2 360 950	5				63
42.704	$3d^8\ ^3F_4$	$3d^74p\ (5)^{\circ}_{4}$	0	2 341 690	35				63
42.400	$_{4}$	$_{5}$	0	2 358 500	50				63
42.647	$3d^8\ ^3F_3$	$3d^74p\ (9)^{\circ}_{3}$	24 250	2 368 938	5				63
41.490	$_{4}$	$_{5}$	0	2 411 280	5				63
42.603	$3d^8\ ^3P_2$	$3d^74p\ (14)^{\circ}_{3}$	51 000	2 398 907	30				63
42.564	$3d^8\ ^3F_4$	$3d^74p\ (6)^{\circ}_{4}$	0	2 349 981	5				63
42.061	$_{4}$	$_{5}$	0	2 377 729	5				63
42.543	$3d^8\ ^1D_2$	$3d^74p\ (14)^{\circ}_{1}$	77 960	2 429 152	25				63
42.489	$3d^8\ ^1S_0$	$3d^74p\ (19)^{\circ}_{1}$	176 680	2 530 230	30				63
42.473	$3d^8\ ^1G_4$	$3d^74p\ (10)^{\circ}_{5}$	82 420	2 436 880	40				63
42.387	$3d^8\ ^3F_3$	$3d^74p\ (10)^{\circ}_{4}$	24 250	2 383 490	50				63
42.116	$_{4}$	$_{3}$	0	2 374 600	15				63
42.290	$3d^8\ ^3P_1$	$3d^74p\ (19)^{\circ}_{2}$	70 310	2 434 930	5				63
42.245	$3d^8\ ^3F_3$	$3d^74p\ (13)^{\circ}_{3}$	24 250	2 391 778	30				63
42.200	$3d^8\ ^3F_3$	$3d^74p\ (14)^{\circ}_{2}$	24 250	2 394 635	5				63
42.163	$3d^8\ ^1D_2$	$3d^74p\ (20)^{\circ}_{3}$	77 960	2 449 993	5				63
42.089	$3d^8\ ^3P_2$	$3d^74p\ (18)^{\circ}_{3}$	51 000	2 426 890	25				63
41.954	$3d^8\ ^3F_4$	$3d^74p\ (7)^{\circ}_{5}$	0	2 383 840	19				63
41.908	$3d^8\ ^3F_4$	$3d^74p\ (12)^{\circ}_{3}$	0	2 386 200	30				63
41.844	$3d^8\ ^1G_4$	$3d^74p\ (21)^{\circ}_{3}$	82 420	2 472 230	20				63
41.767	$3d^8\ ^3P_2$	$3d^74p\ (20)^{\circ}_{2}$	51 000	2 445 644	5				63
41.576	$3d^8\ ^3F_3$	$3d^74p\ (15)^{\circ}_{4}$	24 250	2 430 370	5				63
41.446	$3d^8\ ^3P_1$	$3d^74p\ (23)^{\circ}_{2}$	70 310	2 483 140	5				63
41.040	$3d^8\ ^1G_4$	$3d^74p\ (23)^{\circ}_{3}$	82 420	2 519 060	10				63

Mo XVIII

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
83.428	$3p^63d^7\ ^4F_{9/2}$	$3p^53d^8\ (1)^o_{11/2}$	0	1 198 630	10				64
80.492	$_{9/2}$	$_{9/2}$	0	1 242 360	45				64
81.988	$3p^63d^7\ ^4P_{5/2}$	$3p^53d^8\ (2)^o_{7/2}$	60 740	1 280 420	10				64
81.859	$3p^63d^7\ ^2G_{9/2}$	$3p^53d^8\ (2)^o_{9/2}$	62 500	1 284 110	25				64
80.686	$3p^63d^7\ ^2G_{7/2}$	$3p^53d^8\ (4)^o_{7/2}$	81 500	1 320 790	30				64
80.364	$3p^63d^7\ ^2G_{9/2}$	$3p^53d^8\ (3)^o_{7/2}$	62 500	1 306 770	20				64
77.415	$_{9/2}$	$_{9/2}$	62 500	1 354 790	45				64
80.201	$3p^63d^7\ ^4P_{5/2}$	$3p^53d^8\ (3)^o_{5/2}$	60 740	1 307 600	30				64
79.653	$3p^63d^7\ ^2H_{9/2}$	$3p^53d^8\ (5)^o_{7/2}$	107 650	1 362 690	20				64
67.141	$_{11/2}$	$_{9/2}$	84 900	1 574 310	48				36, 64°
79.457	$3p^63d^7\ ^4F_{7/2}$	$3p^53d^8\ (2)^o_{7/2}$	21 850	1 280 420	30				64
77.875	$_{9/2}$	$_{9/2}$	0	1 284 110	40				64
78.735	$3p^63d^7\ ^2H_{11/2}$	$3p^53d^8\ (3)^o_{9/2}$	84 900	1 354 790	40				64
78.255	$3p^63d^7\ ^2_3D_{5/2}$	$3p^53d^8\ (4)^o_{3/2}$	94 000	1 372 180	10				64
78.053	$3p^63d^7\ ^2G_{7/2}$	$3p^53d^8\ (5)^o_{7/2}$	81 500	1 362 690	25				64
66.146	$_{9/2}$	$_{9/2}$	62 500	1 574 310	25				64
77.552	$3p^63d^7\ ^2_3D_{5/2}$	$3p^53d^8\ (6)^o_{5/2}$	94 000	1 383 380	10				64
76.992	$3p^63d^7\ ^4F_{7/2}$	$3p^53d^8\ (4)^o_{7/2}$	21 850	1 320 790	10				64
76.870	$_{7/2}$	$_{5/2}$	21 850	1 322 740	45				64
75.712	$_{9/2}$	$_{7/2}$	0	1 320 790	20				64
76.812	$3p^63d^7\ ^4P_{5/2}$	$3p^53d^8\ (5)^o_{7/2}$	60 740	1 362 690	15				64
75.309	$_{5/2}$	$_{3/2}$	60 740	1 388 018	20				64
76.647	$3p^63d^7\ ^4F_{5/2}$	$3p^53d^8\ (3)^o_{3/2}$	31 440	1 336 120	25				64
76.529	$_{9/2}$	$_{7/2}$	0	1 306 770	30				64
73.812	$_{9/2}$	$_{9/2}$	0	1 354 790	15				64
74.407	$3p^63d^7\ ^2G_{9/2}$	$3p^53d^8\ (6)^o_{7/2}$	62 500	1 406 680	30				64
74.303	$3p^63d^7\ ^4P_{5/2}$	$3p^53d^8\ (6)^o_{7/2}$	60 740	1 406 680	45				64
74.280	$3p^63d^7\ ^4F_{5/2}$	$3p^53d^8\ (5)^o_{5/2}$	31 440	1 377 840	25				64
73.944	$_{3/2}$	$_{3/2}$	35 936	1 388 018	10				64
73.747	$_{7/2}$	$_{5/2}$	21 850	1 377 840	20				64
73.676	$_{5/2}$	$_{3/2}$	31 440	1 388 018	15				64
73.380	$_{9/2}$	$_{7/2}$	0	1 362 690	20				64
74.020	$3p^63d^7\ ^2F_{7/2}$	$3p^53d^8\ (7)^o_{7/2}$	141 650	1 492 600	15				64
73.446	$3p^63d^7\ ^4F_{7/2}$	$3p^53d^8\ (6)^o_{5/2}$	21 850	1 383 380	10				64
72.211	$_{7/2}$	$_{7/2}$	21 850	1 406 680	30				64
71.089	$_{9/2}$	$_{7/2}$	0	1 406 680	25				64
72.679	$3p^63d^7\ ^2F_{7/2}$	$3p^53d^8\ (8)^o_{7/2}$	141 650	1 517 570	15				64
72.171	$3p^63d^7\ ^2_3D_{5/2}$	$3p^53d^8\ (9)^o_{5/2}$	94 000	1 479 650	25				64
71.461	$_1D_{5/2}$	$_{7/2}$	210 770	1 610 200	25				64
72.089	$3p^63d^7\ ^2H_{9/2}$	$3p^53d^8\ (4)^o_{9/2}$	107 650	1 494 810	35				64
71.523	$3p^63d^7\ ^2G_{7/2}$	$3p^53d^8\ (9)^o_{5/2}$	81 500	1 479 650	25				64
71.196	$3p^63d^7\ ^2_1D_{5/2}$	$3p^53d^8\ (11)^o_{5/2}$	210 770	1 615 600	20				64
70.926	$3p^63d^7\ ^2H_{9/2}$	$3p^53d^8\ (8)^o_{7/2}$	107 650	1 517 570	30				64
70.121	$3p^63d^7\ ^2F_{5/2}$	$3p^53d^8\ (9)^o_{3/2}$	129 033	1 553 198	15				64
69.929	$3p^63d^7\ ^2G_{9/2}$	$3p^53d^8\ (7)^o_{7/2}$	62 500	1 492 600	35				64

Mo XVIII – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
69.675	$3p^6 3d^7\ ^2G_{7/2}$	$3p^5 3d^8\ (8)^{\circ}_{7/2}$	81 500	1 517 570	25				64
68.727	$_{9/2}$	$_{7/2}$	62 500	1 517 570	30				64
69.212	$3p^6 3d^7\ ^2_1D_{3/2}$	$3p^5 3d^8\ (7)^{\circ}_{1/2}$	199 694	1 643 278	25				64
68.128	$3p^6 3d^7\ ^2F_{5/2}$	$3p^5 3d^8\ (10)^{\circ}_{3/2}$	129 033	1 597 386	30				64
67.984	$3p^6 3d^7\ ^4F_{7/2}$	$3p^5 3d^8\ (7)^{\circ}_{7/2}$	21 850	1 492 600	22				64
67.845	$3p^6 3d^7\ ^2F_{7/2}$	$3p^5 3d^8\ (11)^{\circ}_{5/2}$	141 650	1 615 600	40				36, 64°
67.648	$3p^6 3d^7\ ^2G_{7/2}$	$3p^5 3d^8\ (10)^{\circ}_{5/2}$	81 500	1 559 730	40				36, 64°
66.536	$3p^6 3d^7\ ^2H_{9/2}$	$3p^5 3d^8\ (9)^{\circ}_{7/2}$	107 650	1 610 200	55				36, 64°

Mo XXIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3553.3	$3p^6 3d^2\ ^3F_2$	$3p^6 3d^2\ ^3F_3$	0	28 135		M1			51

Mo XXIV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2686.5	$3d\ ^2D_{3/2}$	$3d\ ^2D_{5/2}$	0	37 212		M1			51
77.369	$3p^63d\ ^2D_{3/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2F^o_{5/2}$	0	1 292 510	5				68
75.141	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1G)\ ^2F^o_{7/2}$	37 212	1 368 040	30				68
72.050	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)\ ^2D^o_{5/2}$	37 212	1 425 140	100				68
70.726	$_{3/2}$	$_{3/2}$	0	1 413 910	80				68
71.175	$3p^63d\ ^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3P)\ ^2P^o_{3/2}$	37 212	1 442 200	40				68
70.596	$_{3/2}$	$_{1/2}$	0	1 416 510	3				68
21.854	$3d\ ^2D_{5/2}$	$4f\ ^2F^o_{7/2}$	37 212	4 613 000	5				44
21.684	$_{3/2}$	$_{5/2}$	0	4 611 700	5				44

Mo XXV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
91.328^S	$3p^6\ ^1S_0$	$3p^53d\ ^3D^o_1$	0	1 094 950					69
74.170^S	$3p^6\ ^1S_0$	$3p^53d\ ^1P^o_1$	0	1 348 250					69
18.500	$3p^6\ ^1S_0$	$3p^54d\ ^1P^o_1$	0	5 405 400	5				44
17.979	$3p^6\ ^1S_0$	$3p^54d\ ^3D^o_1$	0	5 562 000	6				44

Mo XXVI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	A (s^{-1})	Acc.	References
534.9	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^5\ ^2P^o_{1/2}$	0	186 950		M1	1.17+5	B	70°, 81*
78.056	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^1D)3d\ ^2S_{1/2}$	0	1 281 130	20				71
77.369	$3s^23p^5\ ^2P^o_{1/2}$	$3s^23p^4(^3P)3d\ ^2D_{3/2}$	186 950	1 479 460	5				71
76.624	$_{3/2}$	$_{5/2}$	0	1 305 070	200				71
75.698	$3s^23p^5\ ^2P^o_{3/2}$	$3s^23p^4(^3P)3d\ ^2P_{3/2}$	0	1 321 040	20				71

Mo XXVII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
2350.8	$3s^23p^4\ ^3P_1$	$3s^23p^4\ ^1D_2$	175 500	218 030		M1	2.23+2	D	70, 72°, 81*
458.6	2	2	0	218 030		M1	7.18+4	D	70°, 81*
569.8	$3s^23p^4\ ^3P_2$	$3s^23p^4\ ^3P_1$	0	175 500		M1	9.50+4	C	70°, 81*
397.2	$3s^23p^4\ ^3P_1$	$3s^23p^4\ ^1S_0$	175 500	427 000		M1	4.13+5	D	70, 72°, 81*
80.403	$3s^23p^4\ ^1D_2$	$3s^23p^3(^2D^o)3d\ ^1F^o_3$	218 030	1 461 760	2				73
79.613	$3s^23p^4\ ^3P_2$	$3s^23p^3(^2P^o)3d\ ^3P^o_2$	0	1 256 080	20				73
78.268	$3s^23p^4\ ^3P_2$	$3s^23p^3(^2P^o)3d\ ^1F^o_3$	0	1 277 660	10				73

Mo XXVIII

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2285.4	$3s^23p^3\ ^2D^o_{3/2}$	$3s^23p^3\ ^2D^o_{5/2}$	156 960	200 710		M1	5.01+2	C	70°, 81*
643.0	$3s^23p^3\ ^2P^o_{1/2}$	$3s^23p^3\ ^2P^o_{3/2}$	257 940	413 440		M1	2.04+4	C	74°, 81*
637.1	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^3\ ^2D^o_{3/2}$	0	156 960		M1	8.04+4	D	74°, 81*
498.2	3/2	5/2	0	200 710		M1	1.55+4	D	74°, 81*
470.0	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^3\ ^2P^o_{3/2}$	200 710	413 440		M1	4.42+4	D	74°, 81*
389.9	3/2	3/2	156 960	413 440		M1	2.10+5	D	74°, 81*
387.7	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^3\ ^2P^o_{1/2}$	0	257 940		M1	1.05+5	D	74°, 81*
91.301	$3s^23p^3\ ^2P^o_{3/2}$	$3s^23p^2(^3P)3d\ ^2D_{5/2}$	413 440	1 508 720	50				75
85.932	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^1D)3d\ ^2D_{5/2}$	200 710	1 364 420	2				75
83.756	$3s^23p^3\ ^4S^o_{3/2}$	$3s^23p^2(^3P)3d\ ^4P_{5/2}$	0	1 193 940	5				75
83.308	$3s^23p^3\ ^2D^o_{5/2}$	$3s^23p^2(^3P)3d\ ^2F_{7/2}$	200 710	1 401 070	5				75

Mo XXIX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
2841.1	$3s^23p^2\ ^3P_1$	$3s^23p^2\ ^3P_2$	161 720	196 910		M1	2.91+2	C	51°, 70, 81*
618.5	0	1	0	161 720		M1	6.03+4	B	70°, 81*
530.3	$3s^23p^2\ ^3P_2$	$3s^23p^2\ ^1D_2$	196 910	385 480		M1	6.68+4	D	70, 72°, 81*
446.9	1	2	161 720	385 480		M1	7.59+4	D	70, 72°, 81*
326.3$^{\mathrm{P}}$	$3s^23p^2\ ^3P_1$	$3s^23p^2\ ^1S_0$	161 720	468 220		M1	3.10+5	D	70, 76°, 81*
108.714	$3s^23p^2\ ^3P_2$	$3s3p^3\ ^3S^\circ_1$	196 910	1 116 750	2				76
95.497	$3s^23p^2\ ^1D_2$	$3s^23p3d\ ^1F^\circ_3$	385 480	1 432 630	2				76
89.059	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^1D^\circ_2$	196 910	1 319 850	3				76
86.339	1	2	161 720	1 319 850	4				76
88.173	$3s^23p^2\ ^3P_2$	$3s^23p3d\ ^3D^\circ_3$	196 910	1 331 040	20				76

Mo XXX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
490.1	$3s^23p\ ^2P^o_{1/2}$	$3s^23p\ ^2P^o_{3/2}$	0	204 020		M1	7.60+4	B	70°, 77, 81*
186.22^T	$3s^23p\ ^2P^o_{1/2}$	$3s3p^2\ ^4P_{1/2}$	0	[538 435]					77
163.17	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2D_{3/2}$	204 020	816 860	1000				80
140.77^T	3/2	5/2	204 020	914 330					77
122.420^S	1/2	3/2	0	816 860	10				77, 79°
145.50	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2P_{1/2}$	204 020	891 280	300				80
114.087^S	3/2	3/2	204 020	1 080 540	3				77, 79°
112.17^T	1/2	1/2	0	891 280					77
92.546^S	1/2	3/2	0	1 080 540	30				77, 79°
112.16^T	$3s^23p\ ^2P^o_{3/2}$	$3s3p^2\ ^2S_{1/2}$	204 020	1 095 240					77
91.27	1/2	1/2	0	1 095 240	1500bl				77, 80°
105.618^S	$3s^23p\ ^2P^o_{3/2}$	$3s^23d\ ^2D_{3/2}$	204 020	1 150 820	7				77, 79°
104.372^S	3/2	5/2	204 020	1 162 130	3				77, 79°
86.86^T	1/2	3/2	0	1 150 820					77
18.056	$3s^23d\ ^2D_{5/2}$	$3s^24f\ ^2F^o_{7/2}$	1 162 130	6 701 000					78
17.964	3/2	5/2	1 150 820	6 718 000					78
18.004	$3s^23p\ ^2P^o_{3/2}$	$3s^24s\ ^2S_{1/2}$	204 020	5 760 000					78
17.355	1/2	1/2	0	5 760 000					78

Mo XXXI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
609.8	$3s3p\ ^3P^o_2$	$3s3p\ ^1P^o_1$	698 160	862 060		M1	9.56+3	C	70°, 81*
577.5	$3s3p\ ^3P^o_1$	$3s3p\ ^3P^o_2$	525 030	698 160		M1	6.33+4	C	70°, 81*
190.466	$3s^2\ ^1S_0$	$3s3p\ ^3P^o_1$	0	525 030					69, 83°, 84, 85
155.339	$3s3p\ ^3P^o_1$	$3p^2\ ^3P_0$	525 030	1 168 780					80
123.38	$_1$	$_1$	525 030	1 335 450					80
121.870	$_2$	$_2$	698 160	1 518 870					80
100.620	$_1$	$_2$	525 030	1 518 870	2				80, 83, 86°
143.10	$3s3p\ ^1P^o_1$	$3s3d\ ^3D_2$	862 060	1 560 630					80
136.066	$3s3d\ ^3D_3$	$3p3d\ ^3F^o_4$	1 585 980	2 320 910	2				80, 86°
133.210	$3s3d\ ^1D_2$	$3p3d\ ^1F^o_3$	1 739 970	2 490 670	3				80, 86°
131.905	$3p3d\ ^1F^o_3$	$3d^2\ ^1G_4$	2 490 670	3 248 790	3bl				86
124.54	$3s3p\ ^1P^o_1$	$3p^2\ ^1S_0$	862 060	1 664 960					80
124.236	$3s3p\ ^3P^o_1$	$3p^2\ ^1D_2$	525 030	1 329 950	1				80, 86°
121.373	$3p3d\ ^3D^o_3$	$3d^2\ ^3F_4$	2 362 430	3 186 340	3				86
118.797	$3p^2\ ^3P_1$	$3p3d\ ^1D^o_2$	1 335 450	2 177 240	1				86
118.560	$3p^2\ ^3P_2$	$3p3d\ ^3D^o_3$	1 518 870	2 362 430	2				86
97.964	$_0$	$_1$	1 168 780	2 189 530	3				86
115.999	$3s^2\ ^1S_0$	$3s3p\ ^1P^o_1$	0	862 060	5bl				29,46,69,78,82, 83°, 86
115.988	$3s3p\ ^3P^o_2$	$3s3d\ ^3D_2$	698 160	1 560 630	5bl				86
112.640	$_2$	$_3$	698 160	1 585 980	3				46, 78, 82, 83, 86°
98.224	$_1$	$_1$	525 030	1 543 100	3bl				80, 86°
96.563	$_1$	$_2$	525 030	1 560 630	2				46, 86°
94.737	$_0$	$_1$	487 560	1 543 100	5bl				86
115.555	$3p3d\ ^3F^o_4$	$3d^2\ ^3F_4$	2 320 910	3 186 340	1				86
100.430	$_3$	$_3$	2 162 220+x	3 157 940+x	2				86
94.737	$_2$	$_2$	2 069 150+x	3 124 800+x	5bl				86
113.897	$3s3p\ ^1P^o_1$	$3s3d\ ^1D_2$	862 060	1 739 970	3				46, 78, 82, 83, 86°
101.081	$3p^2\ ^1D_2$	$3p3d\ ^3D^o_2$	1 329 950	2 319 210	2				86
96.839	$_2$	$_3$	1 329 950	2 362 430	4bl				86
98.224	$3p3d\ ^3D^o_1$	$3d^2\ ^3P_0$	2 189 530	3 207 640	3bl				86
96.839	$3p^2\ ^3P_1$	$3p3d\ ^3P^o_1$	1 335 450	2 368 610	4bl				86
96.471	$3p3d\ ^1D^o_2$	$3d^2\ ^1D_2$	2 177 240	3 213 700	2				86
95.358	$3p3d\ ^1D^o_2$	$3d^2\ ^3P_1$	2 177 240	3 225 800	2				86
86.150	$3p^2\ ^1D_2$	$3p3d\ ^1F^o_3$	1 329 950	2 490 670	3				86
17.871	$3s3d\ ^1D_2$	$3s4f\ ^1F^o_3$	1 739 970	7 335 700					78
17.578	$3s3d\ ^3D_3$	$3s4f\ ^3F^o_3$	1 585 980	7 275 000					78
17.556	$_3$	$_4$	1 585 980	7 282 000					78
17.500	$_2$	$_3$	1 560 630	7 275 000					78
17.445	$_1$	$_2$	1 543 100	7 275 100					78
14.928	$3s^2\ ^1S_0$	$3s4p\ ^3P^o_1$	0	6 698 800					78
14.745	$3s^2\ ^1S_0$	$3s4p\ ^1P^o_1$	0	6 782 000					44, 46, 78°

Mo XXXII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
176.648[S]	$3s\ ^2S_{1/2}$	$3p\ ^2P^o_{1/2}$	0	566 098	1				29, 46, 78△, 87°, 108
127.868[S]	$1/2$	$3/2$	0	782 056	25				29, 46, 78△, 87°, 108
134.615[S]	$2p^63p\ ^2P^o_{3/2}$	$2p^63d\ ^2D_{3/2}$	782 056	1 524 931					80, 87°
126.979[S]	$3p\ ^2P^o_{3/2}$	$3d\ ^2D_{5/2}$	782 056	1 569 588	20				46, 78△, 87°
104.291[S]	$1/2$	$3/2$	566 098	1 524 931	20				46, 78△, 87°
39.272	$4f\ ^2F^o_{7/2}$	$5g\ ^2G_{9/2}$	7 400 800	9 947 200					88
39.183	$5/2$	$7/2$	7 392 800	9 944 900					88
37.305	$4d\ ^2D_{5/2}$	$5f\ ^2F^o_{5/2}$	7 251 600	9 933 300					88
37.239	$5/2$	$7/2$	7 251 600	9 937 000					88
37.012	$3/2$	$5/2$	7 231 500	9 933 300					88
18.72	$3d\ ^2D_{3/2}$	$4p\ ^2P^o_{1/2}$	1 524 931	6 865 500	1				78
18.581	$5/2$	$3/2$	1 569 588	6 951 500	26				46, 78△, 88°
18.431	$3/2$	$3/2$	1 524 931	6 951 500	5				78
17.172	$3d\ ^2D_{5/2}$	$4f\ ^2F^o_{5/2}$	1 569 588	7 392 800	3				78△, 88°
17.149[S]	$5/2$	$7/2$	1 569 588	7 400 800	45				44, 46, 78△, 87°
17.042[S]	$3/2$	$5/2$	1 524 931	7 392 800	35				46, 78△, 87°
17.097	$3p\ ^2P^o_{3/2}$	$4s\ ^2S_{1/2}$	782 056	6 630 700	5				44, 46, 78△, 88°
16.490	$1/2$	$1/2$	566 098	6 630 700	10				46, 78△, 88°
15.506	$3p\ ^2P^o_{3/2}$	$4d\ ^2D_{3/2}$	782 056	7 231 500	7				46, 78△, 88°
15.457	$3/2$	$5/2$	782 056	7 251 600	35				46, 78△, 88°
15.002	$1/2$	$3/2$	566 098	7 231 500	22				46, 78△, 88°
14.566	$3s\ ^2S_{1/2}$	$4p\ ^2P^o_{1/2}$	0	6 865 500	19				46, 78△, 88°
14.382	$1/2$	$3/2$	0	6 951 500	27				44, 46°, 78△
12.284	$3d\ ^2D_{5/2}$	$5p\ ^2P^o_{3/2}$	1 569 588	9 735 200	1				78
11.957	$3d\ ^2D_{5/2}$	$5f\ ^2F^o_{7/2}$	1 569 588	9 937 000	17				46, 78°
11.898	$3/2$	$5/2$	1 524 931	9 933 300	8				46, 78°
11.011	$3p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	782 056	9 863 900	11				46, 78°
10.767	$1/2$	$3/2$	566 098	9 853 700	5				46, 78°
10.323	$3s\ ^2S_{1/2}$	$5p\ ^2P^o_{1/2}$	0	9 687 100	2				46
10.272	$1/2$	$3/2$	0	9 735 200	3				46
10.241	$3d\ ^2D_{5/2}$	$6f\ ^2F^o_{7/2}$	1 569 588	11 334 300	3				46
10.197	$3/2$	$5/2$	1 524 931	11 331 700	2				46

Mo XXXIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
5.2069	$2p^6\ ^1S_0$	$2p^53s\ ^3P^\circ_1$	0	19 205 000	9				44, 90, 92$^\triangle$, 93°, 94
4.9828	$2p^6\ ^1S_0$	$2p^53s\ ^1P^\circ_1$	0	20 069 000	6				44, 90, 92$^\triangle$, 93°, 94
4.8516	$2p^6\ ^1S_0$	$2p^53d\ ^3P^\circ_1$	0	20 612 000	7				91°, 92$^\triangle$, 94
4.8044	$2p^6\ ^1S_0$	$2p^53d\ ^3D^\circ_1$	0	20 814 000	10				44, 90, 91, 92$^\triangle$, 93°, 94
4.6325	$2p^6\ ^1S_0$	$2p^53d\ ^1P^\circ_1$	0	21 587 000	8				90, 91, 92$^\triangle$, 93°, 94
4.4653	$2s^22p^6\ ^1S_0$	$2s2p^63p\ ^3P^\circ_1$	0	22 395 000	5				90, 91, 92$^\triangle$, 93°, 94
4.4184	$2s^22p^6\ ^1S_0$	$2s2p^63p\ ^1P^\circ_1$	0	22 633 000	4				90, 91, 92$^\triangle$, 93°, 94
3.809	$2p^6\ ^1S_0$	$2p^54s\ ^3P^\circ_1$	0	26 250 000	2				94°, 95
3.763	$2p^6\ ^1S_0$	$2p^54s\ ^1P^\circ_1$	0	26 570 000	1				94°, 95
3.684	$2p^6\ ^1S_0$	$2p^54d\ ^3D^\circ_1$	0	27 140 000	12				94°, 95
3.636	$2p^6\ ^1S_0$	$2p^54d\ ^1P^\circ_1$	0	27 500 000	7				94°, 95
3.42	$2p^6\ ^1S_0$	$2p^55d\ ^3D^\circ_1$	0	29 200 000	4				95
3.32	$2p^6\ ^1S_0$	$2p^55d\ ^1P^\circ_1$	0	30 100 000	2				95
3.26	$2p^6\ ^1S_0$	$2p^56d\ ^3D^\circ_1$	0	30 700 000	2				95
3.18	$2p^6\ ^1S_0$	$2p^56d\ ^3P^\circ_1$	0	31 400 000	1				95
3.18	$2p^6\ ^1S_0$	$2p^57d\ ^3D^\circ_1$	0	31 400 000	1				95
3.09	$2p^6\ ^1S_0$	$2p^57d\ ^1P^\circ_1$	0	32 400 000	1				95

Mo XXXIV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
112.828	$2p^5\ ^2P^o_{3/2}$	$2p^5\ ^2P^o_{1/2}$	0	886 305	M1		1.24+7	B	81*, 97, 98°, 111
56.527	$2s^22p^5\ ^2P^o_{1/2}$	$2s2p^6\ ^2S_{1/2}$	886 305	2 655 300					97
37.661	$_{3/2}$	$_{1/2}$	0	2 655 300					97
5.536	$2p^5\ ^2P^o_{3/2}$	$2p^4(^3P)3d\ ^2F_{5/2}$	0	18 064 000					96
4.550	$2p^5\ ^2P^o_{3/2}$	$2p^4(^3P)3d\ ^2D_{3/2}$	0	21 978 000					96
4.521	$_{3/2}$	$_{5/2}$	0	22 119 000					96
4.512	$2p^5\ ^2P^o_{3/2}$	$2p^4(^1D)3d\ ^2S_{1/2}$	0	22 163 000					96
4.506	$2p^5\ ^2P^o_{3/2}$	$2p^4(^1D)3d\ ^2F_{5/2}$	0	22 193 000					96
4.506	$2p^5\ ^2P^o_{3/2}$	$2p^4(^1D)3d\ ^2P_{3/2}$	0	22 193 000					96
4.472	$_{3/2}$	$_{1/2}$	0	22 361 000					96
4.503	$2p^5\ ^2P^o_{3/2}$	$2p^4(^1D)3d\ ^2D_{5/2}$	0	22 207 000					96
4.480	$_{3/2}$	$_{3/2}$	0	22 321 000					96
4.493	$2p^5\ ^2P^o_{1/2}$	$2p^4(^1S)3d\ ^2D_{3/2}$	886 305	23 143 000					96

Mo XXXV

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
71.223	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^3P^o_2$	976 560	2 380 360	1				101
59.590	$_2$	$_1$	976 560	2 654 560	1				101
65.933	$2s^22p^4\ ^3P_1$	$2s2p^5\ ^3P^o_2$	863 620	2 380 360	2				101
55.842	$_1$	$_1$	863 620	2 654 560	1				101
42.014	$_2$	$_2$	0	2 380 360	5				101
41.221	$_1$	$_0$	863 620	3 289 690	2				101
40.866	$_0$	$_1$	208 080	2 654 560	3				101
37.661	$_2$	$_1$	0	2 654 560	10bl				101
62.135	$2s^22p^4\ ^1S_0$	$2s2p^5\ ^1P^o_1$	1 920 420	3 530 130	1				101
57.362	$2s2p^5\ ^1P^o_1$	$2p^6\ ^1S_0$	3 530 130	5 273 440	3				101
39.161	$2s^22p^4\ ^1D_2$	$2s2p^5\ ^1P^o_1$	976 560	3 530 130	5bl				101
38.187	$2s2p^5\ ^3P^o_1$	$2p^6\ ^1S_0$	2 654 560	5 273 440	3				101
37.483	$2s^22p^4\ ^3P_1$	$2s2p^5\ ^1P^o_1$	863 620	3 530 130	1bl				101

Mo XXXVIII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
121.098	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^4P_{5/2}$	964 360	1 790 130					98
111.85	$_{1/2}$	$_{1/2}$	0	894 050	bl				98
103.696	$2s^22p\ ^2P^o_{1/2}$	$2s^22p\ ^2P^o_{3/2}$	0	964 360		M1	7.94+6	B	98
47.553	$2s^22p\ ^2P^o_{1/2}$	$2s2p^2\ ^2D_{3/2}$	0	2 102 900					98
46.570	$2s^22p\ ^2P^o_{1/2}$	$2s2p^2\ ^2S_{1/2}$	0	2 147 300					98
45.446	$2s^22p\ ^2P^o_{3/2}$	$2s2p^2\ ^2P_{1/2}$	964 360	3 164 770					98
45.312	$_{3/2}$	$_{3/2}$	964 360	3 171 300					98

Mo XXXIX

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
137.787	$2s^2\ ^1S_0$	$2s2p\ ^3P^\circ_1$	0	725 758					102
49.904	$2s^2\ ^1S_0$	$2s2p\ ^1P^\circ_1$	0	2 003 847					102

Mo XL

Wavelength (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
143.997^{S}	$1s^22s\ ^2S_{1/2}$	$1s^22p\ ^2P^o_{1/2}$	0	694 460					102, 104°
58.4912^{S}	1/2	3/2	0	1 709 658					102, 104°
98.5030^{C}	$1s^22p\ ^2P^o_{1/2}$	$1s^22p\ ^2P^o_{3/2}$	694 460	1 709 658		M1			
24.9287^{C}	$1s^24p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	[35 000 550]	[39 011 990]					
24.8031^{C}	3/2	5/2	[35 000 550]	[39 032 310]					
24.1666^{C}	1/2	3/2	[34 874 050]	[39 011 990]					
11.8550^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	[26 358 700]	[34 793 960]					
11.4473^{C}	1/2	1/2	[26 058 250]	[34 793 960]					
11.5334^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	[26 358 700]	[35 029 200]					
11.4808^{C}	3/2	5/2	[26 358 700]	[35 068 860]					
11.1471^{C}	1/2	3/2	[26 058 250]	[35 029 200]					
11.1020^{C}	$1s^23s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	[25 866 700]	[34 874 050]					
10.9483^{C}	1/2	3/2	[25 866 700]	[35 000 550]					
7.97876^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	[26 358 700]	[38 891 980]					
7.79197^{C}	1/2	1/2	[26 058 250]	[38 891 980]					
7.90308^{C}	$1s^23p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	[26 358 700]	[39 011 990]					
7.89041^{C}	3/2	5/2	[26 358 700]	[39 032 310]					
7.71978^{C}	1/2	3/2	[26 058 250]	[39 011 990]					
4.139580^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^23s\ ^2S_{1/2}$	1 709 658	[25 866 700]					105
3.972630^{C}	1/2	1/2	694 460	[25 866 700]					105
4.045765^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^23d\ ^2D_{3/2}$	1 709 658	[26 426 860]					105
4.030462^{C}	3/2	5/2	1 709 658	[26 520 710]					105
3.886151^{C}	1/2	3/2	694 460	[26 426 860]					105
3.837556^{C}	$1s^22s\ ^2S_{1/2}$	$1s^23p\ ^2P^o_{1/2}$	0	[26 058 250]					105
3.793814^{C}	1/2	3/2	0	[26 358 700]					105
3.022582^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^24s\ ^2S_{1/2}$	1 709 658	[34 793 960]					105
2.932594^{C}	1/2	1/2	694 460	[34 793 960]					105
3.001242^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^24d\ ^2D_{3/2}$	1 709 658	[35 029 200]					105
2.997674^{C}	3/2	5/2	1 709 658	[35 068 860]					105
2.912502^{C}	1/2	3/2	694 460	[35 029 200]					105
2.867462^{C}	$1s^22s\ ^2S_{1/2}$	$1s^24p\ ^2P^o_{1/2}$	0	[34 874 050]					105
2.857098^{C}	1/2	3/2	0	[35 000 550]					105
2.689450^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^25s\ ^2S_{1/2}$	1 709 658	[38 891 980]					105
2.617971^{C}	1/2	1/2	694 460	[38 891 980]					105
2.680798^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s^25d\ ^2D_{3/2}$	1 709 658	[39 011 990]					105
2.679338^{C}	3/2	5/2	1 709 658	[39 032 310]					105
2.609772^{C}	1/2	3/2	694 460	[39 011 990]					105
2.568532^{C}	$1s^22s\ ^2S_{1/2}$	$1s^25p\ ^2P^o_{1/2}$	0	[38 932 740]					105
2.564275^{C}	1/2	3/2	0	[38 997 370]					105
0.70487^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s2s^2\ ^2S_{1/2}$	1 709 658	[143 551 000]					105
0.70014^{C}	1/2	1/2	694 460	[143 551 000]					105
0.69911^{C}	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^4P_{1/2}$	1 709 658	[144 721 000]					105
0.69533^{C}	3/2	3/2	1 709 658	[145 499 000]					105
0.69445^{C}	1/2	1/2	694 460	[144 721 000]					105
0.69072^{C}	1/2	3/2	694 460	[145 499 000]					105
0.69013^{C}	3/2	5/2	1 709 658	[146 582 000]					105
0.68559^{C}	1/2	5/2	694 460	[146 582 000]					103,105
0.69554^{C}	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^4P^o_{1/2}$	0	[143 773 000]					105
0.69501^{C}	1/2	3/2	0	[143 883 000]					105

Mo XL – Continued

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
0.69482[C]	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1D)\ ^2D_{5/2}$	1 709 658	[145 604 000]					105
0.69381[C]	3/2	3/2	1 709 658	[145 813 000]					103,105
0.68923[C]	1/2	3/2	694 460	[145 813 000]					103,105
0.69417[C]	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^3P)\ ^2P_{1/2}$	1 709 658	[145 738 000]					105
0.68958[C]	1/2	1/2	694 460	[145 738 000]					105
0.68898[C]	3/2	3/2	1 709 658	[146 823 000]					105
0.68446[C]	1/2	3/2	694 460	[146 823 000]					103,105
0.69275[C]	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^3P^o)\ ^2P^o_{1/2}$	0	[144 352 000]					105
0.68913[C]	1/2	3/2	0	[145 111 000]					103,105
0.68814[C]	$1s^22p\ ^2P^o_{3/2}$	$1s(^2S)2p^2(^1S)\ ^2S_{1/2}$	1 709 658	[147 001 000]					103,105
0.68363[C]	1/2	1/2	694 460	[147 001 000]					105
0.68809[C]	$1s^22s\ ^2S_{1/2}$	$1s(^2S)2s2p(^1P^o)\ ^2P^o_{1/2}$	0	[145 330 000]					103,105
0.68763[C]	1/2	3/2	0	[145 427 000]					105

Mo XLI

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4320^{C}	$1s4p\ ^3P^o_2$	$1s4d\ ^3D_2$	[180 411 970]	[180 435 100]					
1500^{C}	2	3	[180 411 970]	[180 478 600]					
653^{C}	1	2	[180 281 880]	[180 435 100]					
644^{C}	1	1	[180 281 880]	[180 437 200]					
639^{C}	0	1	[180 280 590]	[180 437 200]					
3857^{C}	$1s5s\ ^3S_1$	$1s5p\ ^3P^o_1$	[184 517 020]	[184 542 940]					
1082^{C}	1	2	[184 517 020]	[184 609 430]					
1946^{C}	$1s4s\ ^3S_1$	$1s4p\ ^3P^o_1$	[180 230 480]	[180 281 880]					
551.0^{C}	1	2	[180 230 480]	[180 411 970]					
1258^{C}	$1s5s\ ^1S_0$	$1s5p\ ^1P^o_1$	[184 542 600]	[184 622 090]					
796.75^{C}	$1s3s\ ^3S_1$	$1s3p\ ^3P^o_1$	[170 903 110]	[171 028 620]					
230.32^{C}	1	2	[170 903 110]	[171 337 280]					
640.25^{C}	$1s4s\ ^1S_0$	$1s4p\ ^1P^o_1$	[180 280 820]	[180 437 010]					
269.78^{C}	$1s3s\ ^1S_0$	$1s3p\ ^1P^o_1$	[171 027 460]	[171 398 130]					
224.12^{C}	$1s2s\ ^3S_1$	$1s2p\ ^3P^o_0$	[143 972 040]	[144 418 220]					
218.49^{C}	1	1	[143 972 040]	[144 429 730]					
66.9344^{C}	1	2	[143 972 040]	[145 466 040]					
80.3536^{C}	$1s2s\ ^1S_0$	$1s2p\ ^1P^o_1$	[144 441 300]	[145 685 800]					
58.3512^{C}	$1s2s\ ^3S_1$	$1s2p\ ^1P^o_1$	[143 972 040]	[145 685 800]					
24.3602^{C}	$1s4p\ ^3P^o_2$	$1s5s\ ^3S_1$	[180 411 970]	[184 517 020]					
23.6120^{C}	1	1	[180 281 880]	[184 517 020]					
24.3570^{C}	$1s4p\ ^1P^o_1$	$1s5s\ ^1S_0$	[180 437 010]	[184 542 600]					
23.1886^{C}	$1s4s\ ^3S_1$	$1s5p\ ^3P^o_1$	[180 230 480]	[184 542 940]					
23.0347^{C}	$1s4s\ ^1S_0$	$1s5p\ ^1P^o_1$	[180 280 820]	[184 622 090]					
11.2579^{C}	$1s3p\ ^1P^o_1$	$1s4s\ ^1S_0$	[171 398 130]	[180 280 820]					
11.257^{C}	$1s3d\ ^3D_1$	$1s4p\ ^3P^o_0$	[171 397 400]	[180 280 590]					
11.256^{C}	1	1	[171 397 400]	[180 281 880]					
11.249^{C}	2	1	[171 392 500]	[180 281 880]					
11.215^{C}	3	2	[171 495 500]	[180 411 970]					
11.087^{C}	2	2	[171 392 500]	[180 411 970]					
11.2445^{C}	$1s3p\ ^3P^o_2$	$1s4s\ ^3S_1$	[171 337 280]	[180 230 480]					
10.8674^{C}	1	1	[171 028 620]	[180 230 480]					
10.992^{C}	$1s3p\ ^3P^o_2$	$1s4d\ ^3D_2$	[171 337 280]	[180 435 100]					
10.939^{C}	2	3	[171 337 280]	[180 478 600]					
10.6310^{C}	1	2	[171 028 620]	[180 435 100]					
10.629^{C}	1	1	[171 028 620]	[180 437 200]					
10.625^{C}	0	1	[171 025 510]	[180 437 200]					
10.6624^{C}	$1s3s\ ^3S_1$	$1s4p\ ^3P^o_1$	[170 903 110]	[180 281 880]					
10.5165^{C}	1	2	[170 903 110]	[180 411 970]					
10.6275^{C}	$1s3s\ ^1S_0$	$1s4p\ ^1P^o_1$	[171 027 460]	[180 437 010]					
7.607762^{C}	$1s3p\ ^1P^o_1$	$1s5s\ ^1S_0$	[171 398 130]	[184 542 600]					
7.58740^{C}	$1s3p\ ^3P^o_2$	$1s5s\ ^3S_1$	[171 337 280]	[184 517 020]					
7.413778^{C}	1	1	[171 028 620]	[184 517 020]					
7.355846^{C}	$1s3s\ ^1S_0$	$1s5p\ ^1P^o_1$	[171 027 460]	[184 622 090]					
7.331470^{C}	$1s3s\ ^3S_1$	$1s5p\ ^3P^o_1$	[170 903 110]	[184 542 940]					
7.29590^{C}	1	2	[170 903 110]	[184 609 430]					
3.946071^{C}	$1s2p\ ^1P^o_1$	$1s3s\ ^1S_0$	[145 685 800]	[171 027 460]					
3.931270^{C}	$1s2p\ ^3P^o_2$	$1s3s\ ^3S_1$	[145 466 040]	[170 903 110]					
3.777379^{C}	1	1	[144 429 730]	[170 903 110]					

Mo XLI – Continued

Wave-length (Å)	Classification Lower	Classification Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
3.85706[C]	$1s2p\ ^3P^o_2$	$1s3d\ ^3D_2$	[145 466 040]	[171 392 500]					
3.84180[C]	2	3	[145 466 040]	[171 495 500]					
3.70882[C]	1	2	[144 429 730]	[171 392 500]					
3.70814[C]	1	1	[144 429 730]	[171 397 400]					
3.70656[C]	0	1	[144 418 220]	[171 397 400]					
3.709635[C]	$1s2s\ ^1S_0$	$1s3p\ ^1P^o_1$	[144 441 300]	[171 398 130]					
3.695959[C]	$1s2s\ ^3S_1$	$1s3p\ ^3P^o_1$	[143 972 040]	[171 028 620]					
3.654271[C]	1	2	[143 972 040]	[171 337 280]					
2.890589[C]	$1s2p\ ^1P^o_1$	$1s4s\ ^1S_0$	[145 685 800]	[180 280 820]					
2.876503[C]	$1s2p\ ^3P^o_2$	$1s4s\ ^3S_1$	[145 466 040]	[180 230 480]					
2.793238[C]	1	1	[144 429 730]	[180 230 480]					
2.85967[C]	$1s2p\ ^3P^o_2$	$1s4d\ ^3D_2$	[145 466 040]	[180 435 100]					
2.85612[C]	2	3	[145 466 040]	[180 478 600]					
2.77736[C]	1	2	[144 429 730]	[180 435 100]					
2.77720[C]	1	1	[144 429 730]	[180 437 200]					
2.77631[C]	0	1	[144 418 220]	[180 437 200]					
2.778109[C]	$1s2s\ ^1S_0$	$1s4p\ ^1P^o_1$	[144 441 300]	[180 437 010]					
2.754074[C]	$1s2s\ ^3S_1$	$1s4p\ ^3P^o_1$	[143 972 040]	[180 281 880]					
2.744242[C]	1	2	[143 972 040]	[180 411 970]					
2.573552[C]	$1s2p\ ^1P^o_1$	$1s5s\ ^1S_0$	[145 685 800]	[184 542 600]					
2.560755[C]	$1s2p\ ^3P^o_2$	$1s5s\ ^3S_1$	[145 466 040]	[184 517 020]					
2.494556[C]	1	1	[144 429 730]	[184 517 020]					
2.488751[C]	$1s2s\ ^1S_0$	$1s5p\ ^1P^o_1$	[144 441 300]	[184 622 090]					
2.464821[C]	$1s2s\ ^3S_1$	$1s5p\ ^3P^o_1$	[143 972 040]	[184 542 940]					
2.460788[C]	1	2	[143 972 040]	[184 609 430]					
0.6945793[C]	$1s^2\ ^1S_0$	$1s2s\ ^3S_1$	0	[143 972 040]		M1			
0.6923782[C]	$1s^2\ ^1S_0$	$1s2p\ ^3P^o_1$	0	[144 429 730]					103,110
0.6874457[C]	0	2	0	[145 466 040]					103,110
0.6864087[C]	$1s^2\ ^1S_0$	$1s2p\ ^1P^o_1$	0	[145 685 800]					103,110
0.68436[C]	$1s2p\ ^1P^o_1$	$2s^2\ ^1S_0$	[145 685 800]	[291 776 000]					105
0.68139[C]	$1s2p\ ^1P^o_1$	$2p^2\ ^3P_0$	[145 685 800]	[292 412 000]					105
0.67743[C]	1	1	[145 685 800]	[293 271 000]					105
0.67209[C]	1	2	[145 685 800]	[294 454 000]					105
0.67882[C]	$1s2p\ ^3P^o_1$	$2s^2\ ^1S_0$	[144 429 730]	[291 776 000]					105
0.67785[C]	$1s2s\ ^1S_0$	$2s2p\ ^3P^o_1$	[144 441 300]	[291 964 000]					105
0.67696[C]	$1s2p\ ^1P^o_1$	$2p^2\ ^1D_2$	[145 685 800]	[293 384 000]					105°,110
0.67642[C]	$1s2p\ ^3P^o_2$	$2p^2\ ^3P_1$	[145 466 040]	[293 271 000]					105
0.67591[C]	1	0	[144 429 730]	[292 412 000]					105
0.67200[C]	1	1	[144 429 730]	[293 271 000]					105
0.67194[C]	0	1	[144 418 220]	[293 271 000]					105
0.67110[C]	2	2	[145 466 040]	[294 454 000]					105
0.66675[C]	1	2	[144 429 730]	[294 454 000]					105
0.67629[C]	$1s2s\ ^3S_1$	$2s2p\ ^3P^o_0$	[143 972 040]	[291 839 000]					105
0.67572[C]	1	1	[143 972 040]	[291 964 000]					105
0.67125[C]	1	2	[143 972 040]	[292 948 000]					105°,110
0.67595[C]	$1s2p\ ^3P^o_2$	$2p^2\ ^1D_2$	[145 466 040]	[293 384 000]					105
0.67154[C]	1	2	[144 429 730]	[293 384 000]					105
0.67149[C]	$1s2s\ ^1S_0$	$2s2p\ ^1P^o_1$	[144 441 300]	[293 363 000]					105
0.67053[C]	$1s2p\ ^1P^o_1$	$2p^2\ ^1S_0$	[145 685 800]	[294 789 000]					105°,110

Mo XLI – Continued

Wavelength (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
0.66939[C]	$1s2s\ ^3S_1$	$2s2p\ ^1P^o_1$	[143 972 040]	[293 363 000]					105
0.66522[C]	$1s2p\ ^3P^o_1$	$2p^2\ ^1S_0$	[144 429 730]	[294 789 000]					105
0.5846975[C]	$1s^2\ ^1S_0$	$1s3p\ ^3P^o_1$	0	[171 028 620]					
0.5834369[C]	$1s^2\ ^1S_0$	$1s3p\ ^1P^o_1$	0	[171 398 130]					
0.5546869[C]	$1s^2\ ^1S_0$	$1s4p\ ^3P^o_1$	0	[180 281 880]					
0.5542100[C]	$1s^2\ ^1S_0$	$1s4p\ ^1P^o_1$	0	[180 437 010]					
0.5418793[C]	$1s^2\ ^1S_0$	$1s5p\ ^3P^o_1$	0	[184 542 940]					
0.5416470[C]	$1s^2\ ^1S_0$	$1s5p\ ^1P^o_1$	0	[184 622 090]					

Mo XLII

Wave-length (Å)	Classification Lower	Upper	Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
284.07[C]	$3s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[176 157 810]	[176 509 840]					
279.03[C]	$3p\ ^2P^o_{1/2}$	$3d\ ^2D_{3/2}$	[176 150 710]	[176 509 090]					
84.302[C]	$2s\ ^2S_{1/2}$	$2p\ ^2P^o_{3/2}$	[148 322 460]	[149 508 670]					
10.5838[C]	$3d\ ^2D_{5/2}$	$4f\ ^2F^o_{7/2}$	[176 623 450]	[186 071 880]					
10.4841[C]	$3p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[176 509 840]	[186 048 050]					
10.1603[C]	$3s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[176 157 810]	[186 000 030]					
7.24266[C]	$3d\ ^2D_{5/2}$	$5f\ ^2F^o_{7/2}$	[176 623 450]	[190 430 530]					
7.18986[C]	$3p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[176 509 840]	[190 418 320]					
7.02448[C]	$3s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[176 157 810]	[190 393 730]					
3.688025[C]	$2p\ ^2P^o_{3/2}$	$3d\ ^2D_{5/2}$	[149 508 670]	[176 623 450]					
3.547687[C]	$2s\ ^2S_{1/2}$	$3p\ ^2P^o_{3/2}$	[148 322 460]	[176 509 840]					
2.736773[C]	$2p\ ^2P^o_{3/2}$	$4d\ ^2D_{5/2}$	[149 508 670]	[186 048 050]					
2.654099[C]	$2s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	[148 322 460]	[186 000 030]					
2.444411[C]	$2p\ ^2P^o_{3/2}$	$5d\ ^2D_{5/2}$	[149 508 670]	[190 418 320]					
2.376919[C]	$2s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	[148 322 460]	[190 393 730]					
0.6743144[C]	$1s\ ^2S_{1/2}$	$2p\ ^2P^o_{1/2}$	0	[148 298 780]					
0.6688575[C]	$_{1/2}$	$_{3/2}$	0	[149 508 670]					110
0.5676957[C]	$1s\ ^2S_{1/2}$	$3p\ ^2P^o_{1/2}$	0	[176 150 710]					110
0.5665407[C]	$_{1/2}$	$_{3/2}$	0	[176 509 840]					110
0.5376343[C]	$1s\ ^2S_{1/2}$	$4p\ ^2P^o_{3/2}$	0	[186 000 030]					
0.5252274[C]	$1s\ ^2S_{1/2}$	$5p\ ^2P^o_{3/2}$	0	[190 393 730]					

2.11.3. References for Comments and Tables for Mo Ions

[1] M. W. Trawick, Phys. Rev. **46**, 63 (1934).
[2] G. W. Charles, Phys. Rev. **77**, 120 (1950).
[3] B. Edlén, K. Rahimullah, A. Tauheed, and M. S. Z. Chaghtai, Phys. Scr. **32**, 215 (1985).
[4] A. Tauheed, K. Rahimullah, and M. S. Z. Chaghtai, Phys. Rev. A **32**, 237 (1985).
[5] A. Kancerevicius, A. Ramonas, A. N. Ryabtsev, and S. S. Churilov, Lithuanian Phys. J. **31**, 143 (1990).
[6] M. S. Z. Chaghtai, Phys. Scr. **1**, 31 (1970).
[7] J. Reader, G. Epstein, and J. O. Ekberg, J. Opt. Soc. Am. **62**, 273 (1972).
[8] A. Tauheed and M. S. Z. Chaghtai, J. Phys. B **17**, 179 (1984).
[9] J. Reader and U. Feldman, J. Opt. Soc. Am. B **7**, 253 (1990).
[10] M. S. Z. Chaghtai, Phys. Scr. **1**, 109 (1970).
[11] J. O. Ekberg, J. E. Hansen, and J. Reader, J. Opt. Soc. Am. **62**, 1143 (1972).
[12] M. S. Z. Chaghtai, S. P. Singh, and S. Khatoon, J. Phys. B **8**, 1831 (1975).
[13] Z. A. Khan, M. S. Z. Chaghtai, and K. Rahimullah, Phys. Scr. **23**, 837 (1981).
[14] M. S. Z. Chaghtai, L. Rahimullah, and S. Khatoon, Phys. Scr. **14**, 281 (1976).
[15] J. Reader and N. Acquista, J. Opt. Soc. Am. **66**, 896 (1976).
[16] K. Rahimullah, M. S. Z. Chaghtai, and S. Khatoon, Phys. Scr. **18**, 96 (1978).
[17] S. Khatoon, M. S. Z. Chaghtai, and K. Rahimullah, Phys. Scr. **19**, 22 (1979).
[18] K. Rahimullah, M. S. Z. Chaghtai, and S. Khatoon, Phys. Scr. **14**, 221 (1976).
[19] J. Reader and N. Acquista, J. Opt. Soc. Am. **71**, 434 (1981).
[20] N. Ateqad, M. S. Z. Chaghtai, and K. Rahimullah, J. Phys. B **17**, 4617 (1984).
[21] U. Litzén and J. Reader, Phys. Scr. **39**, 468 (1989).
[22] R. D. Cowan, *The Theory of Atomic Structure,* (Univ. California Press, Berkeley, CA, 1981).
[23] E. Alexander, M. Even-Zohar, B. S. Fraenkel, and S. Goldsmith, J. Opt. Soc. Am. **61**, 508 (1971).
[24] L. J. Curtis, J. Reader, S. Goldsmith, B. Denne, and E. Hinnov, Phys. Rev. A **29**, 2248 (1984).
[25] J. Reader, N. Acquista, and S. Goldsmith, J. Opt. Soc. Am. B **3**, 874 (1986).
[26] U. Litzén and J. Reader, Phys. Scr. **39**, 73 (1989).
[27] E. Träbert and E. H. Pinnington, Can. J. Phys. **71**, 128 (1993).
[28] E. Hinnov, L. C. Johnson, E. B. Meservey, and D. L. Dimock, Plasma Phys. **14**, 755 (1972).
[29] E. Hinnov, Phys. Rev. A **14**, 1533 (1976).
[30] J. Reader and N. Acquista, Phys. Rev. Lett. **39**, 184 (1977).
[31] M. Finkenthal, R. E. Bell, H. W. Moos, A. K. Bhatia, E. S. Marmar, J. L. Terry, and J. E. Rice, Phys. Lett. **82A**, 123 (1981).
[32] U. Litzén and K. Ando, Phys. Lett. **100A**, 411 (1984).
[33] J. -F. Wyart, P. Mandelbaum, M. Klapisch, J. -L. Schwob, and N. Schweizer, Phys. Scr. **36**, 224 (1987).
[34] U. Litzén and J. Reader, Phys. Rev. A **36**, 5159 (1987).
[35] U. Litzén and A. Hansson, Phys. Scr. **40**, 468 (1989).
[36] P. G. Burkhalter, J. Reader, and R. D. Cowan, J. Opt. Soc. Am. **70**, 912 (1980).
[37] J. F. Wyart, J. Reader, and A. Ryabtsev, J. Opt. Soc. Am. **71**, 692 (1981).
[38] L. J. Curtis, A. Lindgard, B. Edlén, I. Martinson, and S. E. Nielsen, Phys. Scr. **16**, 72 (1977).
[39] J. Reader, G. Luther, and N. Acquista, J. Opt. Soc. Am. **69**, 144 (1979).
[40] J. Reader, G. Luther, and N. Acquista, J. Opt. Soc. Am. **71**, 204 (1981).
[41] M. Klapisch, P. Mandelbaum, J. L. Schwob, A. Bar-Shalom, and N. Schweitzer, Phys. Lett. **84A**, 177 (1981).
[42] J. F. Wyart, Th. A. M. Van Kleef, A. N. Ryabtsev, and Y. N. Joshi, Phys. Scr. **29**, 319 (1984).
[43] J. Sugar, E. Träbert, G. Möller, P. H. Heckmann, J. H. Blanke, and I. Martinson, Phys. Scr. **43**, 484 (1991).
[44] J. L. Schwob, M. Klapisch, N. Schweitzer, M. Finkenthal, C. Breton, C. DeMichelis, and M. Mattioli, Phys. Lett. **62A**, 85 (1977).
[45] M. Klapisch, J. L. Schwob, M. Finkenthal, B. S. Fraenkel, S. Egert, A. Bar-Shalom, C. Breton, C. DeMichelis, and M. Mattioli, Phys. Rev. Lett. **41**, 403 (1978).
[46] M. W. D. Mansfield, N. J. Peacock, C. C. Smith, M. G. Hobby, and R. D. Cowan, J. Phys. B **11**, 1521 (1978).
[47] N. Schweitzer, M. Klapisch, J. L. Schwob, M. Finkenthal, A. Bar-Shalom, P. Mandelbaum, and B. S. Fraenkel, J. Opt. Soc. Am. **71**, 219 (1981).
[48] A. N. Ryabtsev, S. S. Churilov, and J. F. Wyart, Opt. Spectrosc. **62**, 153 (1987).
[49] T. Brage and U. Litzén, Phys. Scr. **35**, 662 (1987).
[50] J. Sugar and A. Musgrove, J. Phys. Chem. Ref. Data **17**, 155 (1988).
[51] S. Suckewer, E. Hinnov, S. Cohen, M. Finkenthal, and K. Sato, Phys. Rev. A **26**, 1161 (1982).
[52] B. Edlén, Physica **13**, 545 (1947).
[53] K. Ando, J. Phys. Soc. Japan **51**, 15 (1982).
[54] J. F. Wyart, M. Klapisch, J. L. Schwob, and N. Schweitzer, Phys. Scr. **26**, 141 (1982).
[55] A. N. Ryabtsev and J. Reader, J. Opt. Soc. Am. **72**, 710 (1982).
[56] J. -F. Wyart, private communication (1986).
[57] J. Sugar, J. Reader, and W. L. Rowan, Phys. Rev. A **51**, 835 (1995).
[58] K. Ando and K. Ishii, J. Phys. Soc. Japan **54**, 3297 (1985).
[59] T. A. Carlson, C. W. Nestor, Jr., N. Wasserman, and J. D. McDowell, At. Data Nucl. Data Tables **2**, 63 (1970).
[60] M. I. Bogdanovichene, E. Ya. Kononov, G. V. Merkelis, A. A. Ramonas, A. N. Ryabtsev, and S. S. Churilov, Opt. Spectrosc. **49**, 244 (1980).
[61] J. Reader and A. Ryabtsev, J. Opt. Soc. Am. **71**, 231 (1981).
[62] J. Reader and A. Ryabtsev, J. Opt. Soc. Am. **73**, 1207 (1983).
[63] J. F. Wyart, M. Klapisch, J. L. Schwob, N. Schweizer, and P. Mandelbaum, Phys. Scr. **27**, 275 (1983).
[64] J. F. Wyart, M. Klapisch, J. L. Schwob, and P. Mandelbaum, Phys. Scr. **28**, 381 (1983).
[65] H. Kubo, K. Ishii, T. Sugie, M. Shiho, and H. Maeda, JAERI-M Report 86-081 (1986).
[66] J. F. Wyart, A. J. J. Raassen, and P. H. M. Uylings, Phys. Scr. **32**, 169 (1985).
[67] M. Finkenthal, B. C. Stratton, H. W. Moos, W. L. Hodge, S. Suckewer, S. Cohen, P. Mandelbaum, and M. Klapisch, J. Phys. B **18**, 4393 (1985).
[68] V. Kaufman, J. Sugar, and W. L. Rowan, J. Opt. Soc. Am. B **6**, 142 (1989).
[69] J. Sugar, V. Kaufman, and W. L. Rowan, J. Opt. Soc. Am. B **4**, 1927 (1987).
[70] B. Denne, E. Hinnov, S. Suckewer, and S. Cohen, Phys. Rev. A **28**, 206 (1983).
[71] V. Kaufman, J. Sugar, and W. L. Rowan, J. Opt. Soc. Am. B **6**, 1444 (1989).
[72] E. Hinnov, private communication (1985).
[73] V. Kaufman, J. Sugar, and W. L. Rowan, J. Opt. Soc. Am. B **7**, 1169 (1990).
[74] B. Denne, E. Hinnov, S. Suckewer, and J. Timberlake, J. Opt. Soc. Am. B **1**, 296 (1984).
[75] J. Sugar, V. Kaufman, and W. L. Rowan, J. Opt. Soc. Am. B **8**, 22 (1991).
[76] J. Sugar, V. Kaufman, and W. L. Rowan, J. Opt. Soc. Am. B **7**, 152 (1990).
[77] E. Hinnov, F. Boody, S. Cohen, U. Feldman, J. Hosea, K. Sato, J. L. Schwob, S. Suckewer, and A. Wouters, J. Opt. Soc. Am. B **3**, 1288 (1986).

[78] P. G. Burkhalter, J. Reader, and R. D. Cowan, J. Opt. Soc. Am. **67**, 1521 (1977).
[79] J. Sugar, V. Kaufman, and W. L. Rowan, J. Opt. Soc. Am. B **5**, 2183 (1988).
[80] C. Jupén, B. Denne, and I. Martinson, Phys. Scr. **41** 669, (1990).
[81] V. Kaufman and J. Sugar, J. Phys. Chem. Ref. Data **15**, 321 (1986).
[82] J. Reader, J. Opt. Soc. Am. **73**, 796 (1983).
[83] J. Sugar, V. Kaufman, P. Indelicato, and W. L. Rowan, J. Opt. Soc. Am. B **6**, 1437 (1989).
[84] M. Finkenthal, E. Hinnov, S. Cohen, and S. Suckewer, Phys. Lett. **91**, 284 (1982).
[85] J. F. Seely, J. O. Ekberg, U. Feldman, J. L. Schwob, S. Suckewer, and A. Wouters, J. Opt. Soc. Am. B **5**, 602 (1988).
[86] J. O. Ekberg, U. Feldman, J. F. Seely, C. M. Brown, B. J. MacGowan, D. R. Kania, and C. J. Keane, Phys. Scr. **43**, 19 (1991).
[87] J. Reader, V. Kaufman, J. Sugar, J. O. Ekberg, U. Feldman, J. F. Seely, and W. L. Rowan, J. Opt. Soc. Am. B **4**, 1821 (1987).
[88] J. Reader, J. O. Ekberg, U. Feldman, C. M. Brown, and J. F. Seely, J. Opt. Soc. Am. B **7**, 1176 (1990).
[89] B. Edlén, Phys. Scr. **17**, 565 (1978).
[90] E. V. Aglitskii, V. A. Boiko, O. N. Krokhin, S. A. Pikuz, and A. Ya. Faenov, Soviet J. Quant. Electron. **4**, 1152 (1975).
[91] E. V. Aglitskii, E. Ya. Golts, Yu. A. Levykin, A. M. Lifshits, S. L. Mandelstam, and A. S. Safronova, Opt. Spectrosc. **46**, 590 (1979).
[92] H. Gordon, M. G. Hobby, N. J. Peacock, and R. D. Cowan, J. Phys. B **12**, 881 (1979).
[93] E. V. Aglitskii, E. P. Ivanova, S. A. Panin, U. I. Safronova, S. I. Ulityn, L. A. Vainshtein, and J. -F. Wyart, Phys. Scr. **40**, 601 (1989).
[94] P. G. Burkhalter, C. M. Dozier, and D. J. Nagel, Phys. Rev. A **15**, 700 (1977).
[95] P. G. Burkhalter, R. Schneider, C. M. Dozier, and R. D. Cowan, Phys. Rev. A **18**, 718 (1978).
[96] V. A. Boiko, S. A. Pikuz, A. S. Safronova, and A. Ya. Faenov, J. Phys. B **11**, 503 (1978).
[97] J. Reader, C. M. Brown, J. O. Ekberg, U. Feldman, J. F. Seely, and W. E. Behring, J. Opt. Soc. Am. B, **3**, 1609 (1986).
[98] R. Myrnäs, C. Jupén, G. Miecznіak, I. Martinson, and B. Denne-Hinnov, Phys. Scr. **49**, 429 (1994).
[99] K. T. Cheng, unpublished material (1981).
[100] W. C. Martin, unpublished material (1982).
[101] U. Feldman, J. O. Ekberg, J. F. Seely, C. M. Brown, D. R. Kania, B. J. MacGowan, C. J. Keane, and W. E. Behring, J. Opt. Soc. Am. B **8**, 531 (1991).
[102] B. Denne, G. Magyar, and J. Jacquinot, Phys. Rev. A **40**, 3702 (1989).
[103] R. Beier and H. J. Kunze, Z. Physik A **285**, 347 (1978).
[104] Y. -K. Kim, D. H. Baik, P. Indelicato, and J. P. Desclaux, Phys. Rev. A **44**, 148 (1991).
[105] L. A. Vainshtein and U. I. Safronova, Reprint No. 2, Acad. Nauk USSR, Inst. Spectrosc. Moscow (1985).
[106] M. H. Chen, K. T. Cheng, W. R. Johnson, and J. Sapirstein, Phys. Rev. A **52**, 266 (1995).
[107] K. T. Cheng, private communication (1996).
[108] Y. -K. Kim, private communication (1993).
[109] P. Indelicato, Nucl. Instrum. Meth. B **31**, 14 (1988); P. Indelicato, O. Gorceix, and J. P. Desclaux, J. Phys. B **20**, 651 (1987).
[110] J. J. Turechek and H. J. Kunze, Z. Physik A **273**, 111 (1975).
[111] G. A. Doschek and U. Feldman, J. Appl. Phys. **47**, 3083 (1976).
[112] U. Feldman and J. Reader, J. Opt. Soc. Am. B **6**, 264 (1989).

3. FINDING LIST

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
Vacuum		0.745699^C	Kr XXXV	1.204725^C	Cu XXIX	1.4860^C	Cu XXVII
		0.745948^C	Kr XXXV	1.205873^C	Cu XXIX	1.4866^C	Cu XXVII
0.5252274^C	Mo XLII	0.763012^C	Kr XXXV	1.213	Cu XXVII	1.4867^C	Cu XXVII
0.5376343^C	Mo XLII	0.763521^C	Kr XXXV	1.226773^C	Ni XXVIII	1.4889^C	Cu XXVII
0.5416470^C	Mo XLI	0.7765678^C	Kr XXXVI	1.25349^C	Ni XXVII	1.4910^C	Cu XXVII
0.5418793^C	Mo XLI	0.7777188^C	Kr XXXVI	1.25380^C	Ni XXVII	1.4911^C	Cu XXVII
0.5542100^C	Mo XLI	0.803294^C	Kr XXXV	1.25574^C	Cu XXVIII	1.4914^C	Cu XXVII
0.5546869^C	Mo XLI	0.804637^C	Kr XXXV	1.25734^C	Cu XXVIII	1.491750^C	Cu XXVIII
0.5665407^C	Mo XLII	0.91448^C	Kr XXXV	1.272	Cu XXVII	1.4940^C	Cu XXVII
0.5676957^C	Mo XLII	0.91717^C	Kr XXXV	1.28252^C	Ni XXVII	1.4945^C	Cu XXVII
0.5834369^C	Mo XLI	0.9177942^C	Kr XXXVI	1.28316^C	Ni XXVII	1.49460^C	Fe XXV
0.5846975^C	Mo XLI	0.91852^C	Kr XXXV	1.289581^C	Co XXVII	1.4953^C	Cu XXVII
0.66522^C	Mo XLI	0.92027^C	Kr XXXV	1.293381^C	Ni XXVIII	1.49531^C	Fe XXV
0.66675^C	Mo XLI	0.92138^C	Kr XXXV	1.294528^C	Ni XXVIII	1.4959^C	Cu XXVII
0.6688575^C	Mo XLII	0.92160^C	Kr XXXV	1.303	Ni XXVI	1.4963^C	Cu XXVII
0.66939^C	Mo XLI	0.92173^C	Kr XXXV	1.320339^C	Co XXVII	1.4985^C	Cu XXVII
0.67053^C	Mo XLI	0.92198^C	Kr XXXV	1.35006^C	Ni XXVII	1.502350^C	Fe XXVI
0.67110^C	Mo XLI	0.92252^C	Kr XXXV	1.35125^C	Co XXVI	1.503496^C	Fe XXVI
0.67125^C	Mo XLI	0.92271^C	Kr XXXV	1.35158^C	Co XXVI	1.506305^C	Mn XXV
0.67149^C	Mo XLI	0.92300^C	Kr XXXV	1.35173^C	Ni XXVII	1.5090^C	Cu XXVII
0.67154^C	Mo XLI	0.9232377^C	Kr XXXVI	1.367	Ni XXVI	1.5136^C	Cu XXVII
0.67194^C	Mo XLI	0.92592^C	Kr XXXV	1.38252^C	Co XXVI	1.5272^C	Ni XXVII
0.67200^C	Mo XLI	0.92621^C	Kr XXXV	1.38319^C	Co XXVI	1.530340^C	Ni XXVIII
0.67209^C	Mo XLI	0.92623^C	Kr XXXV	1.391696^C	Fe XXVI	1.5313^C	Ni XXVII
0.6743144^C	Mo XLII	0.92670^C	Kr XXXV	1.392065^C	Co XXVII	1.5340^C	Ni XXVII
0.67572^C	Mo XLI	0.92697^C	Kr XXXV	1.393211^C	Co XXVII	1.5346^C	Ni XXVII
0.67591^C	Mo XLI	0.92787^C	Kr XXXV	1.4222^C	Cu XXVIII	1.535769^C	Ni XXVIII
0.67595^C	Mo XLI	0.92861^C	Kr XXXV	1.424905^C	Fe XXVI	1.5378^C	Ni XXVII
0.67629^C	Mo XLI	0.92919^C	Kr XXXV	1.425264^C	Cu XXIX	1.5379^C	Ni XXVII
0.67642^C	Mo XLI	0.93042^C	Kr XXXV	1.4262^C	Cu XXVIII	1.5384^C	Ni XXVII
0.67696^C	Mo XLI	0.93215^C	Kr XXXV	1.4282^C	Cu XXVIII	1.5390^C	Ni XXVII
0.67743^C	Mo XLI	0.93642^C	Kr XXXV	1.4293^C	Cu XXVIII	1.5400^C	Ni XXVII
0.67785^C	Mo XLI	0.94359^C	Kr XXXIV	1.430694^C	Cu XXIX	1.5404^C	Ni XXVII
0.67882^C	Mo XLI	0.94511^C	Kr XXXIV	1.4320^C	Cu XXVIII	1.5415^C	Ni XXVII
0.68139^C	Mo XLI	0.945330	Kr XXXV	1.4321^C	Cu XXVIII	1.542265^C	Mn XXV
0.68363^C	Mo XL	0.94705^C	Kr XXXV	1.4326^C	Cu XXVIII	1.5425^C	Ni XXVII
0.68436^C	Mo XLI	0.94746^C	Kr XXXIV	1.4331^C	Cu XXVIII	1.5429^C	Ni XXVII
0.68446^C	Mo XL	0.94804^C	Kr XXXIV	1.4340^C	Cu XXVIII	1.5432^C	Ni XXVII
0.68559^C	Mo XL	0.94808^C	Kr XXXIV	1.4344^C	Cu XXVIII	1.5436^C	Ni XXVII
0.6864087^C	Mo XLI	0.94961^C	Kr XXXIV	1.4353^C	Cu XXVIII	1.5443^C	Ni XXVII
0.6874457^C	Mo XLI	0.94963^C	Kr XXXIV	1.4366^C	Cu XXVIII	1.5466^C	Ni XXVII
0.68763^C	Mo XL	0.94995^C	Kr XXXIV	1.4370^C	Cu XXVIII	1.5480^C	Ni XXVII
0.68809^C	Mo XL	0.95034^C	Kr XXXIV	1.4372^C	Cu XXVIII	1.5491^C	Ni XXVII
0.68814^C	Mo XL	0.95137^C	Kr XXXIV	1.4377^C	Cu XXVIII	1.5508^C	Ni XXVII
0.68898^C	Mo XL	0.951763	Kr XXXV	1.4383^C	Cu XXVIII	1.5510^C	Ni XXVII
0.68913^C	Mo XL	0.95241^C	Kr XXXIV	1.4403^C	Cu XXVIII	1.5587^C	Ni XXVII
0.68923^C	Mo XL	0.95288^C	Kr XXXIV	1.4416^C	Cu XXVIII	1.57317^C	Fe XXV
0.68958^C	Mo XL	0.95451^C	Kr XXXIV	1.4426^C	Cu XXVIII	1.57503^C	Fe XXV
0.69013^C	Mo XL	0.95491^C	Kr XXXIV	1.4444^C	Cu XXVIII	1.58412^C	Mn XXIV
0.69072^C	Mo XL	0.95519^C	Kr XXXV	1.4445^C	Cu XXVIII	1.58449^C	Mn XXIV
0.6923782^C	Mo XLI	0.95566^C	Kr XXXIV	1.4518^C	Cu XXVIII	1.588404^C	Ni XXVII
0.69275^C	Mo XL	0.95615^C	Kr XXXIV	1.45528^C	Co XXVI	1.5892^C	Ni XXVI
0.69381^C	Mo XL	0.95652^C	Kr XXXIV	1.45704^C	Co XXVI	1.592314^C	Ni XXVII
0.69417^C	Mo XL	0.95699^C	Kr XXXIV	1.46082^C	Fe XXV	1.5931^C	Ni XXVI
0.69445^C	Mo XL	0.95725^C	Kr XXXIV	1.46116^C	Fe XXV	1.5933^C	Ni XXVI
0.6945793^C	Mo XLI	0.96028^C	Kr XXXIV	1.477583^C	Cu XXVIII	1.5936^C	Ni XXVI
0.69482^C	Mo XL	0.96415^C	Kr XXXIV	1.4779^C	Cu XXVII	1.5938^C	Ni XXVI
0.69501^C	Mo XL	0.96884^C	Kr XXXIV	1.481061^C	Cu XXVIII	1.596563^C	Ni XXVII
0.69533^C	Mo XL	1.116122^C	Cu XXIX	1.4811^C	Cu XXVII	1.5970^C	Ni XXVI
0.69554^C	Mo XL	1.142716^C	Cu XXIX	1.4815^C	Cu XXVII	1.5977^C	Ni XXVI
0.69911^C	Mo XL	1.16587^C	Cu XXVIII	1.4817^C	Cu XXVII	1.5984^C	Ni XXVI
0.70014^C	Mo XL	1.16616^C	Cu XXVIII	1.4824^C	Cu XXVII	1.5984^C	Ni XXVI
0.70487^C	Mo XL	1.19288^C	Cu XXVIII	1.4825^C	Cu XXVII	1.5997^C	Ni XXVI
0.7196891^C	Kr XXXVI	1.19349^C	Cu XXVIII	1.4853^C	Cu XXVII	1.6009^C	Ni XXVI
0.7367656^C	Kr XXXVI	1.198208^C	Ni XXVIII	1.485378^C	Cu XXVIII	1.6029^C	Ni XXVI

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
1.6029^{C}	Ni XXVI	1.7332^{C}	Co XXV	1.87051	Fe XXIII	1.9423^{C}	Mn XXIV
1.603601^{C}	Ni XXVII	1.7338^{C}	Co XXV	1.8708	Fe XXIII	1.9458^{C}	Mn XXIV
1.6039^{C}	Ni XXVI	1.7342^{C}	Co XXV	1.8714	Fe XXIII	1.9476^{C}	Mn XXIV
1.6063^{C}	Ni XXVI	1.7362^{C}	Co XXV	1.8722^{C}	Fe XXIV	1.948846^{C}	Ti XXII
1.6068^{C}	Ni XXVI	1.7499^{C}	Co XXV	1.87242	Fe XXIII	1.9491^{C}	Mn XXIV
1.6077^{C}	Ni XXVI	1.7544^{C}	Co XXV	1.8727^{C}	Fe XXIV	1.9501^{C}	Mn XXIV
1.6083^{C}	Ni XXVI	1.76334^{C}	Cr XXIII	1.87363	Fe XXIII	1.9515^{C}	Mn XXIV
1.6087^{C}	Ni XXVI	1.76414^{C}	Cr XXIII	1.8738^{C}	Fe XXIV	1.9607^{C}	Mn XXIV
1.6108^{C}	Ni XXVI	1.765700^{C}	Cr XXIV	1.8743^{C}	Fe XXIV	1.995429^{C}	Ti XXII
1.62071^{C}	Mn XXIV	1.766845^{C}	Cr XXIV	1.87466	Fe XXIV	2.006074^{C}	Mn XXIV
1.62147^{C}	Mn XXIV	1.7747^{C}	Fe XXV	1.8752	Fe XXIII	2.0088^{C}	Mn XXIII
1.6228^{C}	Ni XXVI	1.778016^{C}	Fe XXVI	1.8752	Fe XXIII	2.011784^{C}	Mn XXIV
1.626130^{C}	Mn XXV	1.7791^{C}	Fe XXV	1.87568	Fe XXIII	2.0127^{C}	Mn XXIII
1.627276^{C}	Mn XXV	1.781981^{C}	V XXIII	1.8767^{C}	Fe XXIV	2.0131^{C}	Mn XXIII
1.6274^{C}	Ni XXVI	1.7830^{C}	Fe XXV	1.87814	Fe XXIII	2.0136^{C}	Mn XXIII
1.635535^{C}	Cr XXIV	1.783442^{C}	Fe XXVI	1.8794	Fe XXII	2.015	Ti XXI
1.6441^{C}	Co XXVI	1.7836^{C}	Fe XXV	1.87973	Fe XXIII	2.015	Ti XXI
1.647303^{C}	Co XXVII	1.7871^{C}	Fe XXV	1.88210^{C}	V XXII	2.0151^{C}	Mn XXIII
1.6483^{C}	Co XXVI	1.7873^{C}	Fe XXV	1.8824	Fe XXII	2.015816^{C}	Mn XXIV
1.6519^{C}	Co XXVI	1.7881^{C}	Fe XXV	1.8824	Fe XXII	2.0180^{C}	Mn XXIII
1.6519^{C}	Co XXVI	1.7888^{C}	Fe XXV	1.88253^{C}	V XXII	2.0194^{C}	Mn XXIII
1.652730^{C}	Co XXVII	1.7899^{C}	Fe XXV	1.88259	Fe XXII	2.0199^{C}	Mn XXIII
1.6556^{C}	Co XXVI	1.7904^{C}	Fe XXV	1.88534	Fe XXII	2.0204^{C}	Mn XXIII
1.6556^{C}	Co XXVI	1.7920^{C}	Fe XXV	1.8867	Fe XXII	2.0205^{C}	Mn XXIII
1.6563^{C}	Co XXVI	1.7921^{C}	Fe XXV	1.88706	Fe XXIII	2.0234^{C}	Mn XXIII
1.6570^{C}	Co XXVI	1.7925^{C}	Fe XXV	1.8916	Fe XXI	2.0243^{C}	Mn XXIII
1.6580^{C}	Co XXVI	1.7930^{C}	Fe XXV	1.89244	Fe XXIV	2.0248^{C}	Mn XXIII
1.6585^{C}	Co XXVI	1.7933^{C}	Fe XXV	1.89359	Fe XXI	2.025512^{C}	Mn XXIV
1.6598^{C}	Co XXVI	1.7942^{C}	Fe XXV	1.8942	Fe XXI	2.026	Ti XXI
1.6603^{C}	Co XXVI	1.7972^{C}	Fe XXV	1.8942	Fe XXI	2.026	Ti XXI
1.6607^{C}	Co XXVI	1.7989^{C}	Fe XXV	1.89474	Fe XXI	2.02635^{C}	V XXII
1.6611^{C}	Co XXVI	1.8002^{C}	Fe XXV	1.8966	Fe XXI	2.0282^{C}	Mn XXIII
1.6615^{C}	Co XXVI	1.8015^{C}	Fe XXV	1.8966	Fe XXI	2.02866^{C}	V XXII
1.6623^{C}	Co XXVI	1.8025^{C}	Fe XXV	1.89692	Fe XXI	2.0304^{C}	Mn XXIII
1.6649^{C}	Co XXVI	1.8110^{C}	Fe XXV	1.89692	Fe XXIV	2.0308^{C}	Mn XXIII
1.6664^{C}	Co XXVI	1.824559^{C}	V XXIII	1.9051	Fe XX	2.0320^{C}	Mn XXIII
1.6677^{C}	Co XXVI	1.8453	Fe XXIV	1.9051	Fe XX	2.0326^{C}	Mn XXIII
1.6691^{C}	Co XXVI	1.8464	Fe XXIV	1.9051	Fe XX	2.0331^{C}	Mn XXIII
1.6697^{C}	Co XXVI	1.850396^{C}	Fe XXV	1.90568	Fe XX	2.0348^{C}	Mn XXIII
1.674597^{C}	Cr XXIV	1.85248^{C}	Fe XXIV	1.9075	Fe XX	2.041	Ti XXI
1.6778^{C}	Co XXVI	1.85273	Fe XXIV	1.9075	Fe XX	2.041	Ti XXI
1.70583^{C}	Mn XXIV	1.85349	Fe XXIV	1.90845	Fe XX	2.0527^{C}	Mn XXIII
1.70781^{C}	Mn XXIV	1.8540	Fe XXIV	1.91765	Fe XIX	2.0572^{C}	Mn XXIII
1.711994^{C}	Co XXVI	1.855405^{C}	Fe XXV	1.9212^{C}	Mn XXIV	2.06340^{C}	Ti XXI
1.7134^{C}	Co XXV	1.85584^{C}	Cr XXIII	1.92164	Fe XVIII	2.06387^{C}	Ti XXI
1.716409^{C}	Co XXVI	1.85592	Fe XXIV	1.923864^{C}	V XXIII	2.0864^{C}	Cr XXIII
1.7172^{C}	Co XXV	1.8563^{C}	Fe XXIV	1.924723^{C}	Mn XXV	2.090144^{C}	Cr XXIV
1.7177^{C}	Co XXV	1.85691	Fe XXIV	1.925009^{C}	V XXIII	2.0913^{C}	Cr XXIII
1.7180^{C}	Co XXV	1.85704	Fe XXIV	1.92548^{C}	V XXII	2.095567^{C}	Cr XXIV
1.7181^{C}	Co XXV	1.85779^{C}	Fe XXIV	1.9258^{C}	Mn XXIV	2.0960^{C}	Cr XXIII
1.720588^{C}	Co XXVI	1.85796^{C}	Cr XXIII	1.92636^{C}	V XXII	2.0982^{C}	Cr XXIII
1.7215^{C}	Co XXV	1.8580	Fe XXIV	1.9301^{C}	Mn XXIV	2.1014^{C}	Cr XXIII
1.7225^{C}	Co XXV	1.8588	Fe XXIII	1.930147^{C}	Mn XXV	2.1017^{C}	Cr XXIII
1.7231^{C}	Co XXV	1.859511^{C}	Fe XXV	1.9314^{C}	Mn XXIV	2.1030^{C}	Cr XXIII
1.7232^{C}	Co XXV	1.86108	Fe XXIV	1.9348^{C}	Mn XXIV	2.1038^{C}	Cr XXIII
1.72356^{C}	Cr XXIII	1.86224	Fe XXIV	1.9351^{C}	Mn XXIV	2.104080^{C}	Ti XXII
1.72396^{C}	Cr XXIII	1.8628^{C}	Fe XXIV	1.9361^{C}	Mn XXIV	2.105	Ti XX
1.7241^{C}	Co XXV	1.86328	Fe XXIV	1.9368^{C}	Mn XXIV	2.1051^{C}	Cr XXIII
1.7259^{C}	Co XXV	1.86345	Fe XXIV	1.9381^{C}	Mn XXIV	2.105225^{C}	Ti XXII
1.7275^{C}	Co XXV	1.86598	Fe XXIV	1.9386^{C}	Mn XXIV	2.1057^{C}	Cr XXIII
1.7277^{C}	Co XXV	1.8672^{C}	Fe XXIV	1.9400^{C}	Mn XXIV	2.1069^{C}	Cr XXIII
1.728388^{C}	Co XXVI	1.86776^{C}	Fe XXIV	1.9404^{C}	Mn XXIV	2.1074^{C}	Cr XXIII
1.7293^{C}	Co XXV	1.868190^{C}	Fe XXV	1.9405^{C}	Mn XXIV	2.1078^{C}	Cr XXIII
1.7317^{C}	Co XXV	1.8692	Fe XXIII	1.9411^{C}	Mn XXIV	2.1081^{C}	Cr XXIII
1.7322^{C}	Co XXV	1.8699^{C}	Fe XXIV	1.9412^{C}	Mn XXIV	2.1081^{C}	Cr XXIII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
2.1093[C]	Cr XXIII	2.255	Ti XX	2.5060[C]	Ti XXI	2.876503[C]	Mo XLI
2.11088[C]	Ti XXI	2.2736[C]	V XXII	2.5079[C]	Ti XXI	2.890589[C]	Mo XLI
2.11185[C]	Ti XXI	2.277603[C]	V XXIII	2.5089[C]	Ti XXI	2.912502[C]	Mo XL
2.11289[C]	Ti XXI	2.2788[C]	V XXII	2.5105[C]	Ti XXI	2.932594[C]	Mo XL
2.1135[C]	Cr XXIII	2.283024[C]	V XXIII	2.5111[C]	Ti XXI	2.997674[C]	Mo XL
2.1154[C]	Cr XXIII	2.2839[C]	V XXII	2.5116[C]	Ti XXI	3.001242[C]	Mo XL
2.1171[C]	Cr XXIII	2.2872[C]	V XXII	2.5124[C]	Ti XXI	3.022582[C]	Mo XL
2.1178[C]	Cr XXIII	2.2902[C]	V XXII	2.5130[C]	Ti XXI	3.09	Mo XXXIII
2.1197[C]	Cr XXIII	2.2907[C]	V XXII	2.5134[C]	Ti XXI	3.18	Mo XXXIII
2.1296[C]	Cr XXIII	2.2922[C]	V XXII	2.5140[C]	Ti XXI	3.18	Mo XXXIII
2.151	Ti XX	2.2931[C]	V XXII	2.5146[C]	Ti XXI	3.26	Mo XXXIII
2.182033[C]	Cr XXIII	2.2946[C]	V XXII	2.5204[C]	Ti XXI	3.26579[C]	Kr XXXVI
2.1834	Cr XXII	2.2952[C]	V XXII	2.5227[C]	Ti XXI	3.32	Mo XXXIII
2.1834	Cr XXII	2.2960[C]	V XXII	2.5248[C]	Ti XXI	3.33275[C]	Kr XXXVI
2.1834	Cr XXII	2.2966[C]	V XXII	2.5249[C]	Ti XXI	3.40060[C]	Kr XXXV
2.1846	Cr XXII	2.2973[C]	V XXII	2.5279[C]	Ti XXI	3.40448[C]	Kr XXXV
2.1846	Cr XXII	2.2975[C]	V XXII	2.5396[C]	Ti XXI	3.42	Mo XXXIII
2.1846	Cr XXII	2.2976[C]	V XXII	2.560755[C]	Mo XLI	3.44394[C]	Kr XXXV
2.1846	Cr XXII	2.2987[C]	V XXII	2.564275[C]	Mo XL	3.45149[C]	Kr XXXV
2.1846	Cr XXII	2.3036[C]	V XXII	2.568532[C]	Mo XL	3.51485[C]	Kr XXXV
2.1854	Cr XXII	2.3057[C]	V XXII	2.573552[C]	Mo XLI	3.53583[C]	Kr XXXV
2.1856[C]	Cr XXII	2.3076[C]	V XXII	2.609772[C]	Mo XL	3.547687[C]	Mo XLII
2.188576[C]	Cr XXIII	2.3080[C]	V XXII	2.610398[C]	Ti XXI	3.5676[C]	Kr XXXIV
2.1896[C]	Cr XXII	2.3105[C]	V XXII	2.6160[C]	Ti XX	3.5718[C]	Kr XXXIV
2.1898[C]	Cr XXII	2.3211[C]	V XXII	2.617971[C]	Mo XL	3.636	Mo XXXIII
2.1905[C]	Cr XXII	2.376919[C]	Mo XLII	2.619130[C]	Ti XXI	3.6404[C]	Kr XXXIV
2.192532[C]	Cr XXIII	2.381952[C]	V XXII	2.6202[C]	Ti XX	3.64964[C]	Kr XXXVI
2.1929[C]	Cr XXII	2.3864[C]	V XXI	2.6204[C]	Ti XX	3.6510[C]	Kr XXXIV
2.1955[C]	Cr XXII	2.389489[C]	V XXII	2.6213[C]	Ti XX	3.654271[C]	Mo XLI
2.1972[C]	Cr XXII	2.3906[C]	V XXI	2.622933[C]	Ti XXI	3.684	Mo XXXIII
2.1976[C]	Cr XXII	2.3907[C]	V XXI	2.6260[C]	Ti XX	3.688025[C]	Mo XLII
2.1979[C]	Cr XXII	2.3915[C]	V XXI	2.6279[C]	Ti XX	3.695959[C]	Mo XLI
2.1984[C]	Cr XXII	2.393369[C]	V XXII	2.6302[C]	Ti XX	3.70656[C]	Mo XLI
2.2015[C]	Cr XXII	2.394055[C]	V XXII	2.6302[C]	Ti XX	3.70814[C]	Mo XLI
2.2020[C]	Cr XXII	2.3950[C]	V XXI	2.6306[C]	Ti XX	3.70882[C]	Mo XLI
2.2027[C]	Cr XXII	2.3973[C]	V XXI	2.6320[C]	Ti XX	3.709635[C]	Mo XLI
2.203414[C]	Cr XXIII	2.3992[C]	V XXI	2.6348[C]	Ti XX	3.7097[C]	Kr XXXIV
2.2071[C]	Cr XXII	2.3996[C]	V XXI	2.6354[C]	Ti XX	3.7111[C]	Kr XXXIV
2.2079	Cr XXI	2.3996[C]	V XXI	2.6363[C]	Ti XX	3.7222[C]	Kr XXXIV
2.2093[C]	Cr XXII	2.4007[C]	V XXI	2.636861[C]	Ti XXI	3.73172[C]	Kr XXXVI
2.2097[C]	Cr XXII	2.4039[C]	V XXI	2.6434[C]	Ti XX	3.763	Mo XXXIII
2.2103	Cr XXI	2.4040[C]	V XXI	2.6454[C]	Ti XX	3.777379[C]	Mo XLI
2.2110[C]	Cr XXII	2.4050[C]	V XXI	2.6458[C]	Ti XX	3.793814[C]	Mo XL
2.2115	Cr XXI	2.405646[C]	V XXII	2.6473[C]	Ti XX	3.79461[C]	Kr XXXV
2.2115[C]	Cr XXII	2.4106[C]	V XXI	2.6477[C]	Ti XX	3.80406[C]	Kr XXXV
2.2121[C]	Cr XXII	2.4127[C]	V XXI	2.6484[C]	Ti XX	3.809	Mo XXXIII
2.2137[C]	Cr XXII	2.4131[C]	V XXI	2.6497[C]	Ti XX	3.837556[C]	Mo XL
2.2140	Cr XXI	2.4145[C]	V XXI	2.654099[C]	Mo XLII	3.84180[C]	Mo XLI
2.2173	Cr XXI	2.4150[C]	V XXI	2.6772[C]	Ti XX	3.84356[C]	Kr XXXV
2.2199	Cr XX	2.4156[C]	V XXI	2.679338[C]	Mo XL	3.84667[C]	Kr XXXV
2.22130[C]	Ti XXI	2.4171[C]	V XXI	2.680798[C]	Mo XL	3.84685[C]	Kr XXXV
2.2222	Cr XX	2.4408[C]	V XXI	2.6816[C]	Ti XX	3.84708[C]	Kr XXXV
2.2233	Cr XX	2.444411[C]	Mo XLII	2.689450[C]	Mo XL	3.85706[C]	Mo XLI
2.22382[C]	Ti XXI	2.4452[C]	V XXI	2.736773[C]	Mo XLII	3.86605[C]	Kr XXXV
2.2263	Cr XX	2.460788[C]	Mo XLI	2.744242[C]	Mo XLI	3.886151[C]	Mo XL
2.22658[C]	Ti XXI	2.464821[C]	Mo XLI	2.754074[C]	Mo XLI	3.92219[C]	Kr XXXV
2.2343[C]	Cr XXII	2.4868[C]	Ti XXI	2.77631[C]	Mo XLI	3.92572[C]	Kr XXXV
2.2347	Cr XIX	2.488751[C]	Mo XLI	2.77720[C]	Mo XLI	3.931270[C]	Mo XLI
2.2371	Cr XIX	2.491197[C]	Ti XXII	2.77736[C]	Mo XLI	3.94572[C]	Kr XXXV
2.2386	Cr XIX	2.4924[C]	Ti XXI	2.778109[C]	Mo XLI	3.946071[C]	Mo XLI
2.2387[C]	Cr XXII	2.494556[C]	Mo XLI	2.793238[C]	Mo XLI	3.95139[C]	Kr XXXV
2.2414	Cr XIX	2.496618[C]	Ti XXII	2.85612[C]	Mo XLI	3.96891[C]	Kr XXXV
2.243	Ti XX	2.4981[C]	Ti XXI	2.857098[C]	Mo XL	3.972630[C]	Mo XL
2.243	Ti XX	2.5026[C]	Ti XXI	2.85967[C]	Mo XLI	3.9766[C]	Kr XXXIV
2.243	Ti XX	2.5053[C]	Ti XXI	2.867462[C]	Mo XL	3.9870[C]	Kr XXXIV

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
4.030462^{C}	Mo XL	5.8458^{C}	Ni XXVII	6.5214^{C}	Ni XXVII	7.0690^{C}	Co XXVI
4.045765^{C}	Mo XL	5.870801^{C}	Co XXVII	6.53301^{C}	Cu XXVII	7.090077^{C}	Fe XXVI
4.0653^{C}	Kr XXXIV	5.87938^{C}	Cu XXVII	6.5504^{C}	Ni XXVII	7.09058^{C}	Ni XXVI
4.0913^{C}	Kr XXXIV	5.88082^{C}	Cu XXVII	6.567273^{C}	Co XXVII	7.09410^{C}	Ni XXVI
4.139580^{C}	Mo XL	5.89804^{C}	Cu XXVII	6.57650^{C}	Cu XXVII	7.1048^{C}	Co XXVI
4.1502^{C}	Kr XXXIV	5.9034^{C}	Ni XXVII	6.58003^{C}	Cu XXVII	7.1082^{C}	Co XXVI
4.1537^{C}	Kr XXXIV	5.937026^{C}	Co XXVII	6.5896^{C}	Ni XXVII	7.123	Kr XXVIII
4.1809^{C}	Kr XXXIV	5.9522^{C}	Ni XXVII	6.5930^{C}	Ni XXVII	7.14006^{C}	Ni XXVI
4.4184	Mo XXXIII	5.9605^{C}	Cu XXVIII	6.60643^{C}	Co XXV	7.1404^{C}	Co XXVI
4.4653	Mo XXXIII	5.9693^{C}	Cu XXVIII	6.61066^{C}	Co XXV	7.162	Kr XXVIII
4.472	Mo XXXIV	6.0511^{C}	Cu XXVIII	6.614	Kr XXVIII	7.169	Fe XXIV
4.480	Mo XXXIV	6.0583^{C}	Cu XXVIII	6.62237^{C}	Cu XXVII	7.169	Fe XXIV
4.493	Mo XXXIV	6.0585^{C}	Cu XXVIII	6.6230^{C}	Ni XXVII	7.171209^{C}	Fe XXVI
4.503	Mo XXXIV	6.0585^{C}	Cu XXVIII	6.626	Kr XXVIII	7.1810^{C}	Co XXVI
4.506	Mo XXXIV	6.0859^{C}	Cu XXVIII	6.626	Kr XXVIII	7.18986^{C}	Mo XLII
4.506	Mo XXXIV	6.099473^{C}	Ni XXVIII	6.639	Kr XXVIII	7.193	Kr XXVIII
4.512	Mo XXXIV	6.11012^{C}	Ni XXVI	6.648503^{C}	Co XXVII	7.2025^{C}	Co XXVI
4.521	Mo XXXIV	6.11436^{C}	Ni XXVI	6.6569^{C}	Ni XXVII	7.209	Kr XXVIII
4.550	Mo XXXIV	6.1280^{C}	Cu XXVIII	6.663	Kr XXVIII	7.209	Kr XXVIII
4.6325	Mo XXXIII	6.129	Kr XXVIII	6.663	Kr XXVIII	7.24266^{C}	Mo XLII
4.8044	Mo XXXIII	6.1314^{C}	Cu XXVIII	6.6777^{C}	Ni XXVII	7.268	Kr XXVII
4.8516	Mo XXXIII	6.145	Kr XXVIII	6.678	Kr XXVIII	7.2738^{C}	Mn XXIV
4.89156^{C}	Kr XXXVI	6.145	Kr XXVIII	6.678	Kr XXVIII	7.2771^{C}	Mn XXIV
4.9828	Mo XXXIII	6.145	Kr XXVIII	6.694	Kr XXVII	7.29590^{C}	Mo XLI
5.03120^{C}	Kr XXXVI	6.1594^{C}	Cu XXVIII	6.699	Kr XXVIII	7.322	Kr XXVI
5.0631^{C}	Kr XXXV	6.166	Kr XXVIII	6.7031^{C}	Fe XXV	7.331470^{C}	Mo XLI
5.077897^{C}	Cu XXIX	6.171	Kr XXVIII	6.7065^{C}	Fe XXV	7.355846^{C}	Mo XLI
5.1033^{C}	Kr XXXV	6.171	Kr XXVIII	6.715	Kr XXVIII	7.36403^{C}	Co XXV
5.1429^{C}	Kr XXXV	6.180802^{C}	Ni XXVIII	6.727	Kr XXVIII	7.370	Fe XXIV
5.144290^{C}	Cu XXIX	6.185	Kr XXVIII	6.74877^{C}	Fe XXIV	7.37431^{C}	Co XXV
5.1484^{C}	Kr XXXV	6.1878^{C}	Cu XXVIII	6.78583^{C}	Co XXV	7.3891^{C}	Fe XXIV
5.1489^{C}	Kr XXXV	6.1961^{C}	Co XXVI	6.787	Fe XXIV	7.3994^{C}	Mn XXIV
5.1492^{C}	Kr XXXV	6.1996^{C}	Co XXVI	6.787	Fe XXIV	7.4128^{C}	Mn XXIV
5.2069	Mo XXXIII	6.2079^{C}	Cu XXVIII	6.80582^{C}	Co XXV	7.413778^{C}	Mo XLI
5.2320^{C}	Kr XXXV	6.214	Kr XXVIII	6.808	Fe XXIV	7.438	Fe XXIV
5.2764^{C}	Kr XXXV	6.259	Kr XXVIII	6.808	Fe XXIV	7.438	Fe XXIV
5.2879^{C}	Kr XXXIV	6.27005^{C}	Ni XXVI	6.81110^{C}	Ni XXVI	7.445	Fe XXIII
5.2915^{C}	Kr XXXV	6.28832^{C}	Ni XXVI	6.8150^{C}	Fe XXV	7.452203^{C}	Cr XXIV
5.3286^{C}	Kr XXXV	6.2962^{C}	Co XXVI	6.82139^{C}	Ni XXVI	7.4601^{C}	Fe XXIV
5.3316^{C}	Kr XXXIV	6.3082^{C}	Co XXVI	6.8277^{C}	Fe XXV	7.4678^{C}	Mn XXIV
5.3395^{C}	Cu XXVIII	6.31740^{C}	Cu XXVII	6.85495^{C}	Co XXV	7.472	Fe XXIII
5.3430^{C}	Cu XXVIII	6.32771^{C}	Cu XXVII	6.85639^{C}	Co XXV	7.4833^{C}	Fe XXV
5.3790^{C}	Kr XXXV	6.333	Kr XXVII	6.861473^{C}	Mn XXV	7.4917^{C}	Fe XXV
5.4045^{C}	Kr XXXV	6.337581^{C}	Fe XXVI	6.87680^{C}	Co XXV	7.504	Kr XXVII
5.4206^{C}	Cu XXVIII	6.33917^{C}	Ni XXVI	6.878	Kr XXVII	7.518186^{C}	Cr XXIV
5.4314^{C}	Cu XXVIII	6.34061^{C}	Ni XXVI	6.881	Kr XXVIII	7.5398^{C}	Mn XXIV
5.4359^{C}	Kr XXXIV	6.35930^{C}	Ni XXVI	6.8836^{C}	Fe XXV	7.570	Kr XXVI
5.453125^{C}	Ni XXVIII	6.3650^{C}	Co XXVI	6.9171^{C}	Co XXVI	7.58253^{C}	Co XXV
5.4899^{C}	Cu XXVIII	6.383	Kr XXVII	6.9256^{C}	Co XXVI	7.58740^{C}	Mo XLI
5.519434^{C}	Ni XXVIII	6.403725^{C}	Fe XXVI	6.927539^{C}	Mn XXV	7.607762^{C}	Mo XLI
5.5332^{C}	Cu XXVIII	6.4128^{C}	Ni XXVII	6.941	Kr XXVIII	7.6078^{C}	Fe XXV
5.536	Mo XXXIV	6.418	Kr XXVIII	6.9466^{C}	Fe XXV	7.6172^{C}	Fe XXV
5.5482^{C}	Kr XXXIV	6.4203^{C}	Co XXVI	6.955	Kr XXVII	7.6174^{C}	Fe XXV
5.5799^{C}	Kr XXXIV	6.4214^{C}	Ni XXVII	6.972	Fe XXIV	7.6183^{C}	Fe XXV
5.5951^{C}	Kr XXXIV	6.428	Kr XXVIII	6.975	Kr XXVIII	7.631409^{C}	Cu XXIX
5.66707^{C}	Cu XXVII	6.428	Kr XXVIII	6.997	Kr XXVIII	7.63156^{C}	Co XXV
5.67131^{C}	Cu XXVII	6.466	Kr XXVIII	7.00588^{C}	Ni XXVI	7.6515^{C}	Fe XXV
5.679217^{C}	Cu XXIX	6.466	Kr XXVIII	7.02448^{C}	Mo XLII	7.66721^{C}	Co XXV
5.7143^{C}	Kr XXXIV	6.479	Kr XXVIII	7.0286^{C}	Co XXVI	7.67074^{C}	Co XXV
5.7443^{C}	Ni XXVII	6.49180^{C}	Cu XXVII	7.033	Fe XXIV	7.676836^{C}	Mn XXV
5.7479^{C}	Ni XXVII	6.502	Kr XXVIII	7.033	Fe XXIV	7.680	Fe XXIII
5.760641^{C}	Cu XXIX	6.5130^{C}	Ni XXVII	7.0373^{C}	Co XXVI	7.680	Fe XXIII
5.81025^{C}	Cu XXVII	6.519	Kr XXVIII	7.0374^{C}	Co XXVI	7.6837^{C}	Fe XXV
5.82705^{C}	Cu XXVII	6.5210^{C}	Ni XXVII	7.0379^{C}	Co XXVI	7.6871^{C}	Fe XXV
5.8343^{C}	Ni XXVII	6.5212^{C}	Ni XXVII	7.05071^{C}	Ni XXVI	7.71978^{C}	Mo XL

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
7.72092^{C}	Co XXV	8.338455^{C}	Cr XXIV	8.8151^{C}	V XXII	9.128	Ti XX
7.7218^{C}	Fe XXV	8.3390^{C}	Mn XXIV	8.826	V XXI	9.128	Ti XX
7.733	Fe XXIII	8.3499^{C}	Cu XXVIII	8.8299^{C}	V XXII	9.139	Ni XIX
7.755	Fe XXIII	8.3757	Fe XXIV	8.830318^{C}	Co XXVII	9.14	Fe XXII
7.757880^{C}	Mn XXV	8.3769^{C}	Mn XXIV	8.83911^{C}	Cu XXVII	9.140	Ni XIX
7.7702^{C}	Fe XXV	8.3794^{C}	Cu XXVIII	8.8410^{C}	Cr XXIII	9.153	Ni XIX
7.770237^{C}	Cu XXIX	8.385	Cu XX	8.843	V XXI	9.163	Fe XX
7.778	Fe XXIII	8.400	Cu XX	8.843	V XXI	9.163	Fe XXII
7.79197^{C}	Mo XL	8.40415^{C}	Cu XXVII	8.84426^{C}	Cr XXII	9.169071^{C}	V XXIII
7.7927^{C}	Fe XXV	8.419401^{C}	Cr XXIV	8.84570^{C}	Cr XXII	9.175	V XXI
7.79643^{C}	Mn XXIII	8.4345^{C}	Mn XXIV	8.849	Ni XIX	9.175	V XXI
7.80066^{C}	Mn XXIII	8.4372^{C}	Cu XXVIII	8.8491^{C}	Cr XXIII	9.183	Fe XXII
7.826	Fe XXIII	8.447	Cu XX	8.85423^{C}	Cu XXVII	9.1850^{C}	Ni XXV
7.849	Fe XXIII	8.44757^{C}	Cu XXVII	8.855^{C}	Fe XXI	9.1875^{C}	Cr XXIII
7.854	Fe XXIII	8.4580^{C}	Mn XXIV	8.8630^{C}	Ni XXVII	9.199	Fe XX
7.883	Fe XXIII	8.487	Ni XIX	8.87331^{C}	Cr XXII	9.200	Co XVIII
7.89041^{C}	Mo XL	8.512	Ni XIX	8.87349^{C}	Cu XXVII	9.208	Fe XX
7.90308^{C}	Mo XL	8.51412^{C}	Cr XXII	8.8743^{C}	Ni XXVII	9.208	Fe XX
7.9194^{C}	Cr XXIII	8.51833^{C}	Cr XXII	8.8776^{C}	Ni XXVII	9.21	Fe XIX
7.9227^{C}	Cr XXIII	8.521	Fe XXI	8.882	V XXI	9.2121^{C}	Cr XXIII
7.9644^{C}	Cu XXVIII	8.521	Fe XXI	8.882	V XXI	9.215	Fe XXII
7.972	Cu XX	8.529	Fe XXIII	8.8831^{C}	V XXII	9.220	Fe XX
7.97876^{C}	Mo XL	8.550	Fe XXIII	8.88442^{C}	Ti XXII	9.220	Fe XX
7.986	Fe XXIV	8.551^{C}	Fe XXIII	8.906	Fe XXIII	9.225	Co XVIII
7.996	Fe XXIV	8.552^{C}	Fe XXI	8.95023^{C}	Ti XXII	9.237	Cu XX
8.0018^{C}	Cu XXVIII	8.552^{C}	Fe XXI	8.960	Fe XXII	9.241	Fe XXII
8.02554^{C}	Mn XXIII	8.554^{C}	Fe XXIII	8.96839^{C}	Mn XXIII	9.246	Ti XX
8.04991^{C}	Mn XXIII	8.558	Fe XXI	8.968851^{C}	Co XXVII	9.246	Ti XX
8.0613^{C}	Cr XXIII	8.573	Fe XXI	8.976	Fe XXII	9.254	Ni XIX
8.073	Cu XX	8.576	V XXI	8.977	Fe XXII	9.262	Ni XIX
8.0754^{C}	Cr XXIII	8.576	V XXI	8.9788^{C}	V XXII	9.274	Cu XX
8.091	Fe XXII	8.6064^{C}	Ni XXVII	8.9840^{C}	Ni XXVII	9.2806^{C}	Co XXVI
8.09466^{C}	Mn XXIII	8.614	Ni XIX	8.992	Fe XXII	9.297	Ni XXV
8.09610^{C}	Mn XXIII	8.616	Fe XXIII	8.9987^{C}	Cr XXIII	9.297	Ni XXV
8.1118^{C}	Cu XXVIII	8.618^{C}	Fe XXIII	9.006	Fe XXII	9.306	Ni XXV
8.1203^{C}	Mn XXIV	8.627^{C}	Fe XXI	9.006	Fe XXII	9.316	Ni XXV
8.12090^{C}	Mn XXIII	8.630	Fe XXIII	9.0079^{C}	Ni XXVII	9.33437^{C}	V XXI
8.121636^{C}	V XXIII	8.643	Fe XXI	9.0096^{C}	Cr XXIII	9.338	Ni XX
8.1239^{C}	Cu XXVIII	8.643	Fe XXIII	9.0098^{C}	Cr XXIII	9.33857^{C}	V XXI
8.1249^{C}	Cu XXVIII	8.643	V XXI	9.0120^{C}	Cr XXIII	9.34	Fe XIX
8.1256^{C}	Cu XXVIII	8.646^{C}	Fe XXI	9.02817^{C}	Mn XXIII	9.340	Ni XXV
8.1286^{C}	Mn XXIV	8.646^{C}	Fe XXI	9.03917^{C}	Cu XXVII	9.347	Co XVIII
8.1295^{C}	Cr XXIII	8.6539^{C}	V XXII	9.0505^{C}	Cr XXIII	9.36	Fe XIX
8.187534^{C}	V XXIII	8.6572^{C}	V XXII	9.05308^{C}	Mn XXIII	9.366	Ni XX
8.198784^{C}	Ni XXVIII	8.664	Fe XXIII	9.05660^{C}	Mn XXIII	9.371	Co XVIII
8.2122^{C}	Cr XXIII	8.672	Fe XXIII	9.06	Fe XXII	9.375	Cu XX
8.232	Fe XXIV	8.672	Fe XXIII	9.06028^{C}	Ni XXVI	9.385	Ni XX
8.2425^{C}	Cu XXVIII	8.68938^{C}	Mn XXIII	9.065	Fe XX	9.385	Ni XX
8.2439^{C}	Cu XXVIII	8.69521^{C}	Cu XXVII	9.065	Fe XXII	9.385	Ni XX
8.2573^{C}	Cu XXVIII	8.69963^{C}	Mn XXIII	9.070	Co XVIII	9.38532^{C}	Ni XXVI
8.2602^{C}	Mn XXIV	8.703	V XXI	9.073	Fe XX	9.39	Ni XXV
8.2704^{C}	Mn XXIV	8.703	V XXI	9.073	Fe XXII	9.421	Fe XXI
8.2705^{C}	Mn XXIV	8.715	Fe XXII	9.073	Fe XXII	9.4258^{C}	Co XXVI
8.2719^{C}	Mn XXIV	8.722	Fe XXII	9.0739^{C}	Cr XXIII	9.4308^{C}	Ni XXV
8.273	Fe XXIII	8.731	Fe XXIII	9.0740^{C}	Ni XXVII	9.433	Fe XXI
8.2854	Fe XXIV	8.7328^{C}	Ni XXVII	9.0772^{C}	Cr XXIII	9.434	Ti XX
8.289	Fe XXIII	8.744	Ni XIX	9.088232^{C}	V XXIII	9.434	Ti XX
8.305	Fe XXIII	8.7461^{C}	Ni XXVII	9.10363^{C}	Ni XXVI	9.44	Fe XIX
8.3077^{C}	Mn XXIV	8.7471^{C}	Ni XXVII	9.106	Cu XX	9.4404^{C}	Co XXVI
8.3160	Fe XXIV	8.7478^{C}	Ni XXVII	9.110	Fe XX	9.4414^{C}	Co XXVI
8.317	Fe XXIII	8.752	Fe XXIII	9.110	Fe XX	9.4421^{C}	Co XXVI
8.3205^{C}	Fe XXIV	8.763	Fe XXIII	9.110	Fe XX	9.455	Ni XX
8.333	Cu XX	8.77513^{C}	Cr XXII	9.111	V XXI	9.460^{C}	Fe XXI
8.3359^{C}	Mn XXIV	8.80230^{C}	Cr XXII	9.11756^{C}	Mn XXIII	9.472^{C}	Fe XXI
8.337460^{C}	Ni XXVIII	8.815	Fe XXIII	9.1185^{C}	Cr XXIII	9.476	Fe XXI

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
9.482	Fe XXI	9.705^{C}	Fe XXI	9.96234^{C}	Cr XXII	10.206	Co XIX
9.48840^{C}	Cr XXII	9.707	Ni XXV	9.9635^{C}	V XXII	10.207	Co XVIII
9.4945^{C}	Ti XXI	9.707	Ni XXV	9.97	Ni XXV	10.220^{C}	Fe XXV
9.497	Ni XX	9.7099^{C}	Co XXVI	9.970	Co XX	10.221	Fe XVII
9.497	Ni XX	9.733	Ti XX	9.9712^{C}	Ni XXV	10.221^{C}	Fe XXV
9.497	Ni XX	9.733	Ti XX	9.974	Co XXIV	10.222	Fe XX
9.4977^{C}	Ti XXI	9.733	Ti XX	9.974	Co XXIV	10.222^{C}	Fe XXV
9.49864^{C}	Cr XXII	9.7351^{C}	V XXI	9.974	Co XXIV	10.234	Cu XXI
9.501	Co XVIII	9.742	Co XVIII	9.977	Ni XIX	10.241	Mo XXXII
9.518	Fe XXI	9.742	Co XX	9.98	Fe XVIII	10.250^{C}	Kr XXXV
9.52	Fe XIX	9.744	Ni XXV	9.98	Fe XVIII	10.260	Cu XXI
9.521	Cu XX	9.744^{C}	Fe XXI	9.991	Fe XX	10.265	Co XXIV
9.52922^{C}	Ni XXVI	9.74503^{C}	Ni XXVI	9.991	Fe XX	10.272	Mo XXXII
9.534	Ti XX	9.7464^{C}	Ti XXI	9.991	Fe XX	10.275	Co XIX
9.536097^{C}	Fe XXVI	9.748	Co XVIII	10.008	Fe XX	10.2782^{C}	Ti XX
9.542	Fe XXI	9.75	Ni XXV	10.008	Fe XX	10.282	Cu XXI
9.54432^{C}	Ni XXVI	9.753	Ni XXV	10.0233^{C}	Ti XXII	10.2824^{C}	Ti XX
9.548	Fe XXI	9.759	Ni XXV	10.025	Co XVIII	10.283	Ni XIX
9.5554^{C}	Co XXVI	9.759	Ni XXV	10.03	Fe XVIII	10.290	Co XIX
9.558	Ni XX	9.7613^{C}	Ni XXV	10.030	Co XVIII	10.290	Co XIX
9.5617^{C}	Ni XXV	9.776	Ni XXV	10.034	Fe XX	10.290	Co XIX
9.5699^{C}	Co XXVI	9.78	Fe XIX	10.034	Fe XX	10.291	Cu XXI
9.575^{C}	Fe XXI	9.784	Co XX	10.034	Fe XX	10.3032^{C}	Co XXV
9.5783^{C}	Co XXVI	9.7855^{C}	Co XXVI	10.037^{C}	Fe XXV	10.306	Cu XXI
9.57934^{C}	Ni XXVI	9.788	Ti XX	10.046	Ti XX	10.316	Cu XXI
9.581	Fe XXI	9.788	Ti XX	10.046^{C}	V XXII	10.3183^{C}	Co XXV
9.581	Ni XX	9.79469^{C}	Co XXV	10.053	Co XXIV	10.320	Fe XVII
9.587	Fe XXI	9.8037^{C}	Ni XXV	10.053	Co XXIV	10.323	Mo XXXII
9.587^{C}	Fe XXI	9.80624^{C}	Cr XXII	10.057	Cu XXI	10.3282^{C}	Mn XXV
9.591	Ti XX	9.81	Fe XIX	10.058	Fe XX	10.33	Fe XVIII
9.591	Ti XX	9.81	Fe XIX	10.066	Co XVIII	10.33	Fe XVIII
9.597^{C}	Fe XXI	9.81	Fe XIX	10.066	Co XXIV	10.333^{C}	Fe XXV
9.601	Ni XXV	9.81322^{C}	Kr XXXVI	10.066	Co XXIV	10.348^{C}	Fe XXV
9.603	Co XX	9.82	Fe XIX	10.066	Co XXIV	10.354	Cu XXI
9.61	Fe XIX	9.821	Ni XX	10.072^{C}	V XXII	10.369^{C}	Fe XXV
9.63	Ni XXV	9.822^{C}	Fe XXI	10.074	Cu XXI	10.3716^{C}	Co XXV
9.632	Fe XXI	9.828	Co XX	10.085^{C}	Co XXIV	10.373	Co XIX
9.633	Co XVIII	9.83798^{C}	Co XXV	10.085^{C}	Kr XXXV	10.386	Fe XVII
9.633	Co XX	9.8400^{C}	V XXII	10.109	Ti XX	10.389^{C}	Co XXIV
9.633	Ni XXV	9.8516^{C}	V XXII	10.109	Ti XX	10.389^{C}	Co XXIV
9.6335^{C}	V XXI	9.8517^{C}	V XXII	10.110	Ni XIX	10.392	Cu XXI
9.64	Fe XIX	9.8549^{C}	V XXII	10.115	Co XXIV	10.4014^{C}	V XXI
9.64949^{C}	Kr XXXVI	9.856	Co XX	10.115	Co XXIV	10.406	Co XIX
9.6609^{C}	V XXII	9.856	Co XX	10.120^{C}	Kr XXXV	10.406	Co XIX
9.661	Co XX	9.856	Co XX	10.121	Cu XXI	10.406	Co XIX
9.6641^{C}	V XXI	9.856	Co XX	10.121	Fe XX	10.406	Co XIX
9.6688^{C}	V XXII	9.856	Co XX	10.121	Fe XX	10.41	Fe XVIII
9.674501^{C}	Fe XXVI	9.8578^{C}	Ti XXI	10.123	Fe XVII	10.4116^{C}	V XXI
9.6786^{C}	Ti XXI	9.860	Ni XXV	10.123	Fe XVII	10.416^{C}	Kr XXXV
9.68	Fe XIX	9.8603^{C}	Ni XXV	10.156	Co XXIV	10.428	Co XXIV
9.68	Fe XIX	9.86602^{C}	Kr XXXVI	10.157	Ni XIX	10.433	Ni XIX
9.68	Fe XIX	9.87291^{C}	Cr XXII	10.159	Fe XX	10.44	Fe XVIII
9.681	Co XX	9.873	Ni XXV	10.159	Fe XX	10.44	Fe XVIII
9.681	Co XX	9.89096^{C}	Cr XXII	10.1593^{C}	Co XXV	10.443^{C}	Co XXIV
9.691	Ni XXV	9.89446^{C}	Cr XXII	10.1603^{C}	Mo XLII	10.445	Co XXIV
9.6923^{C}	Co XXVI	9.8966^{C}	V XXII	10.177	Fe XX	10.445	Co XXIV
9.693	Ni XX	9.912	Cu XXI	10.177	Fe XX	10.450^{C}	Kr XXXV
9.694	Co XX	9.9126^{C}	Ni XXV	10.177	Fe XX	10.4665^{C}	Mn XXV
9.694	Co XX	9.9149^{C}	V XXII	10.179^{C}	Co XXIV	10.477	Co XIX
9.694	Co XX	9.9180^{C}	V XXII	10.179^{C}	Kr XXXV	10.477	Co XIX
9.694	Co XX	9.9237^{C}	Ni XXV	10.182	Co XXIV	10.48	Fe XVIII
9.694^{C}	Fe XXI	9.924	Co XX	10.184	Co XVIII	10.4841^{C}	Mo XLII
9.6941^{C}	Ti XXI	9.9254^{C}	Ni XXV	10.197	Mo XXXII	10.489^{C}	Fe XXV
9.7027^{C}	V XXI	9.938	Ni XXV	10.203	Cu XXI	10.499^{C}	Fe XXV
9.7041^{C}	V XXI	9.94255^{C}	Ti XXII	10.204^{C}	Fe XXV	10.500	Fe XVII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
10.503	Co XXIV	10.799^{T}	Co XXIII	11.011	Mo XXXII	11.264^{C}	Ni XXI
10.503	Co XXIV	10.800	Co XXIV	11.014	Cu XXI	11.272	Ni XXI
10.51	Fe XVIII	10.800	Cu XXI	11.018	Fe XXIII	11.282	Ni XX
10.5165^{C}	Mo XLI	10.801	Cu XXI	11.018^{C}	Fe XXIII	11.287	Fe XVII
10.5373^{C}	Co XXV	10.803^{C}	Ti XXI	11.023	Fe XVII	11.298	Fe XXIII
10.543	Co XXIV	10.809^{T}	Co XXIII	11.030	Cr XX	11.302	Ni XXI
10.543	Co XXIV	10.811	Co XXIV	11.030	Fe XXIV	11.308	V XX
10.543	Co XXIV	10.811	Co XXIV	11.030^{C}	Ti XXI	11.318	Ni XXI
10.550	Fe XVII	10.813	Cu XXI	11.043	Fe XVII	11.318	Ni XXI
10.552	Co XXIV	10.813	Fe XIX	11.046^{C}	Kr XXXIV	11.318	Ni XXI
10.564	Fe XIX	10.813	Fe XIX	11.048^{T}	Co XXIII	11.321	Co XVIII
10.568	Co XIX	10.813	Fe XIX	11.05^{C}	Fe XXIII	11.325	Fe XXIII
10.571	Co XXIV	10.813	Fe XIX	11.058^{C}	Ti XXI	11.326	Fe XVIII
10.571	Co XXIV	10.813	Fe XIX	11.064^{T}	Co XXIII	11.326	Fe XVIII
10.5838^{C}	Mo XLII	10.816^{C}	Ti XXI	11.065	Cu XXI	11.326	Fe XVIII
10.586^{C}	Fe XXV	10.816^{C}	Ti XXI	11.070^{T}	Co XXIII	11.326	Fe XVIII
10.587^{C}	Co XXIV	10.820^{C}	Ti XXI	11.080^{C}	Mn XXIV	11.34^{C}	Fe XXIII
10.593	Co XXIV	10.835^{T}	Co XXIII	11.087^{C}	Mo XLI	11.352	Cu XXI
10.593	Co XXIV	10.838	V XX	11.097	Cu XXI	11.3596^{C}	Cr XXIV
10.593	Co XXIV	10.840	Cr XX	11.098^{C}	Mn XXIV	11.378	V XX
10.597	Cu XX	10.8405^{C}	V XXI	11.099^{C}	Mn XXIV	11.383	Cu XX
10.599^{C}	Ti XXI	10.847^{T}	Co XXIII	11.099^{C}	Mn XXIV	11.387^{C}	Mn XXIV
10.607^{C}	Ti XXI	10.847^{T}	Co XXIII	11.1020^{C}	Mo XL	11.387^{C}	Mn XXIV
10.617	Fe XIX	10.8504^{C}	V XXI	11.105^{T}	Co XXIII	11.398^{C}	Fe XXIII
10.619	Fe XXIV	10.851	Fe XVII	11.105^{T}	Co XXIII	11.420	Fe XVII
10.6234^{C}	Ti XX	10.8539^{C}	V XXI	11.108	Co XVIII	11.420	Fe XVIII
10.625^{C}	Mo XLI	10.858	Cu XXI	11.114	Cu XXI	11.426	Fe XXIV
10.6275^{C}	Mo XLI	10.860^{C}	Kr XXXIV	11.133	Fe XVII	11.427	V XX
10.629^{C}	Mo XLI	10.863	Cu XXI	11.136	Cu XXI	11.427	V XX
10.6310^{C}	Mo XLI	10.866^{C}	Ti XXI	11.138	Ni XX	11.427	V XX
10.635	Fe XIX	10.8674^{C}	Mo XLI	11.141	Co XXIV	11.430	Co XXIV
10.635	Fe XIX	10.868^{T}	Co XXIII	11.141	Co XXIV	11.440	Fe XVIII
10.644	Fe XIX	10.878^{C}	Ti XXI	11.1471^{C}	Mo XL	11.440	Fe XVIII
10.645	Co XIX	10.881^{C}	Ti XXI	11.155	Co XVIII	11.442	Fe XVIII
10.653	Cu XX	10.885^{T}	Co XXIII	11.158	Ni XX	11.442	Fe XXII
10.658	Fe XVII	10.888^{C}	Mn XXIV	11.159^{C}	Ni XXI	11.442	Fe XXIII
10.658	Fe XIX	10.889^{T}	Co XXIII	11.162	Cu XXI	11.4473^{C}	Mo XL
10.658	Fe XIX	10.893	Cu XXI	11.166	Fe XXIII	11.45^{C}	Fe XXIII
10.6580^{C}	Ti XX	10.901^{T}	Co XXIII	11.171	Fe XXIV	11.4516^{C}	Ti XX
10.6624^{C}	Mo XLI	10.903	Fe XXIII	11.173^{T}	Co XXIII	11.458	Fe XVIII
10.663	Fe XXIV	10.907	Fe XIX	11.176	Ni XX	11.458	Fe XVIII
10.674	Co XXIV	10.918	Ni XX	11.185	Cu XXI	11.459	Fe XXII
10.674	Co XXIV	10.927	Fe XXIII	11.187	Fe XXIV	11.459	Fe XXIII
10.674	Co XXIV	10.9300^{C}	V XXI	11.197^{T}	Co XXIII	11.46^{C}	Fe XXIII
10.685	Fe XIX	10.931^{C}	Ti XXI	11.209^{C}	Mn XXIV	11.4618^{C}	Ti XX
10.6926^{C}	Ti XX	10.933	Co XXIV	11.215	V XX	11.478	Ni XXI
10.6940^{C}	Ti XX	10.933	Co XXIV	11.215^{C}	Mo XLI	11.478	V XX
10.704	Co XIX	10.933	Fe XIX	11.2214^{C}	Cr XXIV	11.4808^{C}	Mo XL
10.709	Co XXIV	10.933^{T}	Co XXIII	11.223^{C}	Mn XXIV	11.486	Co XVIII
10.712	Cr XX	10.935	Fe XXIII	11.226	Ni XX	11.488^{C}	Mn XXIV
10.7290^{C}	Ti XX	10.936	Ni XX	11.226	Ni XX	11.49^{C}	Fe XXIII
10.736	Fe XIX	10.936^{C}	Kr XXXIV	11.226	Ni XX	11.493	Fe XXIII
10.743	Co XXIV	10.939^{C}	Mo XLI	11.229	Ni XXI	11.517	Ni XXI
10.760	Co XXIV	10.940	Cr XX	11.239	Ni XXI	11.517	Ni XXI
10.760	Co XXIV	10.941	V XX	11.243	V XX	11.517	Ni XXI
10.764^{C}	Co XXIV	10.948^{C}	Kr XXXIV	11.2445^{C}	Mo XLI	11.517	Ni XXI
10.765^{C}	Kr XXXIV	10.9483^{C}	Mo XL	11.249^{C}	Mo XLI	11.519	Fe XXIII
10.7656^{C}	V XXI	10.971	Cu XXI	11.25^{C}	Fe XXIII	11.519	Fe XXIII
10.767	Mo XXXII	10.975	Co XVIII	11.253	Fe XVII	11.523	V XX
10.770	Fe XVII	10.980	Fe XXIII	11.253	Fe XVIII	11.523	V XX
10.770	Fe XIX	10.981^{C}	Fe XXIII	11.256^{C}	Mo XLI	11.525	Fe XXIII
10.772	Ni XX	10.982	Ni XX	11.257^{C}	Mo XLI	11.526	Fe XVIII
10.776	Co XIX	10.992^{C}	Mo XLI	11.2579^{C}	Mo XLI	11.526	Fe XVIII
10.79^{C}	Fe XXIII	11.002	Cu XXI	11.260^{C}	Mn XXIV	11.5334^{C}	Mo XL
10.799^{T}	Co XXIII	11.010^{T}	Co XXIII	11.261	Fe XXIV	11.539	Ni XIX

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
11.539	Ni XXI	11.906	Mn XXII	12.186	Cu XXI	12.488	Mn XXII
11.551	Fe XVIII	11.906	Mn XXII	12.193	Co XIX	12.488	Mn XXII
11.5534[C]	Mn XXIII	11.920	Cu XXI	12.193	Fe XXII	12.502	Ni XXI
11.594	Cu XX	11.921	Fe XXII	12.193	Fe XXII	12.502	Ni XXI
11.594	Fe XXIII	11.935	Fe XXII	12.201[C]	Cr XXIII	12.507	Mn XXII
11.594	Fe XXIII	11.954	Co XIX	12.201[C]	Fe XXI	12.510	Mn XVI
11.5965[C]	Mn XXIII	11.956	Cu XXI	12.208	Ni XXI	12.512[C]	Cr XXIII
11.597[C]	Ni XXI	11.9566[C]	Ti XX	12.209	Ni XXI	12.513	Co XX
11.599	Ni XIX	11.9567[C]	Ti XX	12.212	Co XIX	12.521[C]	Mn XXII
11.614	Fe XXIII	11.957	Mo XXXII	12.215[C]	Cr XXIII	12.525	Fe XXI
11.614	Fe XXIII	11.958	Ti XIX	12.224	Co XIX	12.526	Fe XVII
11.615	V XX	11.959[C]	Mn XXII	12.230[C]	Fe XXI	12.533[C]	Ni XXI
11.640	Fe XVIII	11.9601[C]	Ti XX	12.2336[C]	V XXIII	12.55[C]	Fe XX
11.650	Fe XXII	11.961	Ni XX	12.238	Co XIX	12.551	Co XX
11.669	Fe XXII	11.971	Mn XVI	12.238	Co XX	12.551	Co XX
11.67[C]	Fe XXIII	11.971	Mn XXII	12.245	Ni XXI	12.551	Co XX
11.68[C]	Fe XXIII	11.972[C]	Ni XX	12.264	Fe XVII	12.551	Co XX
11.692	Fe XXIII	11.974	Ni XX	12.269[C]	Cr XXIII	12.553	Mn XXII
11.70[C]	Fe XXIII	11.976	Fe XXII	12.271[C]	Mn XXII	12.553	Mn XXII
11.702[C]	Fe XXIII	11.991	Ni XX	12.277	Ni XXI	12.553	Mn XXII
11.736	Cu XX	11.997	Mn XXII	12.2779[C]	Mn XXIII	12.56[C]	Mn XXII
11.736	Cu XXI	11.997	Mn XXII	12.281	Co XIX	12.570	Cu XX
11.737	Fe XXIII	12.006	Ni XX	12.281	Co XX	12.578[C]	Fe XXI
11.741	Fe XVIII	12.010	Ti XIX	12.282[C]	Co XX	12.580	Mn XXII
11.744	Co XIX	12.015	Co XIX	12.284	Mo XXXII	12.580[C]	Ni XX
11.748	Fe XXII	12.017[C]	Mn XXII	12.285	Fe XXI	12.592	Ni XXI
11.748	Fe XXII	12.0188[C]	Mn XXIII	12.300	Co XIX	12.592	Ni XXI
11.748	Fe XXII	12.027	Fe XXII	12.300	Co XX	12.592	Ti XIX
11.748	Fe XXII	12.029	Cu XXI	12.322	Fe XVII	12.606	Co XVIII
11.748	Fe XXIII	12.042	Ni XX	12.325	Fe XXI	12.606	Co XX
11.767	Fe XXII	12.042	Ni XX	12.325	Fe XXI	12.6125[C]	Cr XXII
11.774	Cu XVIII	12.045	Fe XXII	12.325	Fe XXII	12.622	Ti XIX
11.778	Fe XVIII	12.0462[C]	Ti XX	12.331	Co XX	12.623	Fe XXI
11.779	Ni XX	12.053	Fe XXII	12.336	Mn XXII	12.63[C]	Fe XX
11.787	Ni XX	12.057[C]	Fe XXI	12.345	Ni XXI	12.63[C]	Mn XXII
11.789	Fe XXII	12.061	Cu XXI	12.348	Co XX	12.64[C]	Fe XX
11.789	Fe XXII	12.073[C]	Cr XXIII	12.348	Co XX	12.65[C]	Fe XXIII
11.793	Mn XXII	12.077	Fe XXII	12.348	Co XX	12.6555[C]	Cr XXII
11.793	Mn XXII	12.077	Fe XXII	12.368	Mn XXII	12.656	Mn XXII
11.797	Fe XXII	12.079	Mn XXII	12.370	Ni XXI	12.656	Mn XXII
11.823	Fe XXII	12.079	Ni XX	12.3716[C]	V XXIII	12.656	Mn XXII
11.830	Cu XXI	12.079	Ni XXI	12.373	Mn XVI	12.656	Ni XIX
11.832	Ni XX	12.092[C]	Cr XXIII	12.379	Ti XIX	12.656	Ni XXI
11.837	Fe XXII	12.092[C]	Cr XXIII	12.38	Fe XXI	12.667	Co XVIII
11.837	Fe XXII	12.093[C]	Cr XXIII	12.39[C]	Mn XXII	12.670	Mn XXII
11.846	Ni XX	12.095	Fe XXII	12.393	Fe XXI	12.681	Fe XVII
11.851[C]	Cr XXIII	12.095	Fe XXIII	12.394[C]	Cr XXIII	12.688	Ti XIX
11.853	Mn XVI	12.095	Fe XXIII	12.398	Fe XXI	12.706	Mn XXII
11.8550[C]	Mo XL	12.112	Ni XX	12.40[C]	Mn XXII	12.71[C]	Fe XX
11.86[C]	Fe XXIII	12.123	Fe XVII	12.405[C]	Cr XXIII	12.72[C]	Fe XX
11.865	Fe XVIII	12.130	Ni XX	12.410	Ti XIX	12.726	Ti XIX
11.870	Fe XXIII	12.140	Cu XXI	12.423[C]	Fe XXI	12.728[C]	Fe XXI
11.8719[C]	Ti XX	12.155	Co XIX	12.427	Fe XXIII	12.738	Mn XXII
11.874	Ni XX	12.155	Co XIX	12.427	Mn XXII	12.738	Mn XXII
11.876	Mn XXII	12.157	Ni XX	12.435	Ni XIX	12.75[C]	Fe XX
11.876	Mn XXII	12.1627[C]	Mn XXIII	12.435	Ni XXI	12.76[C]	Mn XXII
11.876	Mn XXII	12.165	Cu XXI	12.4438[C]	Mn XXIII	12.763	Fe XX
11.876	Mn XXII	12.165[C]	Fe XXI	12.447	Mn XXII	12.77[C]	Fe XX
11.880	Co XX	12.165[C]	Ni XXI	12.462	Fe XXI	12.779	Cr XVII
11.886	Fe XXII	12.168	Co XIX	12.465[C]	Fe XXI	12.812	Ni XIX
11.892	Co XIX	12.172	Mn XXII	12.472	Ni XXI	12.812	Ni XX
11.898	Fe XXIII	12.177[C]	Ni XXI	12.480	Ti XIX	12.816	Mn XXII
11.898	Mo XXXII	12.1778[C]	Mn XXIII	12.488	Mn XXII	12.816	Mn XXII
11.906	Co XIX	12.181	Ni XX	12.488	Mn XXII	12.816	Mn XXII
11.906	Mn XXII	12.181	Ni XXI	12.488	Mn XXII	12.818	Fe XX

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
12.818	Fe XX	13.202^{C}	V XXII	13.661	Co XX	14.184	Co XIX
12.827	Cu XX	13.203	Cr XXI	13.67^{C}	Cr XXI	14.197^{C}	Ti XXI
12.828	Co XIX	13.223^{C}	V XXII	13.676	Co XX	14.203	Fe XVIII
12.84^{C}	Fe XX	13.224^{C}	V XXII	13.679^{C}	V XXII	14.203	Fe XVIII
12.847	Fe XVIII	13.224^{C}	V XXII	13.684	Cr XXI	14.213	Cr XX
12.847	Fe XX	13.240	Co XIX	13.684	Cr XXI	14.213	Cr XX
12.857	Fe XX	13.240	Co XX	13.684	Cr XXI	14.229	V XX
12.87^{C}	Cr XXI	13.246	Co XIX	13.700	Fe XIX	14.24^{C}	Cr XXI
12.873^{C}	Fe XXI	13.256	Ni XX	13.735	Fe XIX	14.256	Fe XVIII
12.876	Co XIX	13.258	Co XIX	13.735	Fe XIX	14.279	V XX
12.888	Fe XX	13.27^{C}	Fe XX	13.735	Fe XIX	14.279	V XX
12.890	Co XIX	13.282	Ni XX	13.735	Fe XIX	14.303	Co XIX
12.909	Cr XVII	13.2866^{C}	Cr XXII	13.752	Cr XXI	14.3217^{C}	Kr XXXVI
12.916^{C}	Ni XX	13.289	Co XIX	13.752	Cr XXI	14.323	Cr XX
12.92^{C}	Fe XX	13.294	Cr XV	13.752	Cr XXI	14.344	Fe XVIII
12.924	Fe XX	13.298^{C}	Fe XX	13.775	Co XX	14.355	Co XIX
12.927	Ni XX	13.3015^{C}	Cr XXII	13.779	Cr XXI	14.360	V XX
12.935	Mn XXII	13.307^{C}	Co XX	13.779	Ni XIX	14.361	Fe XVIII
12.942	Co XIX	13.309	Ni XX	13.786	Co XX	14.366	Cr XX
12.942	Co XIX	13.314	Co XIX	13.795	Fe XIX	14.37	Ni XVIII
12.945^{C}	V XXII	13.314	Co XX	13.8216^{C}	V XXI	14.373	Fe XVIII
12.946	Fe XX	13.319	Fe XVIII	13.823	Fe XVII	14.382	Mo XXXII
12.978	Fe XX	13.319	Fe XVIII	13.825	Co XX	14.387^{C}	V XX
12.98^{C}	Fe XX	13.321^{C}	Co XX	13.84^{C}	Fe XIX	14.401	V XX
12.981	Cr XXI	13.330^{C}	V XXII	13.844	Cr XXI	14.402	Cr XX
12.981	Cr XXI	13.344^{C}	V XXII	13.844	Cr XXI	14.418	Fe XVIII
12.981	Cr XXI	13.355	Fe XVIII	13.844	Cr XXI	14.4214^{C}	Kr XXXVI
12.981	Cr XXI	13.355	Fe XVIII	13.862	Cr XV	14.423	Co XIX
12.985	Co XIX	13.356	Co XX	13.8645^{C}	V XXI	14.4290^{C}	V XXI
13.00^{C}	Mn XXII	13.356	Co XX	13.868	Co XVIII	14.442	Cr XX
13.001	Fe XVIII	13.372	Co XX	13.870	Cr XXI	14.453	Fe XVIII
13.01^{C}	Fe XXIII	13.374	Fe XVIII	13.891	Fe XVII	14.457^{T}	Cr XX
13.015	Fe XVIII	13.3870^{C}	Ti XXII	13.91^{C}	Cr XXI	14.466	Cr XX
13.018	Cr XXI	13.397	Fe XVIII	13.919^{C}	Fe XVIII	14.469	Fe XVIII
13.018	Cr XXI	13.397	Fe XVIII	13.94^{C}	Cr XXI	14.486	Fe XVIII
13.018	Cr XXI	13.397	Fe XIX	13.950	Cr XXI	14.496^{C}	Ti XXI
13.02^{C}	Fe XX	13.416	Cr XV	13.954	Fe XVIII	14.508	Cr XX
13.032	Ni XX	13.418^{C}	V XXII	13.991	Cr XV	14.518^{C}	Ti XXI
13.049	Fe XVIII	13.424	Fe XIX	14.00^{C}	Cr XXI	14.519^{C}	Ti XXI
13.049	Fe XX	13.425	Co XX	14.0002^{C}	Kr XXXVI	14.520^{C}	Ti XXI
13.06^{C}	Fe XX	13.4316^{C}	Cr XXII	14.037	Cr XX	14.533	Cr XX
13.060	Cr XXI	13.44^{C}	Cr XXI	14.041	Co XVIII	14.534	Co XIX
13.075	Ni XX	13.46	Mn XVI	14.041	Co XIX	14.534	Fe XVIII
13.082	Fe XX	13.46^{T}	Mn XX	14.041	Cr XXI	14.534	Fe XIX
13.082	Fe XX	13.464	Fe XVIII	14.043	Ni XIX	14.551	Fe XVIII
13.082	Fe XX	13.464	Fe XIX	14.066	Cr XX	14.557	Co XIX
13.084	Co XIX	13.496	Co XX	14.066	Cr XX	14.566	Mo XXXII
13.084	Co XIX	13.504	Fe XIX	14.066	Cr XX	14.5729^{C}	V XXI
13.097	Co XIX	13.517	Co XX	14.077	Ni XIX	14.573^{C}	Kr XXXV
13.11	Cu XIX	13.520	Fe XIX	14.080	Co XVI	14.581	Fe XVIII
13.11^{C}	Fe XX	13.520	Fe XIX	14.098	Mn XVI	14.5879^{C}	V XXI
13.123	Co XIX	13.5248^{C}	Ti XXII	14.098^{T}	Mn XIX	14.594	Co XIX
13.123	Cr XXI	13.541^{C}	V XXII	14.098^{T}	Mn XIX	14.60^{C}	Fe XIX
13.135	Ni XX	13.55	Cr XXI	14.10	Ni XVIII	14.610	Fe XVIII
13.1426^{C}	Cr XXII	13.566^{C}	V XXII	14.121	Cr XX	14.622^{C}	Ti XXI
13.151	Co XIX	13.58^{C}	Mn XXII	14.121	Cr XX	14.63^{C}	Fe XIX
13.157	Co XIX	13.5977^{C}	Cr XXII	14.121	Cr XX	14.635	Cr XX
13.159	Fe XVIII	13.60^{C}	Cr XXI	14.121	Fe XVIII	14.636	V XIX
13.159	Fe XX	13.60^{C}	Cr XXI	14.124^{C}	V XX	14.636^{C}	Ti XXI
13.161	Ni XX	13.61	Mn XVI	14.152	Cr XX	14.649	V XX
13.17^{C}	Fe XX	13.634	Co XVIII	14.152	Cr XX	14.660	Cr XX
13.176^{C}	Fe XX	13.634	Co XX	14.152	Fe XVIII	14.660	Cr XX
13.192	Co XIX	13.634	Co XX	14.164^{C}	Ti XXI	14.668	Fe XIX
13.199	Mn XXII	13.634	Co XX	14.17^{C}	Cr XXI	14.668	Fe XIX
13.199	Mn XXII	13.647	Cr XXI	14.172	Cr XX	14.67^{C}	Fe XVIII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
14.67[C]	Fe XIX	15.216	V XX	15.870	Fe XVIII	16.490	Mo XXXII
14.685	Cr XX	15.229	V XX	15.871	Mn XVII	16.514	Ti XIX
14.698[T]	Mn XVIII	15.238	Mn XVI	15.878[C]	Cu XXVIII	16.521	Mn XVIII
14.70[C]	Fe XIX	15.238[T]	Mn XVIII	15.889	Mn XVII	16.540	Mn XVIII
14.713[C]	Kr XXXV	15.2541[C]	Ti XX	15.9119[C]	Ti XX	16.551[C]	Ti XIX
14.735	Fe XIX	15.256[C]	Kr XXXV	15.916[C]	Kr XXXIV	16.558	V XVIII
14.735[C]	Ti XXI	15.262	Fe XVII	15.924	V XIX	16.561	Ti XVIII
14.738[C]	Kr XXXV	15.272[C]	Kr XXXIV	15.926	Mn XVII	16.562[C]	Ti XIX
14.745	Mo XXXI	15.272[C]	V XX	15.946	Mn XVII	16.575[C]	Ti XIX
14.746[C]	Kr XXXV	15.303[C]	V XX	15.958	Mn XVII	16.577	Mn XVIII
14.751[C]	Kr XXXV	15.312	Mn XVI	15.969[C]	Kr XXXIV	16.589[C]	Mn XVIII
14.752[T]	Mn XVIII	15.332[C]	V XX	15.972[C]	Kr XXXIV	16.616	Mn XVI
14.753[C]	Kr XXXV	15.333	V XIX	15.987	Mn XVII	16.624	Ti XVIII
14.7538[C]	V XXI	15.336	V XX	16.005	Fe XVIII	16.64	Cr XVII
14.759[C]	V XX	15.342[C]	Kr XXXV	16.007	V XIX	16.642[C]	Ti XIX
14.772	Fe XVIII	15.365[C]	Mn XVII	16.018[C]	Cu XXVIII	16.642[C]	Ti XIX
14.794	Co XIX	15.383[C]	Kr XXXV	16.026	Fe XVIII	16.663[C]	Mn XVIII
14.806	Fe XIX	15.400[C]	Kr XXXV	16.041	Mn XVII	16.696	Cr XVII
14.823	Fe XIX	15.403[T]	Mn XVIII	16.054	Mn XVII	16.696	Fe XVI
14.829	V XX	15.404	Mn XVII	16.0559[C]	Ti XX	16.70	Ti XIX
14.856[C]	Ti XXI	15.410[C]	Kr XXXV	16.07	Kr XXVI	16.705[C]	Mn XVIII
14.870	V XX	15.417[C]	Kr XXXV	16.0708[C]	Ti XX	16.719	Ti XIX
14.872[C]	V XX	15.424[C]	Kr XXXV	16.072	Fe XVIII	16.719	Ti XIX
14.877[T]	Mn XVIII	15.424[C]	Kr XXXV	16.087	Fe XVIII	16.719	Ti XIX
14.897[C]	Ti XXI	15.425[C]	Kr XXXIV	16.090	Mn XVII	16.724	Mn XVIII
14.9200[C]	V XXI	15.427	V XX	16.1087[C]	Ni XXVIII	16.736	Ti XIX
14.928	Mo XXXI	15.437	Co XVIII	16.109	Fe XVIII	16.777	Fe XVII
14.929	Fe XIX	15.450	Fe XVII	16.124[C]	Cu XXVIII	16.787	V XVIII
14.929	Fe XIX	15.450	Fe XVIII	16.138[C]	Mn XVIII	16.788[C]	Ti XIX
14.966	Fe XIX	15.457	Mo XXXII	16.165	Fe XVIII	16.795	Ti XIX
14.976	V XX	15.495	V XIX	16.178	Ti XIX	16.795	Ti XIX
14.987[C]	V XX	15.506	Mo XXXII	16.185	Mn XVIII	16.811	Cr XVII
14.989[C]	V XX	15.519	Cr XVIII	16.197[C]	Mn XVIII	16.811	Ti XIX
14.995	Fe XIX	15.519	Cr XVIII	16.221	Cr XVII	16.839	Fe XVI
15.0006[C]	Cu XXIX	15.526[C]	V XX	16.234	Fe XVIII	16.84[C]	Cr XVII
15.002	Mo XXXII	15.551	Co XVII	16.24[C]	V XVIII	16.855[C]	Ti XIX
15.015	Fe XVII	15.560	V XIX	16.249	Cr XVII	16.876[C]	Ti XIX
15.015	Fe XIX	15.570	Mn XVII	16.255	Mn XVIII	16.880	Mn XVII
15.018[C]	Ti XXI	15.584[C]	Kr XXXIV	16.2707[C]	Ni XXVIII	16.882	Mn XVI
15.039	V XIX	15.60	Cr XVIII	16.272	Fe XVIII	16.889	Cr XV
15.04[C]	Fe XIX	15.609	V XIV	16.278	Mn XVII	16.890	Fe XVI
15.040[C]	Kr XXXV	15.615	Mn XVII	16.278[C]	Cu XXVIII	16.890	Fe XVI
15.042[C]	V XX	15.625	Fe XVIII	16.2801[C]	Ti XX	16.90	Ti XVIII
15.048[C]	Kr XXXV	15.63	V XIX	16.305	Fe XVIII	16.914	V XVIII
15.06	Cr XV	15.63	V XIX	16.31	Cr XVII	16.933[C]	Ti XIX
15.100[C]	Kr XXXV	15.639	V XX	16.31	Cr XVII	16.939	Ti XVIII
15.111	Fe XIX	15.670	Mn XVII	16.32[C]	V XVIII	16.939	V XIV
15.114	V XX	15.671	Ti XIX	16.3235[C]	Ni XXVIII	16.952	Fe XVI
15.114	V XX	15.676[C]	Mn XVII	16.328[C]	Cr XVII	16.960[C]	Ti XIX
15.114	V XX	15.702	V XIX	16.332[C]	Mn XVIII	16.965	Cr XV
15.138	Fe XIX	15.73[C]	V XIX	16.337	Fe XVIII	16.993	Fe XVI
15.141	V XX	15.732	Mn XVII	16.34	Kr XXVI	17.018	V XVIII
15.163[C]	Kr XXXV	15.738	Ti XIX	16.349[C]	Cu XXVIII	17.025	Fe XVI
15.1630[C]	Cu XXIX	15.742	Ti XIX	16.377[C]	Kr XXXIV	17.025	Fe XVI
15.169	Co XVIII	15.742	Ti XIX	16.378	V XVIII	17.028[C]	Ti XIX
15.172	Fe XIX	15.742	Ti XIX	16.414	Ti XIX	17.034[C]	Cr XVI
15.176[C]	V XX	15.748	V XIV	16.425	Mn XVIII	17.042[S]	Mo XXXII
15.187[C]	V XX	15.766	Fe XVIII	16.440	Ti XIX	17.050[C]	Ni XXVII
15.198[C]	V XX	15.826	Mn XVII	16.444[C]	Mn XVIII	17.054	Fe XVII
15.209[C]	Fe XVIII	15.828	Co XVII	16.4465[C]	Ti XX	17.073	Cr XVI
15.21	Cr XV	15.828	Fe XVIII	16.451	Mn XVIII	17.076	Ti XIX
15.21	Kr XXVI	15.846[C]	Cu XXVIII	16.458[C]	Ti XIX	17.076	Ti XIX
15.21	Kr XXVI	15.847[C]	Fe XVIII	16.46	Cr XVII	17.081[C]	Ni XXVII
15.2113[C]	Ti XX	15.849[C]	Ti XIX	16.467	V XVIII	17.087	Fe XVI
15.2157[C]	Cu XXIX	15.866	Ti XIX	16.482[C]	Ti XIX	17.087	Fe XVI

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
17.094	V XIV	17.449	Fe XVI	18.008	V XVI	18.939	Ti XVII
17.095	Mn XVI	17.465	Mn XVII	18.017	Cr XVI	18.970[C]	Co XXVI
17.097	Fe XVII	17.467	Fe XVI	18.020	Cr XVII	18.991[C]	V XV
17.097	Mo XXXII	17.482	V XVIII	18.056	Mo XXX	19.015	Cr XV
17.124	Fe XVI	17.490	V XVII	18.089[C]	Cr XVII	19.028	V XV
17.124	Fe XVI	17.498	Fe XVI	18.12	V XVI	19.038	Cr XVI
17.124	Fe XVI	17.498	Fe XVI	18.12	V XVI	19.089	Ti XVI
17.131	Mn XVII	17.498	Fe XVI	18.12[C]	Ti XVII	19.110	Ti XVI
17.149[C]	Fe XXIV	17.500	Mo XXXI	18.123[C]	V XVI	19.112	Ti XVI
17.149[S]	Mo XXXII	17.5040[C]	Co XXVII	18.141	Ti XVII	19.203	V XV
17.150	Ti XVIII	17.506[C]	Ni XXVII	18.141	Ti XVII	19.204	Ti XIII
17.158	V XVII	17.514	Cr XVI	18.154	Ti XVII	19.210	Ti XVI
17.158	V XVII	17.5214[C]	Cu XXVII	18.176	Ti XVII	19.255	Cr XVI
17.16	V XVII	17.536	V XVII	18.218	Ti XVII	19.298	V XV
17.161	Fe XVI	17.541	Mn XVII	18.219	Cr XVII	19.366	Ti XIII
17.161	Fe XVI	17.545	V XVIII	18.219	Cr XVII	19.366	V XV
17.161	Fe XVI	17.550	Mn XVII	18.227[C]	Cr XVII	19.369	Ti XVII
17.172	Mo XXXII	17.555	Fe XV	18.26	V XVI	19.369[C]	V XV
17.181	Ti XIX	17.556	Mo XXXI	18.265	V XVI	19.370	Ti XVI
17.1877[C]	Cu XXVII	17.5567[C]	Co XXVII	18.265	V XVI	19.415	Ti XVII
17.201[C]	Cr XVII	17.575	V XIV	18.269	Ti XVII	19.442	Cr XVI
17.201[C]	Ti XIX	17.578	Mo XXXI	18.336	Cr XVII	19.443	V XV
17.206	Fe XVI	17.587	Ti XVIII	18.336	Cr XVII	19.45	Ti XVI
17.206	Fe XVI	17.587[C]	Ni XXVII	18.350	Ti XVII	19.459	Ti XVII
17.206	Fe XVI	17.589	Cr XVI	18.387	Ti XVII	19.501	Ti XVII
17.22	Ti XVIII	17.593	Fe XV	18.389	Cr XVII	19.511	Cr XVI
17.240[C]	Ni XXVII	17.593	Fe XVI	18.394[C]	Co XXVI	19.518	V XV
17.242	Cr XVI	17.603	Cr XVI	18.425[C]	Co XXVI	19.538	Cr XVI
17.249	Fe XVI	17.620	Fe XV	18.431	Mo XXXII	19.551	Ti XVI
17.249	Fe XVI	17.630	Ti XVIII	18.492	V XVI	19.589	V XV
17.249	Fe XVI	17.633	Cr XVI	18.497	Cr XV	19.645	V XV
17.259	V XVII	17.644	V XVII	18.500	Mo XXV	19.65	Ti XVI
17.264[C]	Fe XXIV	17.656[C]	Cr XVI	18.525	V XVI	19.651	Ti XVII
17.267[C]	Fe XXIV	17.671	Cr XVI	18.531	Cr XVII	19.671	V XV
17.28	Ti XVIII	17.678	V XVIII	18.531	Cr XVII	19.671	V XV
17.285	Fe XVI	17.704	Cr XVI	18.5484[C]	Ni XXVI	19.71	Ti XVI
17.30	Ti XVIII	17.715	Ti XVIII	18.581	Mo XXXII	19.714	Cr XVI
17.300	Fe XV	17.716	Mn XVII	18.605[C]	Co XXVI	19.714	Cr XVI
17.300[C]	Cr XVI	17.717	V XVIII	18.623	Ti XVII	19.718	Ti XVII
17.301	Mn XVII	17.727	Ti XIII	18.630	V XVI	19.725	V XV
17.323	Fe XVI	17.729	Mn XVII	18.651	Ti XVII	19.730	V XVI
17.3356[C]	Cu XXVII	17.730	Cr XVI	18.654	Mn XVI	19.757	V XV
17.337	Fe XVI	17.754	V XIV	18.668[C]	Fe XXIV	19.782	V XV
17.3421[C]	Co XXVII	17.785	Cr XVI	18.68[C]	V XVI	19.80	V XV
17.355	Mo XXX	17.793	Cr XVI	18.689	V XVI	19.807	Cr XVI
17.355[C]	Ni XXVII	17.794	Mn XVII	18.7093[C]	Ni XXVI	19.807	Cr XVI
17.356[C]	Ti XIX	17.807	Mn XVII	18.7185[C]	Ni XXVI	19.807	Cr XVI
17.3577[C]	Cu XXVII	17.833	Cr XVI	18.72	Mo XXXII	19.844	V XV
17.365	Ti XVIII	17.856	Cr XVI	18.72[C]	V XVI	19.844	V XV
17.366	Fe XVI	17.869	Ti XIII	18.7205[C]	Fe XXVI	19.847	Cr XVI
17.370	Cr XVI	17.871	Mo XXXI	18.728[C]	Co XXVI	19.888	V XV
17.3703[C]	Cu XXVII	17.880	Fe XV	18.7310[C]	Ni XXVI	19.902[C]	Fe XXV
17.373	V XVII	17.893[C]	Cr XVII	18.757	Ti XVII	19.903	V XV
17.373[C]	Cr XVI	17.917	Fe XV	18.775	Cr XVI	19.92[C]	V XVI
17.39[C]	Ti XVIII	17.920	Ti XVIII	18.782	Cr XV	19.933[C]	Fe XXV
17.399	Fe XVI	17.931	Cr XVI	18.782	V XIV	19.943	Ti XIII
17.399	Fe XVI	17.94	Kr XXVI	18.789[C]	Fe XXIV	19.95[C]	V XVI
17.399	Fe XVI	17.957	Cr XVII	18.804[C]	Fe XXIV	19.951	Cr XVI
17.400	V XVIII	17.964	Mo XXX	18.870	V XIV	19.97[C]	Ti XV
17.413	Fe XVI	17.968	Cr XVII	18.878[C]	Co XXVI	19.988	V XV
17.413	Fe XVI	17.979	Mo XXV	18.8822[C]	Fe XXVI	19.995	Cr XVI
17.413	Fe XVI	17.987	Mn XVII	18.890	V XVI	20.017	V XVI
17.438	Cr XVI	17.99	Kr XXVI	18.8951[C]	Ni XXVI	20.03[C]	V XVI
17.442	V XVIII	17.993	Cr XVI	18.9349[C]	Fe XXVI	20.038	V XV
17.445	Mo XXXI	18.004	Mo XXX	18.935	Mn XVI	20.051	Ti XV

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
20.06^{C}	Ti XV	21.304	Ti XIV	22.518	Ti XV	24.2027^{C}	V XXIII
20.0749^{C}	Co XXV	21.341	Ti XIV	22.574^{C}	Ti XV	24.262^{C}	Cr XXIII
20.078	V XV	21.369	Kr XXVI	22.654^{C}	Ti XV	24.3019^{C}	Cu XXVII
20.079	V XVI	21.467	Cr XIV	22.661	Cu XIX	24.315	Ti XIV
20.101	Ti XVI	21.522	Ti XIV	22.722^{C}	Ti XV	24.3570^{C}	Mo XLI
20.133	Ti XV	21.568	V XV	22.724	Ti XV	24.3602^{C}	Mo XLI
20.135	Ti XIII	21.601^{C}	Mn XXIV	22.739	Ti XV	24.38^{C}	V XXI
20.138^{C}	Fe XXV	21.631^{C}	Mn XXIV	22.743	Kr XXVI	24.4551^{C}	Cu XXVII
20.15^{C}	V XVI	21.657	Ti XIV	22.936	Ti XV	24.51^{C}	V XXI
20.183	Ti XVII	21.684	Mo XXIV	22.940^{C}	Cu XXVIII	24.51^{C}	V XXI
20.21^{C}	V XVI	21.732	Ti XIV	22.966	Ti XV	24.517	V XIII
20.23	Ti XV	21.737^{C}	Ti XIV	23.034	Ti XV	24.592	Ti XIV
20.23	Ti XV	21.770	Cr XIV	23.0347^{C}	Mo XLI	24.592	Ti XIV
20.24^{C}	Ti XV	21.800	V XV	23.071^{C}	Cu XXVIII	24.688^{C}	Ni XXVII
20.2450^{C}	Co XXV	21.815^{C}	Ti XIV	23.177	Ti XV	24.72^{C}	Ti XX
20.2509^{C}	Co XXV	21.82	Ti XIV	23.1886^{C}	Mo XLI	24.728	Ti XIV
20.2576^{C}	Co XXV	21.823^{C}	Fe XXIV	23.193	Ti XV	24.766	Kr XXVI
20.2676^{C}	Mn XXV	21.8281^{C}	Cu XXIX	23.244^{C}	Cu XXVIII	24.8031^{C}	Mo XL
20.271^{C}	Fe XXV	21.832	V XV	23.254^{C}	Cu XXVIII	24.817^{C}	Ni XXVII
20.278	V XVI	21.840	Kr XXV	23.274^{C}	Cu XXVIII	24.83^{C}	Ti XX
20.278	V XVI	21.854	Mo XXIV	23.277^{C}	Cu XXVIII	24.83^{C}	Ti XX
20.28^{C}	V XVI	21.865^{C}	Mn XXIV	23.356	Ti XIII	24.881	Ni XVIII
20.30^{C}	Ti XV	21.883	Ti XIV	23.4490^{C}	Ni XXVIII	24.891	Ti XIV
20.312	Ti XV	21.909	V XV	23.49^{C}	Ti XX	24.907	Ti XIV
20.313	Ti XV	21.958	Ti XIV	23.490	V XIV	24.9287^{C}	Mo XL
20.364	Ti XV	21.987^{C}	Fe XXIV	23.503	Cu XIX	24.9303^{C}	Cu XXVII
20.37^{C}	Ti XV	21.991^{C}	Fe XXIV	23.522^{C}	Cr XXIII	25.025	Ti XIV
20.389	Ti XV	22.010^{C}	Fe XXIV	23.548^{C}	Cu XXVIII	25.025	Ti XIV
20.418	Ti XV	22.010^{C}	Mn XXIV	23.552^{C}	Cr XXIII	25.025^{C}	Ni XXVII
20.418	Ti XV	22.0121^{C}	Cr XXIV	23.599	Cu XIX	25.035^{C}	Ni XXVII
20.419^{C}	Fe XXV	22.047^{C}	Ti XIV	23.599^{C}	Cu XXVIII	25.058^{C}	Ni XXVII
20.4291^{C}	Mn XXV	22.066	Ti XIV	23.60^{C}	Ti XX	25.061^{C}	Ni XXVII
20.4368^{C}	Co XXV	22.083	V XV	23.60^{C}	Ti XX	25.070	Ni XVIII
20.444	V XVI	22.083	V XV	23.6120^{C}	Mo XLI	25.071	Ti XIV
20.444	V XVI	22.099	Ti XIV	23.621	Cu XIX	25.071^{C}	Ni XVIII
20.4818^{C}	Mn XXV	22.109	Ti XV	23.686^{C}	Cu XXVIII	25.086	Ti XIV
20.513	V XVI	22.1477^{C}	Cu XXIX	23.690	Ti XIV	25.142^{T}	Cu XIX
20.524^{C}	Fe XXV	22.155^{C}	Mn XXIV	23.698	Ti XIII	25.175^{T}	Cu XIX
20.538	Ti XV	22.162	Ti XIV	23.704	Cu XIX	25.206	Ti XIV
20.55^{C}	Ti XV	22.1733^{C}	Cr XXIV	23.7439^{C}	Mn XXIII	25.2533^{C}	Co XXVII
20.59^{C}	Ti XV	22.181^{C}	Fe XXIV	23.7680^{C}	Ni XXVIII	25.260	Ti XIV
20.611	Ti XV	22.190	Ti XIV	23.783^{C}	Cu XXVIII	25.2641^{C}	Cu XXVII
20.659	V XVI	22.192	V XV	23.794	V XIV	25.297	Cu XIX
20.659	V XVI	22.192	V XV	23.820^{C}	Cr XXIII	25.3163^{C}	Cu XXVII
20.70	Ti XV	22.214	V XV	23.8677^{C}	Ni XXVIII	25.327^{C}	Ni XXVII
20.700	Ti XV	22.215	Ti XIV	23.908^{C}	Cu XXVIII	25.378^{C}	Ni XXVII
20.701	Ti XV	22.2261^{C}	Cr XXIV	23.9141^{C}	Mn XXIII	25.416	Kr XXVI
20.716	V XIV	22.232	V XV	23.9267^{C}	Mn XXIII	25.498^{C}	Ni XXVII
20.823	Ti XV	22.2471^{C}	Cu XXIX	23.944^{C}	Cu XXVIII	25.526	Cu XIX
20.863	Cr XV	22.248	Ti XIV	23.9585^{C}	Mn XXIII	25.543	Cu XXVII
20.88^{C}	Ti XV	22.257	Kr XXVI	23.960	Ti XIV	25.5492^{C}	Cu XXVII
20.897	Ti XV	22.276^{C}	Mn XXIV	23.979^{C}	Cr XXIII	25.5720^{C}	Co XXVII
20.92^{C}	Ti XV	22.279	Ti XIV	23.9890^{C}	V XXIII	25.592^{C}	Ni XXVII
20.97^{C}	Ti XV	22.279	Ti XIV	23.991	Ti XIII	25.621	Kr XXVI
21.018	V XIV	22.303^{C}	Ti XV	24.020^{C}	Cu XXVIII	25.646	Cu XXVII
21.019	V XV	22.328	Ti XIV	24.033^{C}	Cu XXVIII	25.6718^{C}	Co XXVII
21.035	Ti XIII	22.328	Ti XIV	24.050^{C}	Cu XXVIII	25.710^{C}	V XXII
21.05^{C}	Ti XV	22.375	V XV	24.056^{C}	Cu XXVIII	25.723^{C}	Ni XXVII
21.094	Ti XV	22.376^{C}	Ti XV	24.070^{C}	Cu XXVIII	25.728	Kr XXVI
21.127	Ti XIII	22.426	Ti XIV	24.084^{C}	Cu XXVIII	25.739^{C}	V XXII
21.153	Cr XV	22.464	Ti XV	24.122^{C}	Cr XXIII	25.747^{C}	Ni XXVII
21.185	Kr XXVI	22.475	Cu XIX	24.1446^{C}	Mn XXIII	25.827^{C}	Ni XXVII
21.213	Cr XV	22.482	Ti XV	24.1500^{C}	V XXIII	25.847^{C}	Ni XXVII
21.285	V XV	22.486	Ti XIV	24.1666^{C}	Mo XL	25.863^{C}	Ni XXVII
21.294	V XIV	22.518	Ti XIV	24.202	V XIII	25.869^{C}	Ni XXVII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
25.8764^{C}	Cu XXVII	27.933^{C}	Co XXVI	30.188^{C}	Fe XXV	32.645^{C}	Kr XXXV
25.885^{C}	Ni XXVII	27.98	Ni XVIII	30.219^{C}	Fe XXV	32.652	Fe XVI
25.902^{C}	Ni XXVII	27.982	Ni XVIII	30.2727^{C}	Co XXV	32.655^{C}	Fe XVI
25.9547^{C}	Cu XXVII	27.9888^{C}	Ni XXVI	30.325	Cu XVIII	32.674^{C}	Mn XXIV
25.9630^{C}	Cr XXII	28.017^{C}	Ni XVIII	30.33	Fe XVI	32.691	Mo XVI
26.02	Ni XVIII	28.018	Ni XVIII	30.743	Fe XXIV	32.718^{C}	Mn XXIV
26.020	Ni XVIII	28.214^{C}	Ti XXI	30.81	Mn XV	32.730^{C}	Mn XXIV
26.046	Ni XVIII	28.220	Ni XVIII	30.895	Fe XXIV	32.735^{C}	Mn XXIV
26.047^{C}	V XXII	28.223^{C}	Ni XVIII	30.91	Ni XVII	32.756^{C}	Mn XXIV
26.1333^{C}	Cr XXII	28.242^{C}	Ti XXI	31.041	Fe XVI	32.794^{C}	Mn XXIV
26.1458^{C}	Cr XXII	28.3417^{C}	Co XXV	31.142	Co XVII	32.816^{C}	Fe XXIV
26.2023^{C}	Cr XXII	28.4947^{C}	Co XXV	31.242	Fe XVI	32.84	Fe XVI
26.2074^{C}	Ni XXVI	28.5049^{C}	V XXI	31.244^{C}	Fe XVI	32.860	Mo XVI
26.218	Ni XVIII	28.598^{C}	Ti XXI	31.287^{C}	Mn XXIV	32.910	Co XVII
26.222^{C}	V XXII	28.631	Cu XIX	31.37	Mn XV	32.916	Mo XVI
26.228^{C}	Ni XVIII	28.67	Fe XVI	31.38	Co XVII	32.950^{C}	Co XVII
26.2415^{C}	Ti XXII	28.674	Cu XIX	31.386	Co XVII	32.951	Co XVII
26.3605^{C}	Ni XXVI	28.6754^{C}	V XXI	31.390^{C}	Co XVII	32.981	Mo XVI
26.362^{C}	V XXII	28.6879^{C}	V XXI	31.410^{C}	Mn XXIV	32.995	Co XVII
26.3886^{C}	Cr XXII	28.7739^{C}	V XXI	31.4357^{C}	Ti XX	33.04	Fe XVI
26.4024^{C}	Ti XXII	28.792^{C}	Ti XXI	31.6063^{C}	Ti XX	33.046	Co XVII
26.416	Cu XIX	28.825^{C}	Fe XXV	31.6188^{C}	Ti XX	33.067	Mo XVI
26.452	Cu XIX	28.85	Co XVII	31.637	Fe XXIV	33.100	Mo XVI
26.4550^{C}	Ti XXII	28.874	Co XVII	31.7405^{C}	Ti XX	33.120	Mo XVI
26.525^{C}	V XXII	28.930^{C}	Ti XXI	31.760^{C}	Mn XXIV	33.161	Mo XVI
26.636^{C}	Co XXVI	28.950^{C}	Fe XXV	31.764^{C}	Mn XXIV	33.185	Mo XVI
26.641	Ti XIII	28.960	Co XVII	31.802^{C}	Mn XXIV	33.211	Mo XVI
26.763^{C}	Co XXVI	28.9604^{C}	V XXI	31.804^{C}	Mn XXIV	33.235	Mo XVI
26.86^{C}	Ti XX	28.987	Cu XIX	31.845	Ni XVIII	33.249	Ni XVII
26.9095^{C}	Ni XXVI	29.121^{C}	Ti XXI	31.890	Ni XVIII	33.264	Mo XVI
26.960	Ti XIII	29.1293^{C}	Co XXV	31.893^{C}	Ni XVIII	33.266	Cu XIX
27.00^{C}	Ti XX	29.171	Co XVII	31.9272^{C}	Ti XX	33.293	Mo XVI
27.00^{C}	Ti XX	29.174^{C}	Co XVII	31.933^{C}	Kr XXXV	33.317	Cu XIX
27.011^{C}	Co XXVI	29.242^{C}	Fe XXV	31.960^{C}	Kr XXXV	33.340	Ni XVII
27.013^{L}	Cu XXVI	29.252^{C}	Fe XXV	31.968	Fe XXIV	33.347	Mo XVI
27.020^{C}	Co XXVI	29.277	Cu XIX	32.00	Fe XXIV	33.358^{C}	Kr XXXV
27.032	Cu XIX	29.283^{C}	Fe XXV	32.034	Ni XVIII	33.363^{C}	Kr XXXV
27.0405^{C}	Ti XIII	29.285^{C}	Fe XXV	32.0384^{C}	Ti XX	33.429	Mo XVI
27.047^{C}	Co XXVI	29.383	Ni XVIII	32.060^{C}	Mn XXIV	33.43^{C}	Fe XXIII
27.050^{C}	Co XXVI	29.422	Ni XVIII	32.061	Mo XVI	33.4571^{C}	Mn XXIII
27.075	Cu XIX	29.423^{C}	Ni XVIII	32.078	Mo XVI	33.479	Mo XVI
27.182	Cu XXVI	29.458	Mo XV	32.0792^{C}	Ti XX	33.543	Mo XVI
27.2434^{C}	Ni XXVI	29.4634^{C}	Co XXV	32.0848^{C}	Cr XXIV	33.55	Mn XV
27.2698^{C}	Fe XXVI	29.5155^{C}	Co XXV	32.0981^{C}	Ti XX	33.567	Ni XVII
27.28^{C}	Ti XX	29.5329^{C}	Mn XXV	32.105^{C}	Mn XXIV	33.591	Mo XVI
27.28^{C}	Ti XX	29.544^{C}	Fe XXV	32.166	Fe XVI	33.6096^{C}	Mn XXIII
27.2956^{C}	Ni XXVI	29.594^{C}	Fe XXV	32.192	Fe XVI	33.635	Mn XV
27.313^{C}	Co XXVI	29.774	Mo XV	32.230	Mn XV	33.635	Mn XV
27.32^{C}	Ti XX	29.779	Ni XVIII	32.230	Mn XV	33.680	Mo XVI
27.363^{C}	Co XXVI	29.796^{C}	Fe XXV	32.323	Mo XVI	33.740	Mo XVI
27.395	Cu XXVI	29.829	Ni XVIII	32.340	Ni XVIII	33.750^{C}	Kr XXXIV
27.522^{C}	Co XXVI	29.8511^{C}	Mn XXV	32.350^{C}	Ni XVIII	33.760	Mo XVI
27.5830^{C}	Ni XXVI	29.8665^{C}	Co XXV	32.360^{C}	Mn XXIV	33.800	Mo XVI
27.5883^{C}	Fe XXVI	29.884^{C}	Fe XXV	32.377	Fe XXIV	33.812	Mo XVI
27.612^{C}	Co XXVI	29.93	Fe XVI	32.402^{C}	Fe XXIV	33.853	Mo XVI
27.6879^{C}	Fe XXVI	29.9508^{C}	Mn XXV	32.4026^{C}	Cr XXIV	33.96	Ni XVII
27.749^{C}	Co XXVI	30.019	Cu XVIII	32.433	Fe XVI	33.982	Mo XVI
27.758^{C}	Co XXVI	30.020^{C}	Fe XXV	32.444^{C}	Mn XXIV	33.992	Mo XVI
27.846^{C}	Co XXVI	30.028^{C}	Fe XXV	32.478	Fe XXIV	34.02	Mn XV
27.872^{C}	Co XXVI	30.10	Fe XVI	32.493^{C}	Ni XVIII	34.072^{C}	Cr XXIII
27.88	Fe XVI	30.104	Cu XVIII	32.5024^{C}	Cr XXIV	34.193^{C}	Cr XXIII
27.887^{C}	Co XXVI	30.115^{C}	Fe XXV	32.533^{C}	Ni XVIII	34.21	Fe XVI
27.892^{C}	Co XXVI	30.150^{C}	Fe XXV	32.542^{C}	Ni XVIII	34.22	Mn XV
27.902	Co XVII	30.164^{C}	Fe XXV	32.568^{C}	Mn XXIV	34.388^{C}	Kr XXXIV
27.910^{C}	Co XXVI	30.170^{C}	Fe XXV	32.597^{C}	Mn XXIV	34.4632^{C}	Mn XXIII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
34.507^{C}	Kr XXXIV	36.807^{C}	Mn XV	38.980^{C}	V XXII	41.446	Mo XVII
34.601^{C}	Cr XXIII	36.990	Ni XVIII	39.045^{C}	V XXII	41.462	Co XVII
34.608^{C}	Cr XXIII	37.012	Mo XXXII	39.0995^{C}	Cr XXII	41.472^{C}	Co XVII
34.648^{C}	Cr XXIII	37.029^{C}	Fe XXIV	39.161	Mo XXXV	41.490	Mo XVII
34.650^{C}	Cr XXIII	37.049	Ni XVIII	39.181	V XIII	41.51	Mn XIV
34.7975^{C}	Mn XXIII	37.053^{C}	Ni XVIII	39.181	V XIII	41.553^{C}	Ti XXI
34.8495^{C}	Mn XXIII	37.070	Co XVI	39.183	Mo XXXII	41.554^{C}	Ti XXI
34.857	Fe XVI	37.096	Fe XVI	39.272	Mo XXXII	41.556	Cr XIV
34.900^{C}	Cr XXIII	37.12	Mn XV	39.287	Mn XV	41.559	Fe XV
34.948^{C}	Cr XXIII	37.136^{C}	Fe XVI	39.346	Ni XVII	41.576	Mo XVII
34.9769^{C}	V XXIII	37.138	Fe XVI	39.373	Ni XVII	41.596	V XIII
35.04	Mn XV	37.165	Co XVI	39.415	Ni XVII	41.596	V XIII
35.106	Fe XVI	37.239	Mo XXXII	39.547	Mn XV	41.607^{C}	Ti XXI
35.113^{C}	Fe XVI	37.241^{C}	V XXII	39.553^{C}	Mn XV	41.608^{C}	Ti XXI
35.190	Kr XVIII	37.249^{C}	Fe XXIV	39.721	V XIII	41.663	Fe XV
35.229	Mn XV	37.262^{C}	Fe XXIV	39.721	V XIII	41.7159^{C}	V XXI
35.238	Cu XVIII	37.293	Cu XIX	39.725	Cu XIX	41.72	Mn XIV
35.25^{C}	Mn XV	37.305	Mo XXXII	39.796	Cr XIV	41.767	Mo XVII
35.256	Cu XVIII	37.360^{C}	V XXII	39.827	Fe XVI	41.7676^{C}	V XXI
35.260^{C}	Cr XXIII	37.4	Mn XV	40.016^{C}	Cr XIV	41.788	Cr XIV
35.294	Cu XVIII	37.401	Co XVI	40.018	Cr XIV	41.796^{C}	Cr XIV
35.2943^{C}	V XXIII	37.42	Mn XV	40.0673^{C}	V XXI	41.844	Mo XVII
35.333	Fe XVI	37.483	Mo XXXV	40.151	Mn XV	41.847^{C}	Ti XXI
35.346^{C}	Cr XXIII	37.488	Cu XIX	40.153	Fe XVI	41.896^{C}	Ti XXI
35.3629^{C}	Mn XXIII	37.60	Cr XIV	40.162^{C}	Fe XVI	41.903	Fe XV
35.368	Fe XVI	37.661	Mo XXXIV	40.199	Fe XVI	41.908	Mo XVII
35.368	Mo XV	37.661	Mo XXXV	40.2194^{C}	V XXI	41.91	Fe XVI
35.370^{C}	Fe XVI	37.6878^{C}	Cr XXII	40.245	Fe XVI	41.954	Mo XVII
35.3940^{C}	V XXIII	37.768	Co XVII	40.246^{C}	Fe XVI	42.014	Mo XXXV
35.397	Kr XVIII	37.843^{C}	V XXII	40.263	Cu XIX	42.061	Mo XVII
35.450	Cr XIV	37.845^{C}	V XXII	40.285	Mn XV	42.089	Mo XVII
35.450	Cr XIV	37.893^{C}	V XXII	40.298	Cu XIX	42.116	Mo XVII
35.454^{C}	Cr XXIII	37.895^{C}	V XXII	40.465^{C}	Mn XV	42.152	Mn XV
35.506^{C}	Cr XXIII	38.02	Mn XV	40.465^{C}	Mn XV	42.163	Mo XVII
35.569^{C}	Cr XXIII	38.0225^{C}	Cr XXII	40.477	V XIII	42.185	Mn XV
35.617	Co XVII	38.036	Cr XIV	40.477	V XIII	42.191^{C}	Mn XV
35.626^{C}	Cr XXIII	38.036	Cr XIV	40.501^{C}	Mn XV	42.200	Mo XVII
35.637^{C}	Cr XXIII	38.0744^{C}	Cr XXII	40.572	Mn XV	42.205^{C}	Cr XIV
35.642^{C}	Cr XXIII	38.1	Cr XIV	40.613	Cu XVIII	42.245	Mo XVII
35.660	Co XVII	38.141^{C}	V XXII	40.650	Ni XIX	42.290	Mo XVII
35.664^{C}	Cr XXIII	38.187	Mo XXXV	40.731	Ni XIX	42.30	Fe XVI
35.707	Co XVII	38.188^{C}	V XXII	40.749	Cu XVIII	42.357^{C}	Ti XXI
35.707^{C}	Co XVII	38.2719^{C}	Ti XXII	40.769	Cu XVIII	42.387	Mo XVII
35.71	Fe XVI	38.54	Mn XIV	40.782	Cr XIV	42.400	Mo XVII
35.714^{C}	Cr XXIII	38.567^{C}	V XXII	40.800	Cr XIV	42.448^{C}	Ti XXI
35.7699^{C}	Mn XXIII	38.573^{C}	Ni XVIII	40.866	Mo XXXV	42.453	Cr XIV
35.932	Co XVII	38.5892^{C}	Ti XXII	40.867^{C}	Ti XXI	42.473	Mo XVII
35.942^{C}	Co XVII	38.643^{C}	Ni XVIII	40.92	Cr XIII	42.489	Mo XVII
36.01	Fe XVI	38.654^{C}	V XXII	40.984^{C}	Ti XXI	42.5100^{C}	V XXI
36.060	Mo XV	38.658^{C}	Ni XVIII	41.015	Ni XVIII	42.511^{C}	Ti XXI
36.09^{C}	Fe XXIII	38.679	Cr XIV	41.040	Mo XVII	42.543	Mo XVII
36.099	Mn XV	38.6888^{C}	Ti XXII	41.095^{C}	Fe XVI	42.564	Mo XVII
36.119	Mn XV	38.6919^{C}	Cr XXII	41.132	Ni XIX	42.603	Mo XVII
36.376	Mo XV	38.742^{C}	V XXII	41.134	Cu XVIII	42.626^{C}	Ti XXI
36.417^{C}	Co XVII	38.824^{C}	V XXII	41.137^{C}	Fe XVI	42.647	Mo XVII
36.455^{C}	Co XVII	38.84^{T}	Co XVI	41.17	Fe XVI	42.656^{C}	Ti XXI
36.466	Cr XIV	38.871^{C}	V XXII	41.173	Cu XVIII	42.704	Mo XVII
36.466	Cr XIV	38.876	Cu XVIII	41.185	Mn XV	42.704^{C}	Mn XV
36.466^{C}	Co XVII	38.89	Mn XV	41.218	Ni XVIII	42.704^{C}	Mn XV
36.5418^{C}	Cr XXII	38.899	Cr XIV	41.221	Mo XXXV	42.745^{C}	Mn XV
36.577	Mn XV	38.944^{C}	V XXII	41.243	Mn XV	42.745^{C}	Ti XXI
36.6942^{C}	Cr XXII	38.95	Fe XV	41.37	Fe XVII	42.754^{C}	Ti XXI
36.749	Fe XVI	38.952^{C}	V XXII	41.3808^{C}	V XXI	42.758^{C}	Ti XXI
36.803	Fe XVI	38.957^{C}	V XXII	41.385	Ni XIX	42.767	Mo XVII
36.803	Mn XV	38.96	Ni XVII	41.404	Co XVII	42.782^{C}	Ti XXI

Finding List – Continued

Wavelength (Å)	Spectrum
42.802	Mo XVII
42.81	Cu XVII
42.817	Mo XVII
42.846	Mo XVII
42.855	Ni XVII
42.865^{C}	Ti XXI
42.891	Mo XVII
42.909	V XIII
42.9183^{C}	V XXI
42.93	Fe XV
42.939	Mo XVII
42.980	Mo XVII
43.00	Mn XIV
43.029	Mo XVII
43.103	V XIII
43.105	Mo XVII
43.144	Mo XVII
43.198	Mo XVII
43.224	Mo XVII
43.256	Mo XVII
43.268	V XIII
43.279^{C}	Co XVII
43.285	Mo XVII
43.31	Cu XVII
43.324	Mo XVI
43.340	Mo XVII
43.348^{C}	Co XVII
43.358	V XII
43.362	Mo XVII
43.367^{C}	Co XVII
43.371	V XIII
43.371	V XIII
43.39	Fe XV
43.446	Mo XVII
43.510	Mo XVII
43.529	Mo XVII
43.553	Mo XVII
43.60	Cr XIV
43.65	Fe XV
43.74	Mn XIV
43.741	V XIII
43.75	Cr XIII
43.802	Mo XVII
43.814	Ni XVIII
43.837	Mo XVI
43.992	Mo XVII
44.013	V XIII
44.03	V XII
44.045	Mo XVII
44.1219^{C}	Ti XX
44.253	Co XVI
44.2736^{C}	Ti XX
44.365	Ni XVIII
44.376	V XIII
44.405	Ni XVIII
44.47^{T}	Cu XVI
44.509	Mo XVI
44.59	Cr XIV
44.594	V XIII
44.597	Cr XIV
44.63^{T}	Cu XVI
44.67	Cu XVI
44.820	Mn XV
44.850	Ni XVII
44.869	Cr XIV
44.869^{L}	Co XVIII
44.873^{C}	Cr XIV
44.919	V XIII
44.920^{C}	Fe XXIV
44.959^{L}	Co XVIII
44.98	Cu XVI
44.995	Ni XVII
45.000	Mo XVI
45.018	Ni XVII
45.071	V XII
45.154	Mn XV
45.155^{C}	Fe XXIV
45.165^{C}	Mn XV
45.167	Ti XII
45.167	Ti XII
45.21	Cu XVI
45.24	Cu XVI
45.245^{C}	Fe XXIV
45.250	Mo XVI
45.290	Mo XVI
45.312	Mo XXXVIII
45.319	Co XVII
45.332	Cu XIX
45.35^{L}	Co XVIII
45.382	Ni XVII
45.424	Ni XVII
45.446	Mo XXXVIII
45.454^{L}	Co XVIII
45.454^{L}	Co XVIII
45.483	Mo XVI
45.527	Co XVII
45.545	Mo XVI
45.553	Mo XVI
45.6375^{C}	Ti XX
45.640^{L}	Co XVIII
45.645	V XIII
45.659	Mn XV
45.659	Mo XVI
45.700	Mn XV
45.707^{C}	Mn XV
45.756	Mo XVI
45.783	Ti XII
45.783	Ti XII
45.809	Mo XVI
45.835	Cr XIV
45.853	Mo XVI
45.867	Mo XVI
45.873	V XIII
45.876^{C}	V XIII
45.887	Mo XVI
45.90	Cu XVI
45.938	Mo XVI
45.9728^{C}	Ti XX
46.024	Mo XVI
46.0244^{C}	Ti XX
46.039	Cr XIV
46.043	Mo XVI
46.043	Mo XVI
46.090	Cu XIX
46.113	Mo XVI
46.118	V XIII
46.125	Cr XIV
46.131	Mo XVI
46.197	Mo XVI
46.229	Mo XVI
46.291	Mo XVI
46.352	Mo XVI
46.378	Mo XVI
46.395	V XIII
46.415^{C}	Cr XIV
46.415^{C}	Cr XIV
46.433	Co XVI
46.452^{C}	Cr XIV
46.460	V XIII
46.463	Mo XVI
46.468	Cr XIV
46.478	Mo XVI
46.478	Mo XVI
46.482	V XIII
46.522	Co XVI
46.527	Cr XIV
46.570	Mo XXXVIII
46.573	Mo XVI
46.573	Mo XVI
46.592	Mo XVI
46.623	Mo XVI
46.641	Ti XII
46.641	Ti XII
46.661	Fe XVI
46.69	Ti XX
46.712	Mo XVI
46.718	Fe XVI
46.725^{C}	Fe XVI
46.755^{C}	Mn XV
46.781	Cu XVIII
46.781	Mo XVI
46.79	Ti XX
46.790^{C}	Mn XV
46.804^{C}	Mn XV
46.841	Mo XVI
46.859	Mo XVI
46.877	Mo XVI
46.913	V XII
46.9175^{C}	Ti XX
47.012	Cu XVIII
47.068	Mo XVI
47.0739^{C}	Ti XX
47.165	Mo XVI
47.184	Ni XVI
47.186	Mo XVI
47.2028^{C}	Ti XX
47.2467^{C}	Ti XX
47.26	Cr XIII
47.262	Mo XVI
47.270	Mn XV
47.302	Mo XVI
47.3265^{C}	Ti XX
47.335^{S}	Cu XIX
47.34	Cr XIII
47.38	Mn XIV
47.382	Mo XVI
47.442^{S}	Cu XIX
47.483	Co XVI
47.55	Cr XIII
47.553	Mo XXXVIII
47.585	Cu XVIII
47.637	V XIII
47.663	Ni XVII
47.666	Mn XV
47.67	Mn XIV
47.772	Ni XVI
47.871	Mo XVI
47.884	V XIII
47.889^{C}	V XIII
47.906	Ti XII
47.906	Ti XII
47.91^{C}	Ti XX
47.93	Mn XIV
47.959	Mo XVI
48.09^{C}	Ti XX
48.09^{C}	Ti XX
48.11	Kr XXVI
48.30^{C}	V XXI
48.300	Cr XIV
48.338	Cr XIV
48.340^{C}	Cr XIV
48.435	V XIII
48.497^{C}	Fe XVII
48.52^{C}	V XXI
48.52^{C}	V XXI
48.564	Co XVII
48.59	Kr XXVI
48.682	V XIII
48.876^{C}	Fe XVII
48.884^{C}	Fe XVI
48.885	Cu XVIII
48.885	Cu XVIII
48.89	Cu XVII
48.97	Fe XVI
48.980^{C}	Fe XVI
48.989^{C}	Cr XIV
48.989^{C}	Cr XIV
49.010	Cu XVIII
49.03	Cr XIII
49.030^{C}	Cr XIV
49.133	Co XVII
49.171	Co XVII
49.226	V XII
49.395	Cu XVIII
49.42	Mn XIV
49.44^{C}	Fe XVII
49.452	Cu XVIII
49.49	Fe XV
49.490	Cu XVIII
49.558	Cu XVIII
49.59	Cr XIII
49.626	Ni XV
49.63	Mn XIV
49.639	Cu XVIII
49.639	Cu XVIII
49.642	V XIII
49.769	Cu XVIII
49.787	Fe XVII
49.808	Co XVI
49.862	Cu XVIII
49.880	Fe XVII
49.90	Cu XVII
49.904	Mo XXXIX
49.912	Ti XII
49.912	Ti XII
49.914	Mo XV
49.914	Ni XV
49.93	Kr XXVI
49.958	Co XVI
49.979	Co XVI

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
50.03	Mn XIV	52.08[T]	Cu XVI	53.640	Kr XXIX	55.962	Mn XVI
50.056	V XII	52.147	Mn XVI	53.641[C]	Cr XIV	55.967	V XIII
50.062	Fe XV	52.147	Mn XVI	53.643	Cu XIX	55.974[C]	V XIII
50.067	Cu XVIII	52.18	Cu XVI	53.672[C]	Cr XIV	56.005[C]	Fe XVII
50.08[C]	Cu XXVIII	52.224	Ni XVII	53.690[C]	Cr XIV	56.01[C]	Ni XXVII
50.085	Fe XV	52.228	Mo XIV	53.729	Mo XIV	56.021	Co XIV
50.118	Cu XVIII	52.315	V XII	53.760	Cr XIV	56.021	Co XVII
50.120	Fe XV	52.321	Cr XIV	53.765	Cr XIII	56.032	Mn XVI
50.17	Cu XVII	52.344	Mn XVI	53.781[C]	V XIII	56.06[T]	Cu XVI
50.172	Ni XV	52.363	Cr XIV	53.781[C]	V XIII	56.110	Mn XVI
50.249	Ni XV	52.367[C]	Cr XIV	53.817[C]	V XIII	56.115	Co XIV
50.253	Ni XVIII	52.41[T]	Cu XVI	53.86[C]	Ni XXVII	56.161	Ti XII
50.262	Fe XVII	52.420	Mo XIV	53.889	Cu XIX	56.18	Ni XIII
50.33[C]	Cu XXVIII	52.460	Mo XIV	53.977	Kr XXIX	56.200	Fe XV
50.357	Co XVI	52.476	Mo XIV	53.986[C]	Cu XXVII	56.207	Mn XVI
50.359	Fe XVI	52.476	Mo XIV	54.088	Mo XVI	56.207	Mn XVI
50.393	Co XVI	52.493[C]	Ni XVIII	54.101	Mo XIII	56.236	Fe XV
50.448	Mo XV	52.583	Co XV	54.127	Fe XVI	56.270	Mn XV
50.448	Ti XII	52.59	Cu XVII	54.164	Cr XIV	56.333	Cu XII
50.494	V XIII	52.590	V XIII	54.18[C]	Ni XXVII	56.37	Cr XIII
50.565	Fe XVI	52.594	Kr XXVIII	54.24	Cu XVI	56.39	Ni XIII
50.674	Ti XII	52.614[S]	Ni XVIII	54.322	Ti XI	56.431	Ti XII
50.788	Mo XIV	52.644	Mo XVI	54.348	Mo XVI	56.432	Mn XVI
50.81[L]	Cu XVII	52.645[C]	Ti XII	54.48	Cu XVI	56.484	Mn XV
50.812	Cr XIV	52.690	Mo XIV	54.493	V XII	56.527	Mo XXXIV
50.86	Kr XXVI	52.721[S]	Ni XVIII	54.596	Kr XXX	56.53	V XII
50.928	Mo XV	52.744[C]	Ni XVIII	54.624[C]	Cu XXVII	56.57	Ni XIII
50.94	Co XVI	52.75[C]	Fe XVII	54.702	V XII	56.61	Mo XIV
50.956	Mo XIV	52.753	Mo XIV	54.710	Fe XVI	56.655	V XII
50.958	Ni XVII	52.76	Cu XVII	54.747	Fe XVI	56.700	Mn XVI
50.98[L]	Cu XVII	52.801	Ni XVII	54.748[C]	Cu XXVII	56.786[C]	V XIII
51.007	Co XVI	52.821[C]	Ni XVIII	54.832	Mn XVI	56.786[C]	V XIII
51.042	Ni XVIII	52.826[C]	Ni XVIII	54.988	Mn XVI	56.826[C]	V XIII
51.091	V XIII	52.85	Cu XVI	55.09	Mn XVI	56.83	Co XVI
51.16	Cu XVII	52.870	V XIII	55.10[T]	Co XIV	56.833	Co XVII
51.16[L]	Cu XVII	52.896	Ti XII	55.136	Ni XVII	56.900	Co XIV
51.161	Mo XIV	52.897[C]	V XIII	55.181	Ti XII	56.915	Cu XI
51.162	Cr XIV	52.911	Fe XV	55.186	Ni XVII	56.96	Cr XIII
51.171[C]	Cr XIV	52.928	V XIII	55.258	Ni XVII	56.976[T]	Kr XXXI
51.208	V XII	52.977	Mn XV	55.29[C]	Ni XXVII	57.047	Cu XI
51.239	Co XVI	53.02	Cr XIII	55.42[T]	Co XIV	57.137[L]	Ni XVI
51.24[C]	Fe XVII	53.032	Mn XV	55.431	Co XIV	57.224	Mn XIV
51.279	Co XVI	53.040[C]	Mn XV	55.443	Ti XII	57.24	Cr XIII
51.287	Cu XVIII	53.043	Co XVI	55.444[C]	Ti XII	57.24	Cr XIII
51.37[C]	Cu XXVIII	53.048	Mo XIV	55.46[T]	Cu XVI	57.257[L]	Ni XVI
51.376	V XIII	53.100	Mo XIV	55.466	Cu XII	57.300[C]	Ni XVIII
51.380[C]	V XIII	53.139[C]	Ti XII	55.472	Mn XVI	57.32	Fe XVII
51.398	Mo XIV	53.140	Ti XII	55.517	Mn XVI	57.349[L]	Ni XVI
51.434	Mo XIV	53.173	Co XV	55.54[C]	Fe XVII	57.362	Mo XXXV
51.446	Ti XII	53.228	Mo XIV	55.560	Mn XVI	57.369[C]	Ni XVIII
51.496[T]	Cu XVIII	53.281	V XIII	55.635	Fe XV	57.376[C]	Ni XVIII
51.531	Mo XIV	53.3[C]	Ti XX	55.658[C]	Mn XV	57.44[L]	Cu XV
51.620	V XIII	53.318	V XIII	55.659	Mn XVI	57.52[L]	Cu XV
51.668	Mo XIV	53.318[C]	V XIII	55.71	Kr XXVI	57.579	Ni XVII
51.669	Ti XII	53.341	Mo XIV	55.72	Mn XV	57.65	Mo XIV
51.847	Mn XVI	53.341	Mo XIV	55.728	Mn XVI	57.71	Mn XIV
51.895	Mo XIV	53.39	Cr XIII	55.762	Co XIV	57.775	Cr XV
51.909	Mo XVI	53.433	Ti XII	55.766[C]	Mn XV	57.81	Mn XIV
51.999	Mn XVI	53.457	Ti XII	55.782	Co XIV	57.834[C]	Ni XVIII
52.00	Mo XIV	53.484	Mo XVI	55.793	Fe XV	57.891	Ti XI
52.000	Ni XVII	53.5[C]	Ti XX	55.815	Fe XV	57.927	Mo XV
52.015	Mo XIV	53.5[C]	Ti XX	55.842	Mo XXXV	57.97[T]	Mn XIV
52.024	Mo XIV	53.506	Cr XIII	55.93	Kr XXVI	58.008	Cr XV
52.03[C]	Cu XXVIII	53.52	Cu XVI	55.932	V XIII	58.09[C]	Co XXVI
52.08[C]	Cu XXVIII	53.551	Mo XIII	55.94[C]	Ni XXVII	58.107	Cr XV

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
58.116	V XIII	60.058^{C}	Ni XVIII	62.467^{C}	Ti XII	64.60^{C}	Fe XXV
58.127	Co XVI	60.065^{C}	Ni XVIII	62.470	Ti XII	64.635	Ni XV
58.187^{C}	Ni XVIII	60.089^{C}	Ni XVIII	62.485	Cr XV	64.651	Kr XXXII
58.19^{T}	Mn XIV	60.11	Co XIII	62.526	Mn XIV	64.7^{C}	Ti XX
58.194	Cr XV	60.212	Ni XVIII	62.694	Mn XIV	64.7^{C}	Ti XX
58.238^{C}	Ni XVIII	60.32^{C}	Co XXVI	62.699	Fe XIII	64.773	Co XVI
58.270^{C}	Ni XXVI	60.332	Kr XXX	62.713	Mn XIV	64.780^{T}	Co XVI
58.350	Cr XV	60.40^{C}	Co XXVI	62.730	Ni XI	64.79^{L}	Ni XIV
58.350	Cr XV	60.596	V XIII	62.754	Cr XV	64.875^{C}	Co XVII
58.3512^{C}	Mo XLI	60.640	V XIII	62.805	Co XVI	64.876^{C}	Ni XVIII
58.365	Co XVI	60.645^{C}	V XIII	62.805	Co XVI	64.892^{C}	Co XVII
58.469	Cr XV	60.699	Cr XIV	62.83^{C}	Fe XXV	64.920	V XII
58.48	Kr XXIX	60.701	Ti XII	62.842	Cr XV	65.01^{L}	Ni XIV
58.48^{C}	Co XXVI	60.720	Mn XV	62.871	Fe XVI	65.036^{C}	Ni XVIII
58.482	V XIII	60.732	Kr XXX	62.958	Cr XV	65.04	Cr XIII
58.490^{C}	V XIII	60.756	Cr XIV	62.963	Fe XIII	65.067	Kr XXXII
58.4912^{S}	Mo XL	60.761^{C}	Cr XIV	63.017	Co X	65.13	Cr XIII
58.555	Cr XV	60.762	Ti XII	63.017^{T}	Co XVI	65.153	Mn XVI
58.62	Fe XVII	60.890^{L}	Ni XV	63.038	Cu XI	65.216	Mn XVI
58.62	Fe XVII	60.971	Ti XII	63.061	Cr XV	65.24^{C}	Fe XXV
58.700	Kr XXIX	60.975	Mo XIV	63.061	Cr XV	65.24^{L}	Cu XIII
58.71	Ni XV	61.025	Co XVI	63.072^{C}	Ti XII	65.330	V XIV
58.76	Fe XVII	61.025	Co XVI	63.072^{C}	Ti XII	65.34^{C}	Fe XXV
58.76	Fe XVII	61.08^{L}	Cu XIV	63.074^{C}	Co XXV	65.352	Kr XXXI
58.832	Mo XV	61.152^{L}	Ni XV	63.103	Kr XXXI	65.370	Fe XV
58.838^{S}	Co XVII	61.200	Co XVI	63.107^{C}	Ti XII	65.39^{T}	Cr XIII
58.907^{C}	Ni XXVI	61.229	Mo XIV	63.109	Mn XIV	65.40^{L}	Ni XIV
58.91	Fe XVII	61.286	Ti XII	63.146	Mn XIV	65.403	Ti XI
58.911^{C}	Ti XII	61.319	Mn XV	63.188	Fe XIII	65.415^{L}	Ni XV
58.924^{C}	Ti XII	61.352	V XII	63.192	Cu XI	65.43	Cu XXII
58.945^{S}	Co XVII	61.361	Mn XV	63.23	Mn XIV	65.445	V XII
58.96	Co XVI	61.455	V XII	63.30^{C}	Fe XXV	65.470	Mn XVI
58.963	Fe XIV	61.460	Cr XV	63.324	Cr XIV	65.508	Mn XVI
58.967^{C}	Co XVII	61.621	Co XVI	63.45	Mn XIV	65.540	Ti XII
58.98	Fe XVII	61.639	Cr XV	63.45	Mo XIV	65.564	V XII
58.98	Fe XVII	61.70^{L}	Cu XIV	63.46	Mn XIV	65.571	V XIV
59.032^{C}	Ni XXVI	61.705	V XIII	63.47	Co XII	65.577	Ti XII
59.045^{C}	Ti XII	61.717	V XII	63.508^{C}	Ni XVIII	65.580^{C}	Ti XII
59.092	V XII	61.746	Cr XV	63.539	Cr XIV	65.585	Co XIV
59.133	Ti XII	61.809	Ni X	63.589^{C}	Ni XVIII	65.612	Fe XV
59.217	Ni XVI	61.875	Co XVI	63.593^{C}	Ni XVIII	65.712^{T}	Co XIV
59.26	Fe XVII	61.915	Ni X	63.60	Co XII	65.740^{C}	Fe XVI
59.26	Fe XVII	61.916	Co XVI	63.637	Cr XV	65.770	Mo XVII
59.325	Mn XIV	61.921	V XII	63.641	Ni XI	65.805	Fe XII
59.336	Ni XVI	61.982	Co XVI	63.671	Kr XXX	65.848	V XII
59.377	Kr XXVI	62.10	Fe XIII	63.70	Co XII	65.891	Mo XVII
59.404	Fe XV	62.131	Co XVI	63.711	Fe XVI	65.905	Fe XII
59.435	Ti XII	62.131	Co XVI	63.712^{C}	Co XXV	65.927	Mn XVI
59.436^{C}	Ti XII	62.132	V XIII	63.80	Co XII	65.927	Mn XVI
59.459	Kr XXVI	62.135	Mo XXXV	63.837^{C}	Co XXV	65.933	Mo XXXV
59.53	Co XIII	62.201^{C}	V XIII	63.931^{C}	Cr XIV	65.968	Cr XIII
59.579	Fe XIV	62.21	Mo XIV	63.96	Fe XV	66.036	Mn XVI
59.58	Ni XV	62.233	Cr XV	64.005	Cr XIV	66.047	Fe XII
59.59	Fe XVII	62.239^{C}	V XIII	64.03	Mn XIV	66.050	Co XIV
59.590	Mo XXXV	62.249^{C}	V XIII	64.042^{C}	Cr XIV	66.079^{C}	Fe XVI
59.625	Co XVI	62.318	Cr XV	64.139	Fe XIII	66.087^{C}	Fe XVI
59.68^{C}	Co XXVI	62.332	Co X	64.14	Kr XXXI	66.100	Mo XVII
59.714	Kr XXIX	62.334	Co XVI	64.224	Mn XVI	66.129	Mn XVI
59.748	Kr XXXI	62.353	Fe XIII	64.229	Co XV	66.146	Mo XVIII
59.791^{C}	Ni XVIII	62.369^{L}	Ni XV	64.23	Mn XIV	66.18^{L}	Cu XIII
59.86	Co XIII	62.378	Cr XV	64.356	Co XV	66.19	Co XI
59.947^{L}	Ni XV	62.411	Kr XXXI	64.4^{C}	Ti XX	66.195^{T}	Co XIV
59.950	Ni XVIII	62.412	Co XVI	64.470^{C}	Co XVII	66.209	Mn XVI
59.99	Co XIII	62.433	Ti XII	64.480	Co XV	66.225	Fe XII
60.02	Ni XII	62.46	Fe XIII	64.537	Co XVI	66.238	Fe XV

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
66.249[S]	Fe XVI	68.733	Kr XXVIII	70.625	Ti X	71.750	Mo XVII
66.293[C]	Ti XII	68.74[C]	Mn XXIV	70.656[L]	Cu XII	71.799	V XIII
66.297	Fe XII	68.807[L]	Co XIV	70.677	V XIV	71.84	Co XIII
66.356[S]	Fe XVI	68.849	Fe XV	70.68	Co XIII	71.845	Cr XV
66.377[C]	Fe XVI	68.883	Fe XV	70.698	Co XIV	71.86	Cr XIII
66.393	Mn XVI	68.890[C]	Fe XXIV	70.72	Mn XII	71.875	Kr XXX
66.43	Fe XII	69.017[L]	Co XIV	70.726	Mo XXIV	71.927	Mn XV
66.49	Co XI	69.036	Fe XV	70.728	Cr XV	71.948[L]	Cu XII
66.503	Mn XVI	69.061[C]	Ni XVIII	70.78[C]	Mn XXIV	71.975	Cr XV
66.526	Fe XII	69.080[C]	Ni XVIII	70.792	Cr XIII	71.987	Ti XII
66.536	Mo XVIII	69.088	Mo XVII	70.796[C]	Ni XXIII	72.02	Co XIII
66.538	Kr XXXII	69.124	Mn XVI	70.804[L]	Cu XII	72.025	V XIII
66.542	Ni X	69.128	Cu XII	70.89	Mn XII	72.048	Co IX
66.574	Mn XIII	69.176	Fe XIV	70.90[C]	Mn XXIV	72.050	Mo XXIV
66.595[C]	Ti XII	69.212	Mo XVIII	70.926	Mo XVIII	72.089	Mo XVIII
66.595[C]	Ti XII	69.213	Cr XIV	70.928	Co IX	72.092	Mo XVII
66.634[C]	Ti XII	69.247	Cr XIV	70.973	Cr XIII	72.116[C]	Co XVII
66.676[C]	Ti XII	69.25[L]	Ni XIII	70.973	Cr XIII	72.13	Cr XIII
66.676[C]	Ti XII	69.37[L]	Ni XIII	70.986	Ti XII	72.157	Cr XV
66.687	Ni X	69.386	Fe XIV	71.022	V XIV	72.166	Fe XI
66.706	Mn XVI	69.414	Kr XXIX	71.031	Ti XII	72.17	Ni XII
66.773	Mn XVI	69.425[C]	Fe XXIV	71.031[C]	Ti XII	72.171	Mo XVIII
66.806	V XII	69.490[C]	Ti XII	71.033[L]	Cu XII	72.177	Co IX
66.819	Co XV	69.5	Mo XIV	71.038	Mn XV	72.211	Mo XVIII
66.913	Co XV	69.534	Fe XV	71.04	Mn XII	72.267[C]	Co XVII
66.9344[C]	Mo XLI	69.596	Mo XVI	71.053	Co IX	72.27	Cr XIII
66.960	Fe XII	69.609	V XIV	71.062	Fe XV	72.310	Fe XI
66.983	Cr XIII	69.62	Ni XXI	71.062	Fe XV	72.314[C]	Fe XVI
67.02	Mn XIV	69.657[C]	Fe XXIV	71.089	Mo XVIII	72.369	Cu XI
67.069	Co XIV	69.66	Fe XIV	71.169[C]	Co XVII	72.373[L]	Cu XII
67.093[C]	Ni XVIII	69.66	Fe XV	71.175	Mo XXIV	72.412[C]	Fe XVI
67.099	Mn XVI	69.667	Fe XIV	71.187	V XIV	72.45	Mn XIV
67.132[C]	Ni XVIII	69.675	Mo XVIII	71.196	Mo XVIII	72.454	Co X
67.141	Mo XVIII	69.726	V XIV	71.201	Ti XI	72.472[C]	Fe XVI
67.149	Mn XVI	69.83	Co XIII	71.223	Mo XXXV	72.477[C]	Fe XVI
67.161[C]	Ni XVIII	69.910[C]	Ti XII	71.248[C]	Co XVII	72.50	Mo XIV
67.164	Fe XII	69.929	Mo XVIII	71.248[C]	Co XVII	72.511	Cr XV
67.171	Ti XII	69.945	Fe XV	71.267	Fe XV	72.52	Ni XXII
67.215	Mn XIII	69.957	Kr XXXII	71.290	V XIV	72.56[L]	Co XIII
67.278[C]	Co XVII	69.987	Fe XV	71.3	Mo XIV	72.57	Cr XIII
67.291	Fe XII	69.994[C]	Ti XII	71.317	V XIV	72.57	Ni XII
67.302	Mo XVII	70.05	Ti XIII	71.32	Mn XII	72.572[L]	Cu XII
67.314	Mn XVI	70.054	Fe XV	71.323	Ti XI	72.580	Cu XI
67.446[C]	Co XVII	70.07[L]	Ni XIII	71.323	Ti XI	72.580	Cu XI
67.555	Ti XII	70.073	Cu XXIII	71.359	Mo XVII	72.635	Fe XI
67.564[C]	Ti XII	70.121	Mo XVIII	71.377	Fe XIV	72.66	Kr XXXIII
67.648	Mo XVIII	70.16[C]	Mn XXIV	71.398	Cr XIII	72.66[L]	Co XIII
67.702	Fe XII	70.224	Fe XV	71.4	Ni XII	72.679	Mo XVIII
67.737[C]	Co XVII	70.224	Fe XV	71.435	Cr XIII	72.692	Cr XV
67.759	Cu XXIII	70.251	Fe XIV	71.461	Mo XVIII	72.719[C]	Fe XVI
67.821	Fe XII	70.262	V XIII	71.48	Ni XXII	72.735[C]	Fe XVI
67.845	Mo XVIII	70.265	Ti X	71.488	Co X	72.756	Kr XXXIII
67.882	Cu XII	70.323	V XIII	71.493[T]	Co XIV	72.77	Ni XII
67.97	Co XI	70.327[C]	V XIII	71.523	Mo XVIII	72.792	Cu XI
67.972	Fe XII	70.367	Mo XVII	71.530[L]	Cu XII	72.8[C]	Ni XXII
67.984	Mo XVIII	70.386	Mo XVII	71.54	Ni XXII	72.80	Fe XIV
68.128	Mo XVIII	70.428	Cr XV	71.545	Ti XII	72.821[L]	Cu XII
68.16[C]	Mn XXIV	70.487	V XIV	71.589	V XIV	72.849	Cr XV
68.188	Mo XVII	70.494	Mo XVII	71.603	Ti XI	72.85	Fe IX
68.382	Fe XII	70.519	Fe XV	71.603	Ti XI	72.88	Cr XIII
68.390	Mo XVII	70.551[L]	Cu XII	71.609[L]	Cu XII	72.891	Fe IX
68.512[C]	Ni XVIII	70.573	V XIV	71.69	Mn XII	72.941	Cr XV
68.594	Cr XIV	70.596	Mo XXIV	71.700[L]	Cu XII	72.95	Fe XIV
68.662	Mn XVI	70.601	Fe XV	71.705	Mo XVII	72.956	Cu XI
68.727	Mo XVIII	70.613	Fe XIV	71.744	Cr VII	72.971	Cr XV

Finding List – Continued

Wavelength (Å)	Spectrum
72.990	Mo XVII
73.019^{C}	Ti XII
73.065^{C}	Ti XII
73.066^{C}	Ti XII
73.08	Fe XIV
73.122	Mo XVII
73.199	Fe XV
73.286	Cr XV
73.289	Mo XVII
73.31	Cr XIII
73.380	Mo XVIII
73.402	Co XIV
73.446	Mo XVIII
73.471	Fe XV
73.473	Fe XV
73.474	V XII
73.516	Cu XI
73.576	V XII
73.58^{L}	Co XIII
73.627	Cr XV
73.63	Fe IX
73.66^{L}	Co XIII
73.665	Co IX
73.676	Mo XVIII
73.734^{L}	Cu XII
73.735	Cu XI
73.747	Mo XVIII
73.798	Co IX
73.812	Mo XVIII
73.856	V XII
73.86^{L}	Co XIII
73.884	Cr XV
73.944	Mo XVIII
73.978	V XII
73.982	Cu XI
74.020	Mo XVIII
74.03^{L}	Co XIII
74.063	Mn XIV
74.07	Ni XXIII
74.097	Ni X
74.10	Co XX
74.108	Ti XIII
74.170^{S}	Mo XXV
74.173	Cr XV
74.209	Cr XV
74.21^{C}	Cr XXIII
74.254^{C}	V XIII
74.257	V XII
74.266	Ni X
74.280	Mo XVIII
74.303	Mo XVIII
74.306	Mo XVII
74.32	V XII
74.321	V XIII
74.327	Fe XIII
74.327	Mn XIV
74.330^{C}	Fe XVI
74.368^{C}	V XIII
74.37	Ni XXII
74.379	Co XIV
74.38^{L}	Co XIII
74.383	Cu XXII
74.407	Mo XVIII
74.42	Ti XIII
74.425	Mo XIV
74.43	Ni XXI
74.43^{C}	Mn XV
74.44	Ni XII
74.49	Ni XXII
74.59	Ti XIII
74.600	Mo XVII
74.619^{C}	Mn XXIII
74.633	Cu XI
74.663	Kr XXIX
74.695	Cr XV
74.71^{C}	Mn XV
74.738	Cr XV
74.74	Ti XIII
74.775^{C}	Fe XVI
74.80^{C}	Mn XV
74.813	Cr XV
74.845	Fe XIII
74.856	Cu XI
74.875	Cr VII
74.89^{C}	Cr XXIII
74.961	Mn XIV
74.975	Cr XV
75.003^{C}	Ni XXIV
75.054	Cr XV
75.059	Mn XI
75.084	Cr XV
75.14^{C}	Co XXII
75.141	Mo XXIV
75.174^{S}	Mn XV
75.227	Mn XI
75.241	Cr XV
75.257^{C}	Mn XXIII
75.280^{S}	Mn XV
75.289^{C}	Co XVII
75.297	Cr XV
75.303^{C}	Mn XV
75.309	Mo XVIII
75.312^{C}	Co XVII
75.324^{C}	Co XVII
75.325	Cu XI
75.382^{C}	Mn XXIII
75.415	Ti XI
75.446	Cr XV
75.455	Kr IX
75.472	Cu XI
75.477	Mn XI
75.548^{C}	Ni XXIV
75.580	Mo XVII
75.605	Cr XV
75.62	Ni XII
75.650^{C}	Ti XII
75.66	Kr XXXIII
75.66	Kr XXXIII
75.670	Cr XV
75.677^{C}	Ti XII
75.685	Fe X
75.69	Ni XII
75.698	Mo XXVI
75.712	Mo XVIII
75.743	Cr XV
75.815	Cr XII
75.816	Mo XVII
75.819	Mn XI
75.83	Ni XII
75.840	Mo XVII
75.866	Cu XI
75.869	Mo XVI
75.87	Co XXI
75.879	Mn XI
75.886	Cr XV
75.892	Fe XIII
75.90	Co XXI
75.94	Mn XIV
76.006	Fe X
76.022	Cu XI
76.022	Fe XIV
76.076	Cu XXIII
76.101^{C}	Fe XVI
76.113^{C}	Fe XVI
76.117	Fe XIII
76.125	Cr XV
76.127^{C}	Fe XVI
76.152	Fe XIV
76.160	Co IX
76.162	Cr XV
76.17	Cr XIII
76.216	Mo XIV
76.254^{C}	Ni XVIII
76.256	Cu XI
76.269	Mo XVII
76.296	Kr IX
76.305	Co IX
76.307	V XII
76.327^{C}	Fe XVI
76.359^{C}	Ni XVIII
76.371	Cr XV
76.377^{C}	Ni XVIII
76.380	Mn XI
76.383^{C}	Co XVII
76.403	Ti XI
76.45	Ni XXI
76.45^{C}	Cr XXIII
76.488	Cr XII
76.495	Fe X
76.502	Fe XVI
76.529	Mo XVIII
76.610	Kr XXXI
76.624	Mo XXVI
76.647	Mo XVIII
76.731	Ti XI
76.763	Mn XI
76.789	Kr IX
76.796	Fe XVI
76.812	Mo XVIII
76.822	Fe X
76.858	Mn XI
76.863	Mo XVII
76.870	Mo XVIII
76.951^{C}	Co XVII
76.960	V XII
76.975^{C}	Co XVII
76.992	Mo XVIII
77.055^{C}	Ni XXIII
77.07^{C}	Cr XXIII
77.10	Kr XXXIII
77.21^{C}	Cr XXIII
77.270	Mn XI
77.29^{C}	Co XXI
77.32	Ni XIX
77.369	Mo XXIV
77.369	Mo XXVI
77.393	Ni XI
77.396	Mo XVII
77.402	Mn XI
77.410	Mo XVII
77.415	Mo XVIII
77.456	Mo XVI
77.512	Cu XXII
77.552	Mo XVIII
77.556	Mn XI
77.627	Fe X
77.666	Mo XVII
77.69	Co XXI
77.706	Mo XVII
77.727	Mo XVII
77.728	Fe X
77.812	Fe X
77.865	Fe X
77.874	Cr XV
77.875	Mo XVIII
77.898	Mo XVII
78.019	Mo XVII
78.053	Mo XVIII
78.056	Mn XI
78.056	Mo XXVI
78.101	V XIII
78.151	Fe X
78.21	Ni XXIII
78.255	Mo XVIII
78.268	Mo XXVII
78.28	Ni XXI
78.35	Mn XIV
78.384	Cu XXI
78.42	Mn XIV
78.462^{L}	Fe XIII
78.54	Mn XIV
78.542	Cu XI
78.56^{L}	Fe XIII
78.625	Cr XV
78.650	Ti X
78.71	Co XXI
78.735	Mo XVIII
78.744	Ni XI
78.746	V XIII
78.749^{C}	Ni XXIII
78.769	Fe X
78.77^{L}	Fe XIII
78.783	V XIII
78.786	Cu XI
78.888	Fe XIX
78.90	Co XXI
78.90	Kr XXXII
78.98	Co XXII
79.004	Ti XIII
79.01	Co XX
79.027	Ti XI
79.027	Ti XI
79.062	Mo XVII
79.076	Ti XI
79.10	Mn XIV
79.105	Ti X
79.112^{C}	Ni XXIV
79.16	Mn XIII
79.186	Mo XVII
79.21^{L}	Co XII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
79.235	Ti XIII	81.05	Mn XIV	82.530	Ni XI	84.302[C]	Mo XLII
79.31[L]	Co XII	81.05	Mn XIV	82.556	Mo XVII	84.31[C]	Co XXIII
79.359	Mo XVII	81.077	V XII	82.625	Ni XI	84.321	Ti XI
79.45	Kr XXXI	81.08[C]	V XXII	82.744	Fe XII	84.418	Ni X
79.457	Mo XVIII	81.080	Mo XVII	82.759	Co XI	84.42[C]	V XXII
79.488	Fe XII	81.098	V XII	82.79	Cr XIII	84.420	V XIV
79.532	Mo XVII	81.119	Ti XI	82.828	Mn X	84.433	Ti XI
79.557	Kr XXXI	81.138	Ni XI	82.837	Fe XII	84.454	Kr XXXII
79.613	Mo XXVII	81.153	Ti XIII	82.844	V XII	84.48[L]	Fe XII
79.615	Cu XXIII	81.154	Fe XIII	82.892	Ni X	84.48[L]	Fe XII
79.653	Mo XVIII	81.161	Fe XIII	82.971	Mo XIV	84.52[L]	Fe XII
79.664	Cu XXIII	81.18	Cr XI	83.068	Mn X	84.52[L]	Fe XII
79.711	Mo XVII	81.213	Ni XI	83.079	Mo XVII	84.525	Ti XI
79.720	Mn XIV	81.23	Cr XI	83.084	Cu XXIV	84.56[C]	Mn XV
79.761	Mn XIV	81.258	Ti XIII	83.108	Ni X	84.616	Cr XIII
79.773[C]	Fe XXI	81.261	Mo XVII	83.108	Ni X	84.627[C]	Cr XIV
79.826	Mn XIV	81.322	Ti XIII	83.134	V XII	84.659	Ni X
79.947	Kr XXIX	81.378	Ni XI	83.139	Ni XI	84.67	Co XI
79.99	Ni XXIII	81.382	Mo XVII	83.183	Cu XXII	84.703[C]	Mn XX
80.022	Fe XII	81.468	Ni XI	83.185	Ni XX	84.703[C]	Ni XXIII
80.057	Cu XXIII	81.491	Cr VII	83.190	Co XI	84.711	Ti X
80.06	Mn XIV	81.507	Co XI	83.23	Fe XX	84.711	Ti XI
80.06	Mn XIV	81.513	V XII	83.23	Mn XIII	84.72[L]	Co XI
80.077[C]	Ni XVIII	81.55	Cr XI	83.235	Fe XX	84.757	V XIV
80.14[L]	Co XII	81.550	V XII	83.308	Mo XXVIII	84.768[L]	Fe XII
80.16	Ni XXII	81.599[C]	Cr XXII	83.31	Cr XI	84.835	Ti XI
80.160	Fe XII	81.611	Ti XIII	83.326	Ni X	84.85[L]	Fe XII
80.19[L]	Co XII	81.651	Fe XII	83.340	Cu XXIII	84.86	Fe XII
80.201	Mo XVIII	81.69	Ni XXI	83.340	Cu XXIV	84.874	Fe XIX
80.212[C]	Ni XVIII	81.732	Ni XI	83.41[L]	Mn XIII	84.876	Ti XI
80.22[C]	Co XXIII	81.733[C]	Mn XV	83.428	Mo XVIII	84.898	Cr XIII
80.225[C]	Fe XVI	81.8[C]	Ni XXII	83.457	Fe IX	85.011[C]	Cr XIV
80.27	Mn XIV	81.838	Cr XIV	83.518	Mn X	85.02	Ni XXII
80.305[C]	Fe XVI	81.859	Mo XVIII	83.52[L]	Mn XIII	85.020[C]	Cr XIV
80.314[C]	Fe XVI	81.89[C]	V XXII	83.546	Ni XI	85.04[C]	Mn XV
80.321[C]	Ni XVIII	81.943	Fe XII	83.619[C]	Mn XV	85.046[C]	Fe XVI
80.3536[C]	Mo XLI	81.976[C]	Ni XVIII	83.619[C]	Mn XV	85.067[C]	Fe XVI
80.364	Mo XVIII	81.980	Cr VII	83.62[C]	V XXII	85.071	V VI
80.388	Co IX	81.988	Mo XVIII	83.669[C]	Ti XII	85.078[C]	Fe XVI
80.400	Cu XXIII	82.00[C]	Fe XX	83.676	Ni X	85.114	Ti XI
80.403	Mo XXVII	82.003[C]	Ni XVIII	83.677	V XII	85.14	Fe XII
80.46	Mn XIV	82.010	Fe XIII	83.689[C]	Mn XV	85.14[L]	Fe XII
80.492	Mo XVIII	82.024	V XII	83.69	Fe XX	85.19	Mn XII
80.5	Fe XII	82.034[C]	Ni XVIII	83.691[C]	Ni XXIII	85.226	Cu XXIV
80.5	Fe XII	82.05	Cr XI	83.70[C]	Co XXII	85.226	Ni XI
80.502	Ti XIII	82.06[C]	Co XXII	83.706[C]	Ti XII	85.262	Ti X
80.51	Co XX	82.11[C]	Co XXII	83.732	Ti XI	85.290	Ti XI
80.51	Fe XX	82.121	Ti XII	83.756	Mo XXVIII	85.290	Ti XI
80.544	Co IX	82.163[C]	Mn XV	83.78	Mn XIV	85.290	Ti XI
80.55	Ni XXII	82.183[C]	Mn XV	83.798	Ni XI	85.360	V XIV
80.570[C]	Fe XVI	82.195	Cu XXIV	83.861	Co XI	85.40	Co XXI
80.59	Fe XX	82.226	Fe XII	83.870	Fe XIX	85.41	Mn XIX
80.61[C]	Co XXIII	82.238[C]	Cr XXII	83.890	Mo XIV	85.411[C]	Co XVII
80.610	Ti XIII	82.307	Ti XII	84.03	Co XXI	85.43	Co XXII
80.666	Cu XII	82.317	Mo XVII	84.039	Co XI	85.461	Fe XIII
80.686	Mo XVIII	82.344	Ti XII	84.05	Mn XVIII	85.477[L]	Fe XII
80.732[C]	Fe XVI	82.348[T]	V XII	84.06	Ni XXII	85.482	V XIV
80.734	Mo XVII	82.363[C]	Cr XXII	84.09	Mn XIV	85.523	Ni X
80.75	Kr XXXIII	82.368	Ti XII	84.092	Ni XI	85.525[C]	Co XVII
80.896	V XII	82.372[C]	Ti XII	84.194	Ni X	85.525[C]	Co XVII
80.91	Ni XIX	82.417	Ni XI	84.22[C]	V XXII	85.566	Cr XIII
80.916	Cr XIV	82.430	Fe IX	84.24	Ni XXII	85.570[C]	Mn XIX
80.927	Ti XIII	82.48	Co XX	84.26	Fe XXI	85.586[C]	Fe XVI
81.02	Cr XI	82.514	V XII	84.275	Fe XIII	85.597	Mo XIV
81.04	Ni XXII	82.527	Co XI	84.292	Mn X	85.651[C]	Fe XXII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
85.669	Fe XII	87.283[C]	Mn XV	89.059	Mo XXIX	91.02	Ni XIX
85.72	Mn XII	87.297[C]	Ti XII	89.103	V XIV	91.046[C]	Fe XVI
85.74[C]	Co XXI	87.30	Fe XVII	89.104	Fe XI	91.050[S]	Kr XXXIV
85.753	Ni X	87.30	Mn XIII	89.17[C]	Co XXII	91.06	Mn IX
85.758	V XIV	87.317	Ni X	89.185[L]	Fe XI	91.097[C]	Ni XXIII
85.831[C]	Fe XXII	87.35[L]	Co XI	89.25	Co XXI	91.158[C]	Mn XV
85.86	Ni XXII	87.363	V XII	89.26	Mn XIX	91.187	Mo XIII
85.899	V XIV	87.364	Ti XII	89.31[L]	Co XI	91.20	Ni XXII
85.90	Cu XIX	87.40	Mn XIII	89.448	Mn IX	91.216[C]	Mn XV
85.932	Mo XXVIII	87.426	Ti XII	89.59	Mn XVIII	91.241[C]	Mn XV
85.979	Mo XIV	87.429[C]	Fe XXI	89.594[C]	V XXI	91.269	Fe XXI
86.059[S]	Cr XIV	87.454[C]	Ti XII	89.599[C]	Cr XVII	91.27	Mo XXX
86.125	V XIV	87.465[C]	Ti XII	89.730[C]	Fe XXII	91.273	Fe XIV
86.131[C]	Fe XVI	87.47	Mn XV	89.783	Mn IX	91.30	Cr XIII
86.148	V XIV	87.49[L]	Co XI	89.844	Ti XII	91.301	Mo XXVIII
86.150	Mo XXXI	87.50	Ni XXIII	89.85	Mn XX	91.328[S]	Mo XXV
86.160	Cu X	87.50	Ni XXIV	89.8614[C]	Fe XI	91.391	Kr XVIII
86.164[S]	Cr XIV	87.516	Cu X	89.887[C]	Co XVII	91.394[L]	Fe XI
86.176[C]	Fe XVI	87.552	Mn IX	89.914	Mn IX	91.472[L]	Fe XI
86.183[C]	Cr XIV	87.66	Ni XXIII	89.92[C]	Ti XXI	91.475[C]	V XVII
86.19	Co XX	87.680	Ni X	89.94[C]	Fe XX	91.487[C]	Mn XXI
86.204	Cu X	87.703	Cu X	89.99	Cr XIII	91.527	Ni X
86.26	Fe XXI	87.725	Ti XI	90.013[C]	Co XVII	91.539[C]	Mn XXI
86.26	Kr XXX	87.77	Ni XXIII	90.02	Cr XIII	91.63[L]	Fe XI
86.300	Ni X	87.770	Mo XIII	90.029[C]	Cr XIX	91.63[L]	Fe XI
86.336	Cu X	87.78[L]	Co XI	90.034	Mn IX	91.63[L]	Fe XI
86.339	Mo XXIX	87.79	Mn IX	90.122[C]	Co XVII	91.63[L]	Fe XI
86.356	V XIV	87.80	Mn XV	90.134	Mn IX	91.646	Mn XI
86.36	Ni XIX	87.868	V XI	90.17	Cr XIII	91.70[C]	Kr XXXV
86.422	Cu X	87.932	Cu X	90.205[L]	Fe XI	91.714[C]	Fe XVI
86.464	Ni X	87.958	Mn IX	90.21[C]	Co XXII	91.733[L]	Fe XI
86.513	Fe XI	87.983[L]	Cu X	90.227	V XIV	91.749	Cr XIII
86.609	V XIV	87.995	Fe XI	90.234[C]	V XXI	91.752	Mo XIII
86.66	Co XXI	88.00	Ni XXII	90.276	Cu XXII	91.76	Co XXI
86.66[C]	Mn XV	88.000	Mo XIV	90.31	Co XXI	91.768	Kr X
86.684	V XIV	88.020[L]	Cu X	90.319	Mo XIV	91.790	Ni X
86.69[C]	Mn XV	88.029	Fe XI	90.341	Cu XXI	91.792	Cr XIII
86.71	Mn XII	88.032	Cu X	90.345[L]	Fe XI	91.806	Ti X
86.720	Cu X	88.07[L]	Co XI	90.358[C]	V XXI	91.834	Mo XIII
86.772	Fe XI	88.08	Mn XIX	90.373[L]	Mn XII	91.84[C]	Ti XXI
86.776	Cu X	88.11	Ni XXIII	90.461[C]	Fe XVII	91.855	Cr XIII
86.78	Cr XIII	88.167	Fe XI	90.474[L]	Co X	91.855	Ti X
86.78[C]	Mn XV	88.173	Mo XXIX	90.49	Ni XXIII	91.865	Ni XXIII
86.792	Cu X	88.20[L]	Co XI	90.512	Ti XII	91.90	Mn XVIII
86.808[C]	Ti XII	88.24	Fe XX	90.519	Mo XIV	92.005	Kr XVIII
86.86[T]	Mo XXX	88.258	Mn IX	90.547	Ti XII	92.01	Cr XIII
86.865	Ni X	88.35	Co XIX	90.595	Fe XX	92.040[C]	Ni XXIV
86.87[L]	Co XI	88.395	Cu XXII	90.599	Mn IX	92.055[C]	Co XVII
86.907	Cu X	88.423	Mn IX	90.63	Cr XVIII	92.089[C]	Co XVII
86.95[L]	Co XI	88.446	Co IX	90.683[C]	Mn XX	92.107[C]	Co XVII
86.964	Cu X	88.48	V IX	90.686[C]	Mn XV	92.128	Cr VII
86.98	Kr XXIX	88.52[L]	Co XI	90.700	V VI	92.16	Cr XIII
86.999	Fe XIX	88.54	Ni XXIV	90.701[L]	Mn XII	92.211	Kr XVIII
87.018	Cu X	88.636	Co IX	90.818[C]	Mn XV	92.240	Mn XI
87.025	Fe XI	88.75	Mn XIX	90.85	Cr XIII	92.32	Ni XXIII
87.053[C]	Mn XIX	88.756	Mo XIII	90.86	Cr XII	92.37	Cr XIII
87.055	Cu XXIV	88.77	Co XXI	90.864	Cu XXII	92.43[C]	Ti XXI
87.077	Ni X	88.773	Mn IX	90.908	Ti XI	92.463[C]	Cr XVIII
87.106	V VI	88.826	Ni XXI	90.927	Ti XI	92.546[S]	Mo XXX
87.128	Cu XXIV	88.923	Mn IX	90.96	Ni XXIII	92.61	Co XXII
87.135	Cu X	88.932[C]	Ni XXIV	90.966	Ti XI	92.61	Cr XIII
87.141	V XIV	88.95[C]	Ti XXI	90.990	Cu XIX	92.63	Fe XX
87.166	V XI	88.994	Co X	91.000	Cu XXIII	92.67[C]	Ti XXI
87.27	Mn IX	89.025[C]	Fe XXI	91.009	Fe XIV	92.71	Mn XIX
87.27[L]	Co XI	89.03	Mn XVIII	91.012	Fe XIX	92.721	Kr XVIII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
92.728	Cu XXIII	94.638	Fe XX	96.301^{C}	Fe XVI	97.635	Mo IX
92.75	Mn XI	94.67^{C}	Ni XVIII	96.305	Co IX	97.639	Cu XXIV
92.75	Mn XI	94.69	Cr XVII	96.320^{C}	Cr XIV	97.642	V XII
92.75	Ni XXIII	94.690^{C}	Mn XX	96.332	Mn VIII	97.67^{C}	Co XXIII
92.8^{L}	Fe XI	94.692^{L}	Co X	96.35^{L}	Cr XII	97.683^{C}	V XIII
92.81^{L}	Fe XI	94.737	Mo XXXI	96.36	Co XXI	97.702^{C}	V XIII
92.87^{L}	Fe XI	94.737	Mo XXXI	96.411^{C}	Fe XVI	97.710	Mo IX
92.87^{L}	Fe XI	94.756	Mo IX	96.416^{C}	Fe XVI	97.737^{C}	Cr XX
92.899	Mo IX	94.788	Ti XIII	96.429	Ti XIII	97.758	Ti XIII
92.9^{L}	Fe XI	94.789^{L}	Co X	96.458	Mo IX	97.76^{C}	Co XXII
92.949	Kr XVIII	94.81^{C}	Co XXIII	96.471	Mo XXXI	97.838	Fe X
92.969	Cr VII	94.888	Cu XXIII	96.48	Cr IX	97.854	Co IX
93.00	Co XXI	94.888	Cu XXIV	96.485	Cu XXIII	97.863	Fe XXI
93.00	Co XXII	94.932^{C}	Fe XXI	96.50^{L}	Cr XII	97.87	Cr XV
93.002^{C}	Cr XIV	94.94	Co XX	96.541	Co IX	97.885	Mo IX
93.018^{L}	Fe XI	94.96	V X	96.546	Mo IX	97.924^{L}	Co X
93.02	Co XXII	95.057	Kr XXXI	96.55	Cr IX	97.932	V VI
93.025	V XIII	95.109^{L}	Co X	96.563	Mo XXXI	97.938	V XII
93.117^{C}	Mn XX	95.16	Co XXIII	96.628^{C}	Mn XV	97.964	Mo XXXI
93.12	Co XXII	95.18^{C}	Ni XVIII	96.660	Mo IX	97.97	Cr IX
93.302	Cu XXII	95.222	Cu XXII	96.690	Kr X	97.991^{C}	Ti XVI
93.349	Kr XVIII	95.29	Fe XVII	96.731^{T}	Ti XI	98.023^{L}	Mn XI
93.36	Cr XVIII	95.338	Fe X	96.760	Cr VII	98.064^{L}	Mn XI
93.395	Ti XI	95.339	Mo IX	96.788	Fe X	98.07	Co XXII
93.42	Cr XIII	95.358	Mo XXXI	96.803	Ni XXI	98.075	Fe XX
93.427^{C}	Cr XIV	95.374	Fe X	96.818^{C}	Cr XIV	98.077	Mo IX
93.433^{L}	Fe XI	95.390	Mn XI	96.839	Mo XXXI	98.08	Cr IX
93.467^{C}	Cr XIV	95.464	Mo IX	96.839	Mo XXXI	98.087	Mo IX
93.469	Fe VIII	95.497	Mo XXIX	96.843^{C}	Mn XV	98.097	Mo IX
93.493	Mo XIII	95.535^{C}	Mn XXI	96.845	Cu XXIII	98.128^{L}	Fe XIII
93.569	Kr XVIII	95.536^{C}	Cr XIX	96.845	Cu XXIV	98.180	Cu XXII
93.589	Ti XI	95.58	V XII	96.86	Cr XIII	98.185	Ni XXII
93.616	Fe VIII	95.624^{C}	Ni XXII	96.871^{C}	Mn XV	98.187	Kr X
93.626	Ti XI	95.640	V XVI	96.88	Co XXII	98.19	Kr XXXIII
93.667	Cu XXIII	95.703	Mo IX	96.880^{C}	Mn XV	98.217	Mo IX
93.696	Mo XIII	95.77	Cr XVIII	96.93	Co XXII	98.224	Mo XXXI
93.75	Kr XXXII	95.811	Mo IX	96.930	Cu XXIV	98.224	Mo XXXI
93.763	Mo IX	95.852	Co IX	96.964	Mo IX	98.261^{L}	Co X
93.782	Fe XX	95.866	Ni XXI	97.012	Kr X	98.319	V VI
93.782^{C}	Mn XV	95.88	Cr XIX	97.122	Fe X	98.345	Mo IX
93.782^{C}	Mn XV	95.917	Cr VII	97.123^{L}	Co X	98.358	Fe XX
93.85	Ni XI	95.929	Ti XI	97.13	Ni XXI	98.369	Fe XXI
93.870^{C}	Mn XV	95.95	Fe XX	97.16	Co XXII	98.371	Fe VIII
93.90	Co XXIII	95.952^{C}	Ni XXIV	97.17	Ni XXIV	98.375^{C}	V XVII
93.909	Ti XI	95.993^{C}	Cr XIV	97.19	Cr IX	98.387	Fe XIII
93.926	Fe XVIII	95.993^{C}	Cr XIV	97.20	Cr XVII	98.39	Ni XXIV
93.926	Ni XXI	95.995	Ni XXII	97.206	Mo IX	98.410	Kr X
93.994	V XIII	96.047^{L}	Co X	97.206	Mo IX	98.444	Cu XXIV
94.008	Mo IX	96.065^{C}	Cr XIV	97.220^{C}	Mn XV	98.460	Mo IX
94.012	Fe X	96.076	Co IX	97.25	Cr XIII	98.47	Cr XI
94.053	Ti XI	96.076	Co IX	97.257^{C}	Mn XV	98.490	Ti XIII
94.085	Ti XI	96.11^{L}	Cr XII	97.272	Cu XXV	98.5030^{C}	Mo XL
94.120	Mo IX	96.122	Fe X	97.287^{C}	V XIII	98.513	Kr X
94.151	Mo IX	96.145	Mo IX	97.355	Co IX	98.513	Kr X
94.16	Cr XVIII	96.17	Cr IX	97.358	Ti XIII	98.523^{L}	Fe XIII
94.172	Mo IX	96.176^{C}	Fe XXI	97.411	Mn VIII	98.548	Fe VIII
94.216	Mo IX	96.215^{L}	Co X	97.416	Mo IX	98.561	Mo IX
94.23	V X	96.23	Mn XVIII	97.416	Mo IX	98.576	Cu XXIV
94.327	Mn XI	96.232^{S}	Kr XIX	97.494	Mo IX	98.58	Ni XXII
94.33	Cr IX	96.24	Mn XIX	97.507^{C}	Cr XX	98.630	V XII
94.431^{L}	Co X	96.246	Ti XI	97.51	Mn XX	98.69	Fe XXI
94.456^{C}	Mn XIX	96.270	V XVII	97.575^{L}	Co X	98.750	Mo IX
94.49	Cr XVII	96.288	Ti XI	97.587	Co IX	98.76	Ti XIII
94.492	Ni XX	96.295	Mo IX	97.591	Fe X	98.795	Mo IX
94.517^{L}	Co X	96.300^{L}	Co X	97.628^{C}	Cr XVIII	98.809^{C}	Ti XX

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
98.826[L]	Fe XIII	100.111	Kr X	101.367	Kr X	102.393	Ti XVI
98.848	Cu XXIII	100.12	Ni XXII	101.39	Co XX	102.410	V XVIII
98.910	Kr X	100.13	Cr XI	101.39	Cr XII	102.439	Co VIII
98.94	Cr XI	100.13	V XII	101.410	Co IX	102.45	Cr VIII
98.977	Mo IX	100.133	Ti XIII	101.42	Cr XIV	102.480	Co VIII
99.01	Mn XIX	100.14	Co XXII	101.435	Fe X	102.480	Ni IX
99.017	Fe XXI	100.173	Mn X	101.46	Cr XII	102.50	Ni XXIII
99.02	Co XIX	100.200	Ti XIII	101.543	Mo XIV	102.50[C]	Mn XX
99.02[L]	Mn XI	100.210	Co IX	101.550	Fe XIX	102.539	Ni IX
99.02[L]	Mn XI	100.241	Ni XXI	101.565	Cr VII	102.602	Ni IX
99.037	Kr X	100.246	Mo IX	101.61[C]	Fe XVI	102.687	Kr X
99.042	Co IX	100.246	Mo IX	101.64[C]	Cr XX	102.71[C]	Cr XIV
99.074	Ti XIII	100.254	Kr XX	101.657	Ni IX	102.710	Ni IX
99.077[C]	Ti XII	100.261	Kr X	101.668	Kr X	102.75[C]	Ni XVIII
99.10	Cr XI	100.266[C]	Ti XII	101.675	Mo IX	102.750	Kr X
99.111[C]	V XVII	100.297	Kr X	101.691	Kr X	102.77[C]	Ni XVIII
99.13[T]	Cr XI	100.3[C]	Ni XXII	101.699	Mo XIV	102.78[C]	Ni XXIV
99.156	Kr XX	100.336[C]	V XVI	101.701	Ni IX	102.829	Fe X
99.17	Mn XIX	100.35[C]	Ni XVIII	101.719	Kr X	102.83[C]	Cr XIV
99.193[C]	Mn XXII	100.37	V XII	101.733	Fe X	102.837	Kr X
99.194	Mo IX	100.370	Mo IX	101.74[C]	Fe XVI	102.854	V XVII
99.196	Kr X	100.42	Ni XXIII	101.744	Mo IX	102.9[C]	Mn XV
99.243	Cu XXIII	100.430	Mo XXXI	101.77[C]	Ti XX	102.914	Kr X
99.243	Cu XXIV	100.437	Mo IX	101.808	Mn X	102.960	Cu XIX
99.246	Kr X	100.44[C]	Ni XVIII	101.816	Fe XX	102.964	Ti XIII
99.25[C]	Ni XVIII	100.440	V XVI	101.823	Mo VIII	102.985	Mo IX
99.262	Kr X	100.50	Mn XIX	101.846	Fe X	103.021	Kr XX
99.284	Co IX	100.50	Ni XXIII	101.846	Ni IX	103.03	Cr VIII
99.330	Kr XVIII	100.585	Mn X	101.854	Mn X	103.043	V XVI
99.339[C]	Cr XVIII	100.591	Ti XI	101.87[C]	Fe XVI	103.059	Ti V
99.356[L]	Mn XI	100.593	Cr VII	101.88	Co XX	103.06[C]	V XVII
99.436[C]	Cr XIV	100.612	Ni XXII	101.904	Co VIII	103.07	Ni XXIII
99.448[C]	Cr XIV	100.620	Mo XXXI	101.904	Co VIII	103.110	Mo IX
99.450[C]	Ti XX	100.636	Co IX	101.92	Mn XIX	103.16	Co XX
99.473[C]	Cr XIV	100.637	Cu XXIV	101.92[C]	Co XXI	103.164	Fe X
99.48	Cr XI	100.653	Kr X	101.926	Cr XVII	103.179	Cu XIX
99.530	Kr X	100.662	Kr X	101.932	Ni IX	103.244	Ni XXIII
99.530	Kr X	100.69[C]	Cr XIX	101.985	Kr X	103.251	Kr X
99.531[S]	V XIII	100.742	Mo IX	102.001	Kr XVIII	103.268	Kr XXI
99.543[C]	V XIII	100.753	Ti XIII	102.03[C]	Ti XX	103.269	Mn X
99.545	Mo IX	100.773	Fe XXII	102.030	Mn X	103.30[C]	Cr XV
99.566	Mo IX	100.787	Mn X	102.033	Co VIII	103.31[C]	Mn XXII
99.572	Ti XIII	100.835	Ti XI	102.041	Ni XXIII	103.319[L]	Fe X
99.572	Ti XIII	100.85[C]	Fe XXII	102.056	Mo IX	103.326	Ni XXII
99.574[C]	Ti XX	100.856	Co IX	102.086	Co VIII	103.36	Cr VIII
99.596[L]	Co X	100.87[C]	Cr XIV	102.095	Fe X	103.40	Ni XXI
99.634[S]	V XIII	100.876	Kr X	102.106	Ti X	103.415	Mo IX
99.648	Kr X	100.90	Cr XI	102.115	Ni XXIV	103.428	Ni IX
99.655[C]	V XIII	100.967	Mo IX	102.151	Kr X	103.43	Ni XXIV
99.660	Kr XX	101.004	Mo XIV	102.152	Mo IX	103.451[C]	Ni XXII
99.67	Cr XI	101.05	Cr XIV	102.18[C]	Ni XVIII	103.48	Cr VIII
99.776[C]	Ni XXIII	101.065	Kr X	102.19[C]	Ti XX	103.48[C]	Fe XXII
99.831	Kr X	101.069	Mo IX	102.192	Fe X	103.493	Kr X
99.834	Ti XIII	101.08[C]	Mn XX	102.216	Fe XXI	103.500	Mo XIV
99.852	Mo IX	101.081	Mo XXXI	102.216	Fe XXII	103.500	Mo XIV
99.89	Co XX	101.107	Co IX	102.247	Ti XV	103.500	Mo XIV
99.921	Co IX	101.13	Ni XXIV	102.249	Co VIII	103.521	Mn X
99.934[C]	Ti XII	101.162	Kr X	102.260	Kr X	103.53	Mn XX
99.978[C]	V XIII	101.164	Mo IX	102.283	Ni IX	103.546	Ni XXIV
100.00	Mn XVII	101.181	Kr X	102.299	Kr X	103.566	Fe IX
100.02[C]	V XVII	101.224	Kr X	102.32	Cr XVIII	103.572	Kr X
100.026	Fe X	101.30	Co XXI	102.340	Ni IX	103.6[C]	Mn XV
100.075	Kr X	101.31	Ni XXII	102.348	Fe X	103.620	Ni IX
100.09[T]	Cr XI	101.31[C]	Co XXIII	102.364	Ni IX	103.67	Ni XXIII
100.099	Mo IX	101.353	Ti X	102.367	Co VIII	103.684	Kr XXI

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
103.696	Mo XXXVIII	104.838	Fe VII	107.25	V XII	108.648	Mo VIII
103.699	Co VIII	104.90	Mn XIX	107.27^{C}	V XIII	108.667	Co IX
103.702	Cu XXIV	104.972	Fe VII	107.29	V XII	108.714	Mo XXIX
103.724	Fe X	104.98^{C}	Fe XXI	107.31^{C}	V XIII	108.73^{C}	Fe XX
103.733	Ti V	104.980	Cr XVIII	107.34^{L}	Mn X	108.76	Mn XVIII
103.754	Ti V	105.03	V XI	107.34^{L}	Mn X	108.796	Mo VIII
103.77	Fe XXI	105.125^{C}	Co XVII	107.36^{L}	Mn X	108.803	Fe XX
103.796	Kr X	105.139	Cr VII	107.380	Mo VIII	108.84	Co XXII
103.80^{T}	Co XXIII	105.208	Fe IX	107.384	Fe XIII	108.854	Kr XXI
103.809	Co VIII	105.24	Mn XX	107.39^{L}	Mn X	108.862^{L}	Fe XII
103.83	Fe XXI	105.256	Mn IX	107.45	Cr X	108.878	Cu XI
103.871	Ni IX	105.26^{L}	Cr XI	107.472^{L}	Mn X	108.93	V XII
103.92	Cr VIII	105.34	V XI	107.49	Co XXII	108.93^{L}	Mn X
103.926^{L}	Ni IX	105.423	Mo VIII	107.57	V XI	108.93^{L}	Mn X
103.93	Co XXI	105.43^{C}	Ti XVI	107.57^{C}	Co XXI	108.952	V XVII
103.939	Fe XVIII	105.49	V XII	107.58	Co XXII	108.966	Mo IX
103.981^{L}	Ni IX	105.594	Co VIII	107.652	Mo VIII	108.97^{L}	Mn X
103.993	Ni IX	105.618^{S}	Mo XXX	107.659	Cu XXV	108.97^{L}	Mn X
104.023	Kr X	105.647^{C}	Co XVII	107.68	Mn XIX	108.977	Kr XXII
104.028	Kr XXI	105.65^{L}	Cr XI	107.69^{C}	Cr XIV	109.015^{L}	Fe XII
104.1^{C}	V XIX	105.69	Cr VIII	107.69^{C}	Cr XIV	109.03	Ni XXIV
104.127	Cr VII	105.69^{C}	Co XXII	107.70	Cr X	109.03^{C}	Ti XVI
104.13	Mn XIX	105.72	Co XX	107.709	Kr XXI	109.06	Ni XXIII
104.13	Mn XX	105.74	V XII	107.74^{C}	Cr XIX	109.095	Mo VIII
104.13^{C}	Ni XXV	105.760	Cu XXIV	107.79^{C}	Cr XIV	109.107	Ti XII
104.14	Co XXI	105.859	Cu XXIV	107.797	Mo VIII	109.14	Co XX
104.18	Cr XIX	105.88	Ni XXII	107.80	Cr X	109.14	Co XXII
104.180	Co VIII	105.92	Cr XVIII	107.83	V XII	109.22^{C}	V XIII
104.180	Co VIII	106.00	V XI	107.868	Fe VIII	109.227	Mo IX
104.248	Fe X	106.064	Ni XXII	107.876	Mo IX	109.287	Mo IX
104.27	Co XXI	106.064	Ni XXIII	107.89	Mn XX	109.29^{C}	V XIII
104.29	Fe XXI	106.080	Mo IX	107.91	Co XXIII	109.29^{C}	V XIII
104.291^{S}	Mo XXXII	106.107	Fe XIX	107.92^{C}	Co XXIII	109.3^{C}	Mn XV
104.292	Cu XXIV	106.154	Ti V	107.947	Fe VII	109.303	Ni XXI
104.306	Mo VIII	106.16	Ni XXII	108.002	Cu XI	109.35	Mn XVII
104.310	Mn X	106.23	Co XXI	108.01^{C}	Ni XXIII	109.35^{C}	Cr XIX
104.369	Kr X	106.23	Co XXII	108.03	Co XXIII	109.4^{C}	Mn XV
104.372^{S}	Mo XXX	106.259	Mo VIII	108.077	Fe VIII	109.4^{C}	Mn XV
104.42^{C}	Cr XIV	106.285	Fe VII	108.086	Ti XII	109.432	Ti XVII
104.45	Co XXIII	106.308	Ti V	108.114	Fe XXI	109.44	Ni XXI
104.45	V XII	106.318	Fe XIX	108.14	Mn XXI	109.444	Mo IX
104.5^{C}	V XIX	106.418	Fe VII	108.16	Co XXII	109.463	Fe VII
104.50^{C}	Cr XIV	106.42	V XI	108.160	V XVI	109.48^{C}	Ti XV
104.50^{C}	Cr XIV	106.49	Cr X	108.210	Mo VIII	109.509^{L}	Fe XII
104.516	Ti X	106.525^{C}	Ti XV	108.255	Mo VIII	109.53	Fe XXII
104.568	Ti X	106.633	Cr XVI	108.27	Ni XXIII	109.552	Mo IX
104.58	V XII	106.68	Cr VIII	108.3^{C}	V XIX	109.600	Mo IX
104.59	Cr XV	106.68	Ni XXIV	108.355	Fe XIX	109.648	Kr XXII
104.593	Ti XIII	106.76	Co XXI	108.362	Kr XXII	109.650	Mo IX
104.608	Mn X	106.781	V XII	108.37	Cr XVIII	109.657	Fe XX
104.618	Kr X	106.80^{C}	V XIII	108.381	Fe VII	109.67^{C}	V XIV
104.620	Cu XXII	106.820	V XII	108.390	Co IX	109.676	Cr XIX
104.626	Ni XXIV	106.84	Cr XVIII	108.440^{L}	Fe XII	109.70	Co XXIII
104.638	Fe X	106.85^{C}	Fe XXII	108.443	Ti V	109.712^{L}	Fe XII
104.66	V XII	106.874	Ti XV	108.479	Cu XI	109.742	Fe VII
104.67	Mn XX	106.885	V XII	108.495	Fe VII	109.75^{C}	Cr XIV
104.70	Ni XXIII	106.955	Fe XX	108.519	Cu XXIII	109.760	Mo VIII
104.711	Ti V	107.00	Ni XXIII	108.519	Fe VII	109.78	Mn XXI
104.72^{C}	V XVII	107.005	Mo VII	108.533	Fe VII	109.783	Mn IX
104.732	Ti V	107.024	Mo VIII	108.57^{C}	Ni XXIII	109.790	Mo VII
104.74	V XI	107.14	Cr X	108.571	Mo VIII	109.84	Cr X
104.752	Mo IX	107.173	Kr XXI	108.584	Fe VII	109.864	Mo VIII
104.80^{C}	Ti XVI	107.19^{C}	V XVIII	108.605^{L}	Fe XII	109.904	Mo VIII
104.801	Co VIII	107.203	Mo VIII	108.611	Ti V	109.952	Fe XIX
104.806	Mn X	107.231	Kr XXIII	108.620	Fe VII	110.019	Ti XI

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
110.063	Kr XXII	111.555^{C}	Co XVII	113.04	Mn XIX	114.412	Fe XXII
110.08	Co XXI	111.586	Fe XX	113.06^{C}	Ti XII	114.45	Ni XXII
110.103	Fe VII	111.604	Fe VII	113.080	Mn IX	114.46	Ni XVIII
110.14	Co XXII	111.638	Fe VII	113.081	Fe VIII	114.472	Mn IX
110.189	Mo VIII	111.65	Kr XXXIII	113.14	Cu XXVI	114.490	Fe VII
110.205	Fe VII	111.654^{C}	Co XVII	113.14	Ni XXIV	114.564	Fe VIII
110.23	Co XXIII	111.663	Fe VII	113.17	Co XXIII	114.59	V VIII
110.242	Kr XXV	111.664	Ti XI	113.205	Mo VIII	114.6^{C}	Ni XVIII
110.283	Ti IX	111.669	Kr XXII	113.24	Co XXII	114.72	Fe XX
110.304	Mo VIII	111.691	Fe VII	113.27	V VIII	114.74	Ni XVIII
110.37	Cr X	111.695	Fe XIX	113.27^{C}	Fe XXII	114.742	Kr VIII
110.37^{C}	Cr XIV	111.713	Fe IX	113.297	Fe XXI	114.854	Mo IX
110.38	V VIII	111.739	Mo IX	113.30	Mn XVIII	114.88^{C}	V XVIII
110.386	Cr XVIII	111.742	Fe VII	113.31	Cr X	114.920	Mo IX
110.386	Cr XIX	111.767	Fe VII	113.315	Fe VIII	114.921	Kr XXIII
110.39^{C}	Ni XVIII	111.78	Ni XXIII	113.349	Fe XX	114.935	Mo IX
110.391	Mo IX	111.79^{C}	Ti XVIII	113.37	Co XXII	114.948	Kr IX
110.40^{C}	Cr XIV	111.791	Fe IX	113.39	V XII	114.974	Cu XXII
110.412^{C}	Co XVII	111.812	Fe VII	113.406	V XVII	115.01	Fe XXI
110.50^{C}	Ni XVIII	111.849	Fe VII	113.463	Fe VIII	115.015	Ti XI
110.52^{C}	Ni XVIII	111.85	Mo XXXVIII	113.48^{C}	Ti XII	115.031	Ti XV
110.55	V VIII	111.86	Ni XXIII	113.48^{C}	Ti XII	115.033	Fe VII
110.561	Ti XVI	111.88	Cr XIX	113.523	Mo IX	115.08	Fe XXI
110.573	Mo VIII	111.889	Mn VII	113.60	V VIII	115.09	V X
110.591^{L}	Fe XII	112.012	Fe VII	113.627	Mn IX	115.109	Mo VIII
110.593	Fe VII	112.017	Fe IX	113.663	Mo IX	115.13	Cr XI
110.62	Kr XXX	112.030	Fe VII	113.70	Co XXI	115.15	Fe XXI
110.62^{C}	Ti XVI	112.060	Mn VII	113.70	Cr X	115.164	Fe VII
110.626	Fe XX	112.096	Fe IX	113.75	Mn XIX	115.19	Fe XXII
110.71	Co XXI	112.1^{C}	Fe XXI	113.76	Co XXI	115.248	Kr VIII
110.71	Co XXIII	112.110	Mo VIII	113.763	Fe VIII	115.281	Fe VII
110.732^{L}	Fe XII	112.16^{T}	Mo XXX	113.78	V XII	115.29^{L}	Cr X
110.87^{C}	V XIII	112.17^{T}	Mo XXX	113.785	V XVII	115.33^{C}	V XIII
111.00	Mn XX	112.21	Fe XXII	113.793	Fe IX	115.35^{C}	V XIII
111.01	Mn XX	112.252	Fe VIII	113.861	Fe VII	115.353	Fe IX
111.012	Mo VIII	112.254	Mo VIII	113.861	Fe VIII	115.355	Cr XVI
111.02	Cr X	112.27	Cr XVIII	113.897	Mo XXXI	115.36^{C}	Co XXII
111.04	Mn XX	112.300	Mo XIV	113.92	V VIII	115.36^{C}	V XIII
111.071	Cu XXIII	112.34^{L}	V XI	113.93	Co XXII	115.36^{C}	V XVII
111.11	Kr XXXV	112.375	Fe IX	113.930	V XV	115.38	Mn XVIII
111.11	V VIII	112.411	Mo IX	113.932	Mo IX	115.38^{C}	Fe XX
111.16	Cr X	112.415	Mn IX	113.940	Ti XI	115.396	Fe XIX
111.18	Cr XIX	112.466	Fe XXI	113.963	Fe VIII	115.407	Cr VII
111.186	Cu XXVI	112.472	Fe VIII	113.964	Fe VII	115.41^{C}	Fe XX
111.23	Ni XXIII	112.486	Fe VIII	114.005	Kr XXII	115.42	V VIII
111.26^{C}	Ti XVIII	112.495	Ti V	114.005	Kr XXIII	115.471	Mo IX
111.262	Mn IX	112.53^{C}	Co XXII	114.012	Cr XVIII	115.472	Fe VII
111.274	Cu XIX	112.55	Ni XXIII	114.012	Cr XIX	115.555	Mo XXXI
111.286	Mo IX	112.586	Kr XXIII	114.023	Mn IX	115.58	V X
111.299	V XVII	112.586	Kr XXIII	114.024	Fe IX	115.58	V VIII
111.33^{C}	V XIII	112.63^{L}	V XI	114.042	Mo IX	115.69^{T}	Mn XXI
111.33^{C}	V XIII	112.640	Mo XXXI	114.05	Fe VIII	115.738	Kr IX
111.345	Ti IX	112.68^{C}	Mn XX	114.087^{S}	Mo XXX	115.78	V X
111.347	Mo VII	112.704	Fe VIII	114.111	Fe IX	115.8^{C}	Mn XV
111.353	Cu XIX	112.73^{C}	Ti XII	114.168^{C}	Ti XVII	115.84	Mn XIX
111.383	Mo VIII	112.73^{C}	Ti XII	114.205	Mn VII	115.902	Mo VIII
111.39	Mn XVIII	112.746	Mo VIII	114.212	Mo IX	115.988	Mo XXXI
111.41^{C}	V XIII	112.76^{L}	V XI	114.235	Cr VII	115.996	Fe IX
111.41^{C}	V XIII	112.828	Mo XXXIV	114.272	Ti XI	115.999	Mo XXXI
111.44	V VIII	112.88^{C}	Mn XXI	114.286	Mo VII	116.0^{C}	Mn XV
111.442	V XVIII	112.896	Ti V	114.295	Fe VIII	116.0^{C}	Mn XV
111.461	Mo VIII	112.916	Mo IX	114.30	Fe XXI	116.028	Ti XI
111.47	Co XXII	112.932	Fe VIII	114.356	Fe VII	116.047	Kr VIII
111.500	Mn IX	112.952	Mo XIV	114.380	Mn VII	116.077	Cr XX
111.542	Co X	112.973	Mo XIV	114.40	Co XX	116.088	Mo IX

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
116.17^{C}	Mn XIX	117.52^{C}	V XIII	119.21	Cr XVIII	120.824	Ti V
116.196	Fe VIII	117.56^{C}	Cr XIV	119.240	Fe VII	120.872	Fe VII
116.198	Ti XVI	117.610	Fe VII	119.269	Cr IX	120.873	V XVII
116.22	Co XXII	117.661	Fe VIII	119.273	Fe VII	120.895	Cr XVII
116.248	Mo IX	117.709	Kr IX	119.28	V XI	120.906	Kr VIII
116.264	Fe XXII	117.73^{C}	Fe XVI	119.284	Ti XVII	120.91	Co XXI
116.365	V XVIII	117.74	Kr XXXIII	119.30^{C}	Cr XX	120.915	Fe VII
116.387	Ti XI	117.74	Mn XIX	119.320	Cr IX	120.958	Kr VIII
116.408	Fe IX	117.762	V VI	119.36	V XI	120.98^{C}	V XIII
116.442	Fe VIII	117.775	Mo IX	119.380	Fe VIII	121.02^{C}	V XIII
116.493^{S}	Ti XII	117.793	Mn VII	119.422	Fe VII	121.06^{C}	V XIII
116.592	Cr XVII	117.814	Mo IX	119.435	Fe VII	121.080	Mo VIII
116.594^{S}	Ti XII	117.814	Mo IX	119.447	Kr VIII	121.090	Fe VII
116.61^{C}	Ti XII	117.91^{C}	V XIII	119.482	Fe VII	121.098	Mo XXXVIII
116.654	Cr VII	117.933	Ni XXII	119.524	Fe VII	121.12^{L}	Mn IX
116.70	Mn XX	117.942	Cr IX	119.538	Kr VIII	121.138	Ti V
116.715	Fe VII	117.978	Mn VII	119.54	Mn XX	121.15	Ni XXIV
116.75^{L}	Cr X	117.986	Cr XX	119.541	Fe VII	121.16	Mn XXI
116.76^{C}	V XVIII	117.986	Ni XXV	119.55	Co XXII	121.180	Mo IX
116.797	Kr XXIII	118.08	V XIII	119.561	Fe VII	121.183	Fe VII
116.803	Fe IX	118.165	Cr IX	119.569	Cr IX	121.20^{C}	Fe XXIII
116.809	Fe VII	118.178	Kr VIII	119.572	Cu XXIV	121.201	Fe XXI
116.836	Fe VII	118.18	V X	119.587	Fe VII	121.293	Cr IX
116.85	V X	118.21	Ni XXII	119.603	Kr VIII	121.303	Kr VIII
116.853	Fe VII	118.215	Ti XVI	119.62	Cr XVIII	121.304	Fe VII
116.882	Fe VII	118.22	Mn XVIII	119.623	Fe VII	121.331	Fe VII
116.910	Ti XI	118.27	Fe IX	119.686	Fe VII	121.351^{L}	Mn IX
116.951	Fe VII	118.279	Mo IX	119.692	Fe VII	121.36	Fe XXI
116.97	Co XXII	118.29^{C}	V XVIII	119.715	Fe VII	121.373	Mo XXXI
116.970	Fe VII	118.30^{C}	Cr XIV	119.76	Mn XIX	121.382	Ti XVI
116.993	Fe VII	118.300	Fe VIII	119.785	Fe VII	121.408	Fe VII
117.034	Fe VII	118.31	Co XXII	119.813	Fe VII	121.419^{L}	Fe XI
117.09^{L}	Cr X	118.31	Cr XIX	119.822	Ti X	121.442^{L}	Mn IX
117.104	Fe VII	118.373	Mo IX	119.846	Fe VII	121.49	Mn XX
117.12^{C}	Ti XIII	118.468	Kr XXIII	119.880	Kr VIII	121.490	Fe VII
117.13	Cr XI	118.50	V XIII	119.891	Ti X	121.493	Kr VIII
117.135	Fe VII	118.510^{L}	Mn IX	119.896	Fe VII	121.517	Mo IX
117.144	Fe XXII	118.537	Mo IX	119.913	Mo IX	121.538	Ti XVI
117.144	Fe VII	118.553	Ni XXIV	119.92	Co XXII	121.55	Mn XX
117.149	Mo XIV	118.560	Mo XXXI	119.978	Fe VII	121.555	Fe VII
117.163	V XVIII	118.626^{S}	Kr XXIV	119.983	Fe XIX	121.577	Kr VIII
117.171	Ti XI	118.648	Fe VIII	120.03	Fe XXII	121.577	Mo IX
117.174	Fe VII	118.667^{S}	Kr XIX	120.030	Fe VII	121.595	Kr VIII
117.18^{C}	Fe XVI	118.67	Cr XIX	120.131	Fe VII	121.597	Mo XIII
117.197	Fe VIII	118.68	Co XXIII	120.156	Mo IX	121.633^{L}	Mn IX
117.2	V VII	118.697	Fe XX	120.17^{C}	Ti XIII	121.647	Mo XIV
117.20	Cr XVII	118.697	Fe XXI	120.18^{C}	Ti XIII	121.747^{L}	Fe XI
117.25	Mn XVIII	118.71	Fe XXI	120.181	Fe VII	121.781	Cr IX
117.254	Fe VIII	118.767	V VI	120.214	Fe VII	121.858	Fe XX
117.276	V XVII	118.797	Mo XXXI	120.304	V XVII	121.870	Mo XXXI
117.281	Fe VII	118.83	Cr XIX	120.33	Ni XXI	121.89	V VII
117.310	Fe VII	118.85^{C}	Mn XX	120.401	Fe VII	121.890	Kr VIII
117.32^{C}	Ti XIII	118.850	Kr XXIII	120.442	Cu XXIV	121.941	Mo IX
117.335	Fe VII	118.907	Fe VIII	120.46	Mn XIX	121.95	V VII
117.355	Kr VIII	118.959	Mo IX	120.46^{C}	Ni XXIII	121.952	Fe VII
117.38^{C}	V XIII	119.00	Cu XXVI	120.478	Mo IX	121.986	Ti XIV
117.41	Mn XIX	119.015	V XVIII	120.50	Mn XXI	122.00	Fe XX
117.432	Fe VII	119.02^{C}	Mn XXI	120.528	Mo IX	122.005	V XV
117.435	Cr IX	119.087	Mo IX	120.53	Ni XXV	122.03^{C}	Ti XII
117.459	Fe VII	119.114	Mo VIII	120.56	Cu XXVI	122.084	Mo IX
117.49^{C}	Fe XXI	119.114	Mo IX	120.607	V XVIII	122.09^{C}	Ti XII
117.501	Fe XXI	119.12	Co XXIII	120.636	Fe VII	122.14^{C}	Mn XIX
117.507	Cu XXV	119.12	Mn XX	120.663	Mo IX	122.16^{C}	Ti XII
117.512	Fe VII	119.141	Mo VII	120.789	Fe VII	122.168	Mn VIII
117.52	Fe XXII	119.144	Fe VII	120.82	Mn XX	122.273	Co VIII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
122.29	Mn XVIII	123.570	Kr VIII	124.586	Fe VII	125.821	Co VIII
122.29[T]	Cr XX	123.572[L]	Fe XI	124.60[C]	V XIX	125.846	Fe VII
122.320	Co VIII	123.654	Ti XVII	124.63[C]	Fe XVI	125.88[C]	V XIII
122.335	Fe VII	123.657	Ti X	124.648	Fe VII	125.922	Fe VII
122.370	Fe VII	123.660	Mo IX	124.649	Co VIII	125.93	Cr XIX
122.392	Fe VII	123.667	Fe VII	124.67	Co XXI	125.940	Ti XI
122.420[S]	Mo XXX	123.703	Ti X	124.725[L]	Fe XI	125.979	Ti XI
122.472	Co VIII	123.709	Fe VII	124.759	Kr VIII	126.00	V VII
122.487	Mo VII	123.738	Mo IX	124.779	Fe VII	126.004	Ti XVII
122.488	Co VIII	123.753	Co VIII	124.782[C]	Ti XVII	126.032	Fe VII
122.520	Fe VII	123.776	Kr VIII	124.795	Co VIII	126.042	Ti XI
122.56	Cr XVIII	123.778	Mo IX	124.805	Ti XVI	126.088	Fe VII
122.577	Co VIII	123.780	V XVI	124.823	Kr VIII	126.09	Mn XVIII
122.577	Mo XIII	123.790	Mn VII	124.830	Co VIII	126.100	Mo IX
122.58	Cu XXVI	123.82[C]	Mn XIX	124.871	Co VIII	126.152	V IX
122.60	V VII	123.822	Fe VII	124.878	Co VIII	126.166	Fe VII
122.61[C]	Fe XXI	123.822[L]	Fe XI	124.914	Mo IX	126.187	Mo IX
122.63[C]	Ti XVII	123.834	Fe XXI	124.979	Fe VII	126.21[C]	Cr XIX
122.72	Ni XXIV	123.85[L]	Mn IX	125.00	Cr XVII	126.22	Co XX
122.720	Cr IX	123.87	Cr XVIII	125.014	Kr VIII	126.258	Mo XIII
122.746	Mo XIII	123.891	Kr VIII	125.03[C]	V XIII	126.29[C]	Ni XXIV
122.897	Mo IX	123.902	Mo XIV	125.03[C]	V XIII	126.296	Mo VIII
122.905	Ti XI	123.902	Mo XIV	125.071	Co VIII	126.30	Cr XIX
122.914	Kr VIII	123.902	Mo XIV	125.12[C]	V XIII	126.32	Ni XXII
122.956	Co VIII	123.946	Ti XI	125.15	Co XXI	126.330	Ti VI
122.96[C]	Mn XX	123.96	Ni XVIII	125.15	Co XXIV	126.358	Cr XIX
122.96[C]	Ti XII	123.973	Mo VIII	125.155	Co VIII	126.4[C]	V XIX
122.964	Cr IX	123.993	Mn VII	125.155	Co VIII	126.411	V XVIII
122.97	Mn XXI	124.03[C]	Ti XII	125.173	V XVI	126.453	Fe VII
122.974	Cr XVII	124.030	Fe VII	125.191	Mo VIII	126.46	Mn XX
122.984	Mo IX	124.04	Ni XVIII	125.22[C]	Cr XIV	126.54	Ni XXIII
123.022	Co VIII	124.055	Mn VIII	125.22[C]	Ni XVIII	126.55[C]	V XIII
123.029	Fe VII	124.058	Fe VII	125.266	Fe VII	126.559	Fe VII
123.03	V VII	124.08	Mn XXI	125.268	Co VIII	126.58[C]	V XIII
123.036	Ti X	124.120	Fe VII	125.278	V XVII	126.631	Mo VII
123.045	Co VIII	124.138	Ti XI	125.29	Fe XXI	126.634	Mo VIII
123.07	V VII	124.143	Ti X	125.301	Kr VIII	126.651	Ti X
123.070	Ti XI	124.184	Cr VIII	125.32[C]	Cr XIV	126.676	Ti XVII
123.076	Kr VIII	124.221	Mo IX	125.340	Co VIII	126.692	Kr VIII
123.10	Kr XXXIII	124.236	Mo XXXI	125.35	Cr XVII	126.705	Fe VII
123.108	Mo VIII	124.24	V VII	125.35	Mn XXI	126.73	Ni XXV
123.130	Fe VII	124.24[C]	Ti XIX	125.35[C]	Cr XIV	126.732	V IX
123.173	Co VIII	124.250	Fe VII	125.350	Co VIII	126.743	Fe VII
123.178	Mo IX	124.266	Mo IX	125.350	Co VIII	126.747	Mo VIII
123.182	Mo XIII	124.31	Ni XXII	125.42	Mn XX	126.765	V IX
123.226	Cr IX	124.322	Kr XXIII	125.420	V IX	126.768	Fe VII
123.23	Mn XXI	124.369	Mo IX	125.431	Fe VII	126.810	V IX
123.239	Co VIII	124.384	Fe VII	125.437	Kr VIII	126.813	Kr VIII
123.30	Mn XX	124.391	Ti X	125.438	Cr XVIII	126.82	Co XXIII
123.307	Co VIII	124.40[L]	V X	125.447	Fe VII	126.832	V XVII
123.33	Fe XXI	124.408	Mo IX	125.45[C]	Ni XVIII	126.855	Fe VII
123.331	Ti X	124.415	Fe VII	125.456	Ti X	126.875	Fe VII
123.38	Mo XXXI	124.425	Fe VII	125.456	Ti VI	126.886	Kr XXV
123.394	Mo VIII	124.48	Ni XXII	125.508	Fe VII	126.898	Fe VII
123.40[C]	Fe XVI	124.481	Kr VIII	125.524	Cr XVIII	126.913	Fe VII
123.415[C]	Ni XXII	124.54	Mo XXXI	125.524	Fe VII	126.930	Mo XIII
123.46[C]	Ti XII	124.54[C]	Fe XVI	125.565	Fe VII	126.979[S]	Mo XXXII
123.485	Mo IX	124.54[C]	Ti XII	125.566	Co VIII	127.026	Fe VII
123.489	Co VIII	124.54[C]	Ti XII	125.596	Fe VII	127.04	Fe XXI
123.49[L]	Fe XI	124.541	Mo XIII	125.640	Fe VII	127.058	Mo VIII
123.49[L]	Fe XI	124.547	Fe VII	125.689	Ti VI	127.068	V IX
123.495	Kr VIII	124.553	Ti XVII	125.704	Mo VII	127.069	Fe VII
123.496	Fe VII	124.56	Mn XX	125.71	Fe XXII	127.079	V XVIII
123.545	Mo IX	124.56[C]	Ni XVIII	125.728	Cr VIII	127.08	V VII
123.558	Mo XIII	124.561	Mo VIII	125.798	Fe VII	127.086	Mo IX

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
127.118	Fe VII	128.379	V VI	129.980	Fe VII	131.531	Fe VII
127.13[C]	Ni XXIII	128.397	Co VIII	129.99[L]	Cr IX	131.532	Cr XX
127.169	Fe VII	128.417	Fe VII	129.996	Fe VII	131.60	Ni XXIII
127.21	Ni XXIII	128.43	Cr XIX	129.998	Cr VIII	131.638	Cr VIII
127.230	Fe VII	128.448	Cr XX	130.017	Fe VII	131.687	V XVII
127.258	Fe VII	128.449	Fe VII	130.02	Co XXI	131.70	Fe XX
127.268	Ti XI	128.450	Ti VI	130.050	Fe VII	131.713	Fe VII
127.27	V XVIII	128.538	Fe VII	130.06	Co XXIII	131.730	Mo VIII
127.278	Fe VII	128.56[C]	Fe XVI	130.111	Mo VIII	131.782	Fe VII
127.28	Mn XIX	128.59[C]	Fe XVI	130.112	Fe VII	131.789	Kr XXV
127.31[L]	Cr IX	128.63	Cr XIX	130.15[C]	Ni XVIII	131.795[S]	Kr XXIV
127.324	Fe VII	128.638	Fe VII	130.221	Fe VII	131.88[C]	Mn XX
127.341[C]	Ni XXII	128.659	Fe VII	130.226	Fe VII	131.9[C]	Ni XVIII
127.36	Mn XXI	128.682	Fe VII	130.248	Fe VII	131.905	Mo XXXI
127.388	Fe VII	128.688	Mo VIII	130.257	Fe VII	132.022	Ti XVI
127.42[L]	Cr IX	128.740	Mo IX	130.277	Fe VII	132.077	Mo IX
127.429	Fe VII	128.753	Fe VII	130.29[C]	Ni XVIII	132.093	Ti VII
127.46	Ni XXIII	128.755	Fe XXI	130.30[C]	Ni XVIII	132.1[C]	Mn XV
127.48	Cu XXVI	128.76[C]	Ti XIII	130.32	V IX	132.11	Cr XIX
127.53[L]	Cr IX	128.796	Ni X	130.336	Fe VII	132.120	Fe VII
127.559	Fe VII	128.85	Ni XXV	130.374	Fe VII	132.149	Ti VII
127.575	Mo XIII	128.852	Fe VII	130.38	Mn XX	132.24[C]	Co XXI
127.604	Fe VII	128.87	Ni XXIII	130.419	Fe VII	132.240	Cu X
127.636	Fe VII	128.878	Mo IX	130.42[C]	Mn XX	132.321	Cr VIII
127.645	Fe VII	128.879[C]	Ni XXII	130.467	Fe VII	132.322	Ti VII
127.653	Kr XXIII	128.93[C]	V XIII	130.481	Fe VII	132.351	Ti VII
127.662	Mo VIII	128.97[C]	V XIII	130.54[C]	Ti XII	132.355	Fe VII
127.694	Fe VII	128.98[C]	V XIII	130.54[C]	Ti XII	132.407	Fe VII
127.738	Kr VIII	129.04[C]	Cr XIX	130.56[C]	Ti XII	132.44	Kr XXIV
127.763	Fe VII	129.055	Ti XI	130.56[C]	Ti XII	132.46[C]	Co XXII
127.78	Ni XXIV	129.075	Ti XVI	130.59	Mn XIX	132.478	Cu X
127.782	Ti XVII	129.10[C]	Ti XII	130.60[C]	Mn XXII	132.522	Ti VII
127.83[C]	Ti XII	129.148	Ti VI	130.608	Fe VII	132.593	Fe VII
127.84	Ti XII	129.17	Fe XXII	130.623	Fe VII	132.63	Co XXII
127.852	Fe VII	129.195	V XVI	130.63[C]	Ti XII	132.63	Fe XIX
127.86	Fe XX	129.249	Ti VI	130.702[S]	Kr XXIV	132.667	Fe VII
127.867	Fe VII	129.258	Ni X	130.703	Kr XXIII	132.677[C]	Ni XXIII
127.868[S]	Mo XXXII	129.26	Cr XX	130.758	Mo VIII	132.733	Ti VII
127.88[L]	Cr IX	129.278	Fe VII	130.779	Fe VII	132.756	Co VIII
127.91[C]	Ti XII	129.31	Mn XX	130.789	Cr XX	132.76	Cr XVII
127.91[C]	Ti XII	129.330	Fe VII	130.838	Fe VII	132.79	Mn XX
127.916	Co VIII	129.420	Kr XXV	130.9[C]	Ni XVIII	132.792	Fe VII
127.94[C]	Fe XVI	129.440	Ti XIV	130.90[C]	Co XXIII	132.850	Fe XX
127.95	Cr XIX	129.55	Mn XX	130.941	Fe VIII	132.90	Mn XXI
127.95[L]	Cr IX	129.55[C]	Cr XVIII	130.941	V XVII	132.906	Fe XXIII
127.96	Co XVII	129.579	Fe VII	130.97	Mn XIX	132.908	Mo IX
127.983	Mo XIII	129.580	V VI	130.99	Cr XIX	132.982	Ti VII
127.983	Mo XIII	129.6[C]	V XIX	130.99	Ni XXV	133.00[C]	V XVII
128.028	Mo XIII	129.603	Ti VII	131.059	Mo VIII	133.01[C]	Cr XVIII
128.076	Mo IX	129.65[C]	Ti XII	131.08	Cr IX	133.034	Cu X
128.141	Mo VII	129.66	V IX	131.09	Co XXI	133.055	Fe VII
128.145	Cr XVIII	129.668[C]	Co XVII	131.13	V IX	133.06	Co XXI
128.147	Fe VII	129.71[C]	V XVIII	131.146	Ti XV	133.06[C]	Cr XIV
128.187[C]	Ni XXIII	129.722	Ti VII	131.193	Fe VII	133.123	Fe VII
128.20	Co XVII	129.730	Fe VII	131.22	V IX	133.165	Fe VII
128.200	Mo IX	129.77[L]	Cr IX	131.240	Fe VIII	133.168	Mo VIII
128.21[C]	Co XVII	129.777	Fe VII	131.245	Mo VIII	133.20[C]	Cr XIV
128.24	Co XXIV	129.78	Cr XVII	131.255	Fe VIII	133.210	Mo XXXI
128.240	Fe VII	129.789	Fe VII	131.263	V XVI	133.24	Kr XXV
128.25	Ti VII	129.806	Mo VIII	131.3[C]	Ni XVIII	133.26[C]	Cr XIV
128.273	Ni X	129.822	Fe VII	131.31	Cr XX	133.274	Fe VII
128.30	Ni XXIII	129.872	Fe VII	131.318	Fe VII	133.338	V XVI
128.368	Fe VII	129.895	Kr XXV	131.385[C]	Co XVII	133.395	Cr VIII
128.37	Co XXIII	129.895[S]	Kr XXV	131.394	Mo XII	133.417	Mn VII
128.373	Ti XVI	129.927	V XVII	131.5[C]	Mn XV	133.417	Mo VIII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
133.424	Fe VII	135.33	Mn XIX	136.97	Kr XXV	139.188	V VIII
133.525	V XVI	135.362	Mn VII	137.01	Ni XXIV	139.34^{C}	Fe XVI
133.54	Ni XXIII	135.378	Mo VIII	137.027	Fe X	139.353	Mo XI
133.633	Ti VII	135.39^{C}	V XIII	137.036^{L}	Cu X	139.36	Mn XIX
133.636	Mn VII	135.394	Mn VII	137.153	Ti IX	139.43^{C}	Fe XVI
133.64^{C}	Co XXI	135.42^{C}	Co XXII	137.194	V VIII	139.431^{C}	Co XVII
133.655	Mn VII	135.47	Ni XXIV	137.316	V VIII	139.45^{C}	Fe XVI
133.661	Mo VIII	135.475	Mn VII	137.37^{C}	Ti XVIII	139.50^{C}	Co XXII
133.670	Fe VII	135.48^{T}	Mn VIII	137.377	Ti IX	139.509^{C}	Co XVII
133.691	Fe VII	135.488	Fe VII	137.384	Fe VII	139.518	V VI
133.778	V XVIII	135.5^{C}	Ni XXIII	137.425	Mo VIII	139.59	V XIX
133.82	Cr XX	135.53^{C}	Ti XII	137.491	V VIII	139.595	Mn VII
133.842	Fe VII	135.532	Mn VII	137.50	Mn VIII	139.64	Fe XXII
133.852	Ti XVIII	135.609	Mn VII	137.55	Ni XXIII	139.65	Mn XVIII
133.854	Mo VIII	135.655	Cu XI	137.62^{C}	V XVII	139.71^{C}	Ti XII
133.874	Fe VII	135.69^{C}	Ti XII	137.640	Fe VII	139.730	V VIII
133.875	Mn VII	135.69^{C}	V XVIII	137.661	Ti VII	139.771	Cu X
133.899	Fe VII	135.734	Cu XI	137.73	Co XXIV	139.80	Co XXIV
133.985	Co VIII	135.751	V VIII	137.743	Ti IX	139.862	Mn VII
133.99	V IX	135.801	Ti VII	137.787	Mo XXXIX	139.868	Cu X
134.056	V XVII	135.812	Fe XXII	137.802	Fe VII	139.868	Fe X
134.063	Fe VII	135.892	Cr VIII	137.813	Ti VI	139.884	Ti XII
134.066	Cr XIX	135.900	Mn VII	137.82	Mn VIII	139.9^{C}	Mn XV
134.076	Cr VIII	135.902	Mo VIII	137.83^{L}	V IX	139.911	Ti VI
134.097^{S}	Kr XXIV	135.95	Ni XXV	137.833	Fe VII	139.93	Mn VIII
134.1	V XVIII	136.00	V XVIII	137.89	Cr XIX	139.977	Cr XVIII
134.11^{C}	Ti XVIII	136.00^{C}	Ni XVIII	137.907	Fe VII	139.98^{L}	V IX
134.128	Fe VII	136.01	Fe XXII	137.92	Mn VIII	140.071	Cu X
134.13	Co XXII	136.034	Cu XI	137.991	Ti IX	140.1^{C}	Mn XV
134.190	Mn VII	136.04	Kr XXV	138.020	Ti XVI	140.177	Kr VIII
134.203	Mo VIII	136.052	Fe XX	138.065	Cu XIII	140.25	V XIX
134.24^{C}	V XVIII	136.066	Mo XXXI	138.15	Cr XIX	140.277	V XVI
134.362	Mo VIII	136.078	V VIII	138.168	V XVI	140.296	Fe X
134.428	Mo XIII	136.08^{C}	V XVIII	138.168	V XVIII	140.31^{L}	V IX
134.428	Mo VIII	136.12	Co XXIII	138.18^{C}	Fe XXI	140.323	Mn VII
134.53	Ni XXIV	136.15^{C}	Ni XVIII	138.191	Fe VII	140.357	Mo XI
134.54	V IX	136.160	Ti XVII	138.235	V VI	140.361	Ti XII
134.57	Co XXII	136.17^{C}	Ni XVIII	138.30	Mn XX	140.395	Ti XV
134.609	Ti XV	136.177	Mn VII	138.357	Ti XV	140.44	Fe XX
134.615^{S}	Mo XXXII	136.20^{C}	V XIII	138.422	Kr VIII	140.443	Ti VI
134.628	Mn VII	136.25	V XIX	138.441	Mn VII	140.443	Ti IX
134.65	Fe XXII	136.267	Ti VII	138.49	Fe XX	140.451	V VIII
134.69	Mn VIII	136.280	Ti XVIII	138.519	Cr XIX	140.51	Cr XIX
134.704	Ti XI	136.30^{C}	V XVIII	138.520	Mo VIII	140.542	Ni IX
134.724	Ti XVI	136.343^{C}	Ni XXII	138.548	Ti VII	140.55	Mn XXI
134.73	Ni XXIV	136.357	Mo VIII	138.548	Ti IX	140.580	Cu XIV
134.763	Mo XIII	136.386	Cu XI	138.600^{C}	Co XVII	140.665	V VIII
134.79	Mn VIII	136.393	Ti XVII	138.61	Fe XXI	140.678	Fe X
134.852	Mo VIII	136.49	Co XXII	138.697	Mn VII	140.71^{C}	Cr XXI
134.914	Cu XI	136.499	Mo XII	138.760	Ti XVI	140.73	Mn VIII
134.940	Fe VII	136.507	Mo VII	138.78	V XIX	140.75	Cr XX
134.942	Cr VIII	136.511	V XVII	138.780	Kr VIII	140.77^{T}	Mo XXX
134.949	Cr XIX	136.52^{C}	Co XXI	138.8^{C}	Mn XV	140.81^{C}	Cr XVIII
134.972	Mn VII	136.53	Fe XXIII	138.80	Ni XXIV	140.833	Mo VII
134.989	Cu XI	136.56	Co XXII	138.800	Ti XVI	140.891	Kr XXVI
135.06	Mn XX	136.595	Ti IX	138.814	Ti VII	140.917	Ni IX
135.06	Mn VIII	136.6^{C}	Ni XXIII	138.84	V XIX	140.917	Ni IX
135.148	Mn VII	136.602	Cr XVIII	138.841	Fe VII	140.92	Cr XIX
135.15	Mn VIII	136.671	Fe VII	138.86	Cr XIX	140.934	V VIII
135.179	Ti XI	136.714	Ti VI	138.97	Co XVII	141.0^{C}	Kr XXXV
135.185	Cr VIII	136.75	Co XXII	139.04	Co XVII	141.002	Ni IX
135.202	Ti XVII	136.782	Mo VIII	139.04^{C}	Fe XX	141.03	Mn XIX
135.24	Co XXIV	136.815	Ti VII	139.07^{C}	Ni XXI	141.030	Mo XI
135.26	Cr XX	136.867	V VIII	139.175^{S}	Cu XII	141.044	Mn VII
135.286	Cu XI	136.898	Mo VIII	139.185^{C}	Ti XVII	141.061	Ti VI

Finding List – Continued

Wavelength (Å)	Spectrum
141.10	Mn XXII
141.113	Ti VI
141.119	Mn VI
141.193	Mn VI
141.231	Mo XI
141.238	V VI
141.277	Mn VI
141.287	Mo VIII
141.29	Mn VIII
141.356	Ni IX
141.49	Mn XXI
141.59[C]	Ti XII
141.664[S]	Kr XXV
141.68[C]	Ti XII
141.68[C]	Ti XII
141.73	V XVIII
141.757	Mn VII
141.76	Mn VIII
141.864	V VIII
141.924	V VIII
141.948	Ti XVII
141.988	Ti VI
142.028	Mn VII
142.05	Co XXIII
142.05	Fe XXI
142.07[C]	Fe XX
142.123	Kr VIII
142.130	Ti XV
142.148	Fe XXI
142.247	V VIII
142.278	Fe XXI
142.57	Ti XVI
142.589	Ti XVII
142.595	Ti X
142.615	Mn VII
142.68	Mn XIX
142.687	Ti X
142.750	Ti XV
142.963	Cu XIII
142.984[C]	Ti XVII
143.10	Mo XXXI
143.13	V XIX
143.17[L]	Cr VIII
143.176	Ti VI
143.21[C]	V XVII
143.26[C]	Co XXII
143.266	Kr XXXII
143.29[C]	Fe XXI
143.30	Co XXIII
143.30	Ni XXIV
143.377	V XVIII
143.459	Ti XVI
143.512	Kr VIII
143.53	Cr XVIII
143.57	Cr XIX
143.62[C]	Ti XII
143.631	Mo X
143.756	Cu XIII
143.76[C]	Co XXII
143.82	V XIX
143.87	Co XXII
143.89	Co XXIII
143.9[C]	Ni XXIII
143.90	Kr XXV
143.90	Kr XXV
143.997[S]	Mo XL
144.06	Fe XVI
144.111	V XVIII
144.194[C]	Ti XVII
144.216	Ni X
144.25	Fe XVI
144.31[C]	Ti XII
144.31[C]	Ti XII
144.323	Ni X
144.328	Fe X
144.36	Fe XXIII
144.370	Mo X
144.4[C]	Fe XVI
144.40	Kr XXV
144.405	Ti XVII
144.42[C]	Mn XX
144.551	Ti V
144.616	Mo XI
144.653	V VIII
144.661[C]	Ti XVII
144.666	Kr XXIII
144.720	Cu XIII
144.759	Ti XVIII
144.81	Cr VI
144.83	Co XXIV
144.843[C]	Ni XXII
144.85	Fe XXII
144.880	Ni X
144.92[C]	Co XX
144.96[C]	Fe XXI
144.961	Cr VI
144.973	Mo VII
144.988	Ni X
145.[C]	Mn XV
145.[C]	Mn XV
145.009	Mo XI
145.05[C]	Mn XIX
145.061	Ni X
145.117	Mn VI
145.14[C]	V XIII
145.16	Mn XX
145.169	Mn VI
145.22[C]	V XIII
145.257	Mn VI
145.26[C]	V XIII
145.27	Mn XXII
145.280	Mn VI
145.304	Mn VI
145.35	Kr XXVII
145.35[C]	Co XXI
145.354	Ti V
145.414	Mn VI
145.43[C]	Ni XVIII
145.45	Mn XXI
145.452	Mn VI
145.498	Kr XXV
145.50	Mo XXX
145.50[C]	Ni XVIII
145.507	V VIII
145.508	Kr XXV
145.516	Kr VIII
145.665	Ti XVI
145.70	Cu XXVI
145.732	Fe XXI
145.733	Ni X
145.75	Kr XXVII
145.75[C]	Ni XVIII
145.79	Ti V
145.96[C]	Ti XII
146.[C]	Mn XV
146.016	Mo XI
146.067	Ti XVII
146.081	Ni X
146.1[C]	Fe XVI
146.118	Mn VI
146.15	Kr XXV
146.15	Kr XXV
146.368[C]	Co XVII
146.37	Cr VIII
146.40	Co XXII
146.497	Cr VII
146.501[C]	Co XVII
146.539[C]	Co XVII
146.57	Mn XIX
146.57	Ti XVI
146.60[C]	Ti XII
146.60[C]	Ti XII
146.613	V VIII
146.63[C]	Fe XX
146.63[L]	Cr VIII
146.641	Mo XI
146.66[C]	Ti XII
146.66[C]	Ti XII
146.70[C]	Ti XII
146.719	V XVII
146.776	Cr VI
146.789	V VIII
146.856	Ti XVII
146.86	Co XXIII
146.897	Ti V
146.91[C]	V XVIII
146.942[S]	Kr XXV
146.955	Mo XI
146.97[C]	Fe XVI
146.98[C]	Fe XXI
146.980	Cr VI
147.013	Ni IX
147.02[C]	Fe XVI
147.04[C]	Fe XVI
147.09	Co XXIII
147.126	V VIII
147.157	Ti IX
147.20[L]	Cr VIII
147.24	Fe XXIII
147.30	Cr VIII
147.30	V XVIII
147.40	Cr XVII
147.436	Ti XV
147.49[L]	Cr VIII
147.51[T]	Kr XXVII
147.607	Ti XVIII
147.62[T]	Cr XX
147.686[C]	Co XVII
147.742	Cu XI
147.79	Cr XVIII
147.847	Ni XII
147.9[C]	Fe XVI
148.028[C]	Co XVII
148.07[C]	V XVIII
148.10	Mn XX
148.104	Ti VI
148.113	V XVIII
148.273	Mn VI
148.303	Ti VI
148.318	Cu XIV
148.318	Cu XIV
148.377	Ni XI
148.438	Ti XVIII
148.47[C]	Cr XIV
148.476	Mn VI
148.48	Mn XIX
148.588	Ti XV
148.61	Kr XXV
148.681	Cr XIX
148.714	Cr VII
148.719[C]	Co XVII
148.83	Ti XVIII
148.846	Mn VI
148.903	V VII
148.909	Mn VI
148.99	Cr XX
148.998	Mn VI
149.010	Ti VI
149.07[C]	Cr XIV
149.22	Fe XXIII
149.392	Ti VI
149.42	V XIX
149.455	Cu XI
149.462	Mo VII
149.560	Ti VI
149.560[L]	Ti IX
149.618	Mo X
149.653	Ti VIII
149.706	Cr VI
149.71	Ti X
149.718	Co VIII
149.743	Mo X
149.75	Kr XXVII
149.765[S]	Kr XXIV
149.768	Kr XXV
149.86	V XVIII
149.86	V XVIII
149.87	Fe XXII
149.88	Co XXIII
149.907	Cr XVIII
149.907	Cr XXI
149.918	Cr VI
149.94	Cr XVIII
149.981	Ti VIII
150.039	Ti VIII
150.103	V XVII
150.15	Ti XVIII
150.186	Fe VII
150.201	Mo X
150.213	Ti VI
150.282	Fe VII
150.315	Ti VI
150.32	Ni IX
150.324	Mn VI
150.328[C]	Ni XXII
150.369	Cu XI
150.403	Fe VII
150.42	Kr XXV
150.521	Fe VII
150.530	Fe VII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
150.544	Mo X	152.175	Mo X	154.34[C]	Ti XVI	156.060	V XVI
150.574	Ni IX	152.182	Mn VI	154.363	Cu X	156.21	Fe XXI
150.625	V VII	152.200	Co VIII	154.363	Fe VII	156.257	Mo X
150.638	Cu XIII	152.29	Cu XXVI	154.418	Cr VI	156.34[C]	Fe XVI
150.701	Co VIII	152.300[C]	Co XVII	154.42[L]	V VIII	156.41[C]	Fe XVI
150.71	Mn XX	152.338	Ti VI	154.43	Mn XXI	156.444	Ti VIII
150.80	Mn XX	152.38	Kr XXVII	154.447	Fe VII	156.494	Mo X
150.807	Fe VII	152.38	Kr XXVII	154.55[L]	V VIII	156.536[C]	Ti XVII
150.836	Cu XIV	152.42	Cr XIX	154.565	Fe VII	156.602[C]	Ni XXII
150.836	Ni IX	152.466	Cu XIV	154.591	Cu X	156.608	V VII
150.852	Fe VII	152.486[C]	Co XVII	154.61	Cr XXI	156.8[C]	Ni XXIV
150.867	Ti VIII	152.486[C]	Co XVII	154.650	Fe VII	156.80	Fe XVI
150.89	Kr XXVII	152.534	Co VIII	154.68[C]	Ni XIII	156.808	Fe VII
150.958	Co VIII	152.566	V XVII	154.68[C]	V XIII	156.88	Fe XVI
151.022	Ni IX	152.597	Co VIII	154.68[L]	V VIII	156.958	Co VIII
151.023	Fe VII	152.597	Co VIII	154.705	Fe VII	157.01[C]	Cr XIV
151.046	Fe VII	152.683	Mo X	154.713	Cu XV	157.03	Fe XXII
151.121	Kr XXXII	152.723	Mo XI	154.768	Ti VI	157.070	V XVII
151.145	Fe VII	152.733	Co IX	154.82[C]	V XIII	157.112	Fe VII
151.281	Ni IX	152.818	Mo XI	154.848	Fe VII	157.112	Ti VIII
151.34[C]	Cr XIX	152.86	Cr XX	154.888	Fe VII	157.17	V XIX
151.432	Fe VII	152.896	Co VIII	154.92	Cr XIX	157.266	Co VIII
151.44[C]	Ti XII	152.93[C]	Mn XIX	154.92[C]	V XIII	157.301	Mn VI
151.44[C]	Ti XII	152.933	V XVIII	154.921	Fe VII	157.37	Fe XXII
151.48[C]	Ti XII	152.960	Ti VI	154.941	Fe VII	157.40	Cr XVIII
151.484	Ti VIII	153.0[C]	Ni XXII	154.942	Co IX	157.40[C]	Co XXI
151.488	Fe VII	153.005	Co VIII	154.949	Fe VII	157.416	Co VIII
151.5[C]	V XX	153.05[C]	Co XXII	154.994	Mn VI	157.472	Ti VIII
151.503[C]	Ni XVI	153.15	Ti XVIII	155.06	Fe XXI	157.522[C]	Ti XVII
151.51	Fe XXI	153.17[C]	Ti XII	155.076	Co IX	157.528	Ti VIII
151.512	Fe VII	153.174	Ni XII	155.09	Kr XXV	157.53[L]	V VIII
151.54	Fe XXII	153.187	Kr VIII	155.1	Cu XV	157.532	Ni XIII
151.575	Mo X	153.242	Mo X	155.119	Mn VI	157.58	Mn XXII
151.61[C]	Fe XIX	153.255	Ti VI	155.12	Ni XIII	157.62[C]	Ni XIV
151.617	Mn VI	153.308	Co IX	155.124	Fe VII	157.624	Mo X
151.656	V XVII	153.346[C]	Ti XVIII	155.13[C]	Mn XX	157.66[C]	Ti XII
151.67[C]	Fe XXI	153.37[C]	Co XXI	155.150	Fe VII	157.687	Co VIII
151.675	Fe VII	153.384	Ti VI	155.16[C]	Fe XX	157.689	Fe VII
151.700	Ni IX	153.5[C]	Ni XXIV	155.21	Mn XX	157.706	Mo X
151.736	Mn VI	153.513[S]	Cu XXVII	155.246	Mo IX	157.73[C]	Mn XIX
151.747	Mo VII	153.550	Ti VI	155.247	Fe VII	157.732	Ni XIII
151.754	Fe VII	153.554	Ti XVII	155.317	Mn VI	157.773	Co VIII
151.769	Mn VI	153.663	Fe VII	155.339	Mo XXXI	157.795	Ni XII
151.782	Fe VII	153.711[L]	Cu X	155.38[L]	V VIII	157.812	Ti XVI
151.864	Ti VIII	153.747	Fe VII	155.38[L]	V VIII	157.82[C]	Mn XV
151.897	Ti VI	153.767	Cu X	155.414	Fe VII	157.83[C]	V XIII
151.899	Mn VI	153.803	Co IX	155.44[C]	Fe XVI	157.88[C]	V XIII
151.90	Ni XXV	153.926	Co VIII	155.45[L]	V VIII	157.88[C]	V XIII
151.90[C]	Mn XX	153.96	Fe XXII	155.46	Cr XVIII	157.9	Cu XV
151.915	Ti VIII	153.98	Mn XX	155.506	Mo X	157.908	Mn VI
151.920	Mn VI	154.03[C]	Co XXIII	155.518	Kr VIII	157.984	Co VIII
151.93[C]	Cr XVIII	154.039[C]	Ni XVI	155.530	Co IX	158.04[L]	V VIII
151.938	Cu XIV	154.042	Fe VII	155.549	Fe VII	158.066	Co VIII
151.944	Co VIII	154.080	Cu XIV	155.59[C]	Cu XXVIII	158.135[C]	Ti XVII
151.949	Mn VI	154.133	Ti XVII	155.619	Fe VII	158.139	Mn VI
151.971	Fe VII	154.161	Ti VI	155.632	Fe VII	158.143	V XVII
152.016[S]	Kr XXIV	154.171	Ni XII	155.669	Co IX	158.168	Fe VII
152.046	Mn VI	154.197	Cr VI	155.675	Ti VIII	158.181[S]	Kr XXV
152.072	Fe VII	154.216	Fe VII	155.747	Mn VI	158.25[C]	Cr XIV
152.093	Mn VI	154.27	Fe XXIII	155.789	Mn VI	158.278	Co XI
152.111[S]	Kr XXIV	154.271	Cu XVI	155.813	Mn VI	158.32[C]	Ti XII
152.151	Ni XII	154.271	Fe VII	155.914	Mn VI	158.34[C]	Cr XIV
152.153	Ni XII	154.28	Mn XXII	155.994	Fe VII	158.377	Ni X
152.164	Ti VIII	154.307	Fe VII	156.019	Cr XX	158.38[C]	Mn XV
152.174	Ti XVII	154.335	Fe VII	156.019	Fe XXII	158.45[T]	Kr XXVII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
158.467	V VII	161.442	Mo X	163.514	Cr VI	165.106	Mo X
158.469	Ti XVII	161.479	Co VIII	163.557	Mn VI	165.160	Kr XXVI
158.481	Fe VII	161.547	Ni XIII	163.6	Cu XX	165.191	Co VIII
158.49^{C}	Ti XII	161.659	Cr VI	163.6^{C}	Mn XV	165.3^{C}	Mn XV
158.51	Mn XXI	161.687	Cr VI	163.610	Ti XVI	165.322	V XVII
158.54^{C}	Ti XII	161.687	Cr VI	163.63	Mn XV	165.34	Mn XXI
158.641	Mo IX	161.733	Co VIII	163.639^{C}	Ni XVI	165.349	Cu XVIII
158.70	Cu XXVI	161.74	Fe XXII	163.64^{C}	Ni XV	165.36	Ni XXV
158.77	Ni XIII	161.752	Ni XIII	163.663	Mn VI	165.403	Ti VII
158.783	Co VIII	161.836	Cr VI	163.7^{C}	Mn XV	165.406^{S}	Ni XXVI
158.84	Ni XXV	161.836	V VII	163.740	Mn VI	165.436	Ni IX
158.873	Co X	161.852	Cu XV	163.801	Cr VI	165.436	Ni IX
158.944	Cu XV	161.908	Cr VI	163.939	Mn VI	165.444	Fe VII
158.953	Co IX	161.917	Co VIII	163.94	Cr XIX	165.488	Cr XIX
159.00	Co XXIV	161.930	Cr VI	163.974	Fe VII	165.490	Fe VII
159.00	Ti XVIII	162.016	Ti VIII	163.986	Mo IX	165.504	Cu XVI
159.049	Mo X	162.08	Kr XXVII	164.051	Mn VI	165.630	Fe VII
159.06	Kr XXVII	162.093^{C}	Ni XVI	164.051	Mn VI	165.658	Fe VII
159.11^{C}	Kr XXXVI	162.095	Co VIII	164.144	Mo IX	165.66^{C}	Fe XVI
159.15^{C}	V XVIII	162.1^{C}	Ni XXIII	164.146	Ni XIV	165.690	Ti XV
159.219	Mo X	162.336	Mn VII	164.159	Cr VI	165.71^{C}	Cr XIV
159.24	V VIII	162.337	Co VIII	164.17^{C}	Cr XIX	165.716	Ti VII
159.33	Mn XXII	162.401	Ti VIII	164.172	Ni XIII	165.724	Fe VII
159.347	V XVII	162.416	Kr VIII	164.173	Ti VII	165.74^{C}	Cr XIV
159.355^{P}	V XX	162.503	Ti XVI	164.188	Mn VI	165.75	Co XXIV
159.38^{C}	Mn XVIII	162.53	V XVIII	164.203	Fe VII	165.764	Fe VII
159.575	Co IX	162.565	Co XI	164.224	Mn VI	165.78^{C}	Fe XVI
159.617^{C}	Ti XVII	162.565	Cr VI	164.228	Cu XVI	165.81^{C}	Fe XVI
159.65^{C}	V XVII	162.57	Co VIII	164.249	Mn VI	165.836	Ti VII
159.677	Cu XV	162.62^{C}	Ni XIV	164.289^{C}	Ni XVI	165.86	Co XII
159.69	Ni XXIV	162.656	Mn VII	164.300	Mn VI	165.919	Fe VII
159.855	V VII	162.689	Mn VII	164.301	Cr VI	165.996	Fe VII
159.920	Kr XXVI	162.698	Mo X	164.302	V VII	166.010	Fe VII
159.948	Kr VIII	162.7^{C}	Ni XXIII	164.355	Mo IX	166.025	Cu XVI
159.955	Ti XVII	162.708	Co VIII	164.365	Mn VI	166.079	Ni IX
159.970	Ni XII	162.764	Cr VI	164.378	Mn VI	166.083^{S}	Kr XXV
159.970	Ni XIII	162.79^{C}	Fe XX	164.421	Mn VI	166.087	Ti VII
159.972	Co IX	162.8^{C}	Ni XXIII	164.446	Ti V	166.115	Mn VI
159.977	Ni X	162.84^{C}	Fe XX	164.454	Mo IX	166.16^{C}	Fe XVI
159.991	V XVIII	162.918	Mo IX	164.478	Ti VII	166.19	V XIX
159.997	Cu XIV	162.984	Ti V	164.48	Mn XXII	166.201	Mo IX
160.01	Cr XIX	162.998	Co XI	164.523	V VII	166.256	Co VIII
160.075	Mo X	163.014	Cr VI	164.564	Cr VI	166.306	Ni IX
160.14^{C}	Mn XX	163.033	Mo IX	164.566	Mn VI	166.35	Ti XVIII
160.143	Cu XV	163.049	Ti XVII	164.59	V XX	166.365	Fe VII
160.188	Mo XI	163.06^{C}	Fe XXI	164.61^{C}	Co XXI	166.488	Cr VII
160.331	Cr XIX	163.135	V VII	164.629	Mn VI	166.560	Cr VII
160.375	Mo IX	163.14^{C}	Ti XIX	164.63	Cr XX	166.74	Fe XXIII
160.40	V XVIII	163.17	Mo XXX	164.639	Mn VI	166.831	Mo X
160.42	Mn XXI	163.176^{C}	Ni XVI	164.70^{C}	Co XXIII	166.88	Ni XII
160.51^{C}	Co XXI	163.182	V VII	164.71^{C}	Ni XIV	166.887	Cu XVI
160.556	Ni XII	163.183	Fe VII	164.721	Co VIII	166.936	Cr VII
160.745	Mo X	163.185^{C}	Co XVII	164.80	Ni XIV	167.016	Co VIII
160.794	Ni X	163.192^{C}	Ni XVI	164.815	Mn VI	167.020	Cr VII
160.90^{T}	Kr XXX	163.212^{C}	Co XVII	164.83	Mn XXI	167.047	Fe VII
160.914	Ti VIII	163.274	Cu XV	164.833	Cr VI	167.12	Mn XX
160.97	Co XXIII	163.292^{C}	Co XVII	164.87	Mn XXI	167.152	Co VIII
161.1^{C}	Ni XXIII	163.32	Kr XXV	164.892	Mn VI	167.19	Mn XX
161.122	V VII	163.323	Co XI	164.913	Co XI	167.2^{C}	Mn XV
161.168	Ti XVI	163.35^{C}	Co XIV	164.955	Fe VII	167.242	Ti XVI
161.290	Ti VIII	163.369	Mo X	164.96^{C}	Cr XIV	167.279	V XVII
161.31	Kr XXV	163.41	Mn XV	165.02^{C}	Cr XVIII	167.297	Ti XVI
161.33	Cr XX	163.436	Mo IX	165.03	Cr XXI	167.34	V XIX
161.35^{C}	Cr XIX	163.5^{C}	Mn XV	165.06^{C}	Fe XVI	167.486	Fe VIII
161.381	Cu XV	163.5^{C}	Mn XV	165.087	Fe VII	167.496	Cr VII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
167.496	Cr VII	169.435	Cr VI	171.37	Ni XIV	173.742	Co VIII
167.61[C]	Ni XXVII	169.46[C]	Cr XIX	171.392[L]	Ti VIII	173.8[C]	Ni XXIII
167.656	Fe VIII	169.537	Co VIII	171.400	Cr VI	173.84[C]	Co XIII
167.66[C]	Fe XVI	169.551	Mn VI	171.432	Fe VII	173.851[C]	Fe XIV
167.738	Co VIII	169.580	Ti XIX	171.460	Co VIII	173.921	Cu XVI
167.74[C]	Ti XVII	169.61	Kr XXV	171.48[C]	Fe XVI	173.973	Cr VI
167.765	Mn VI	169.61[C]	Ni XIII	171.49[C]	Co XXII	173.98[C]	Mn XX
167.833	Mo VIII	169.63[C]	Cr XIV	171.50	Co XXIII	174.01	Kr XXV
167.957	Mn VI	169.69	Ni XIV	171.522	Co VIII	174.019	Mo IX
167.97	Cr XX	169.71[C]	Ti XII	171.529	Fe VII	174.04[C]	Co XIV
168.002	Fe VIII	169.711	Co VIII	171.541[C]	Ni XVI	174.040[S]	Kr XXXIV
168.01[C]	Fe XVI	169.73	Cr XIX	171.633	Mn VI	174.06[C]	V XVIII
168.019	Cu XVI	169.740	Ti XVI	171.64[C]	Fe XVI	174.069	Fe VII
168.024	Fe VIII	169.81	Ti XII	171.668	Co XI	174.070	Cr VII
168.084	Co VIII	169.819	Co VIII	171.680	Fe VII	174.10	Kr XXVII
168.088	Cr VI	169.82[C]	V XIII	171.69[C]	Fe XVI	174.168[S]	Cu XVII
168.12	Ni XIV	169.84[C]	Ti XII	171.69[C]	V XVIII	174.175	Cr VI
168.144	Mo IX	169.84[C]	Ti XII	171.713	Mo IX	174.286	Cr VII
168.147	Mn VI	169.842	Cr VII	171.723[L]	Ti VIII	174.346	Mo IX
168.15[C]	Cr XVII	169.845	Kr XXXIII	171.76[C]	Fe XX	174.505	Cu XVI
168.162[L]	Ti VIII	169.87	Cr XX	171.779	Fe VII	174.534	Fe X
168.172	Fe VIII	169.88[C]	Ni XIV	171.79	Co XXII	174.656	Mo VIII
168.192[L]	Ti VIII	169.91	Co XII	171.822[C]	Fe XIV	174.669[C]	Ni XVI
168.282	Mn VI	169.97	Kr XXVII	171.862	Mo IX	174.739[S]	Cu XII
168.29[C]	Co XIII	169.97[C]	Cr XVIII	171.875	Cu XI	174.82	Co XIII
168.295	Cu XVI	170.02[C]	Mn XXI	171.888	Ti VII	174.852	V XVIII
168.321	Mn VI	170.086	Cr VII	171.952	Ti VII	174.86	Kr XXV
168.327	Co XI	170.09	Co XXII	172.069	Fe VII	174.887	Mo IX
168.34	Co XII	170.12[C]	Cr XIV	172.083	Mo IX	174.99	Ni XV
168.353	Mn VI	170.139	Cr VII	172.16	Ni XIV	175.18	Mn XXII
168.355	Cr VI	170.16	Cr XXI	172.190	Co IX	175.199[C]	Ni XVII
168.37	Ni XIV	170.16[C]	Co XXII	172.204	Cr VI	175.23[C]	Fe XIII
168.40[C]	Ti XVI	170.169	Co VIII	172.3[C]	Ni XXIV	175.266	Fe X
168.515	Mn VI	170.303	Mn VI	172.33	Co XII	175.315	Cr VII
168.523	Cr VII	170.33	Co XII	172.353	Ti VII	175.33	Ti XIX
168.545	Fe VIII	170.33[C]	V XVIII	172.38	Kr XXV	175.399	Ni XVII
168.549	Mn VI	170.337	Co XI	172.380	Ti XVII	175.404	Cr XX
168.55	Kr XXV	170.358	Ti VII	172.402	Co VIII	175.44	Co XII
168.55	Kr XXV	170.376[C]	Ni XVI	172.41	Co XII	175.45	Cr XXI
168.62	Cr XXI	170.393	Cr VII	172.42	Co XXIV	175.474	Fe X
168.652	Ti VII	170.417	Fe VII	172.471[S]	Kr XXIV	175.55	Kr XXVII
168.664	Mn VI	170.464[C]	Ni XVI	172.487	Cr VI	175.6[C]	Ni XXIII
168.68	Co XII	170.50	Ni XIV	172.767	Co VIII	175.69[C]	Co XIII
168.683	Mo IX	170.55[T]	Kr XXVII	172.776	Co VIII	175.7[C]	Mn XV
168.691	Mn VI	170.559	Ti VII	172.80[C]	Ni XIV	175.756	Cr VI
168.72	Mn XXI	170.565	Fe VII	172.829[C]	Ni XVI	175.77	Co XIII
168.740	Mn VI	170.569	Cr VI	172.831	Fe VII	175.77	Kr XXV
168.79[C]	Fe XVI	170.58	Fe X	172.841	Cr VI	175.785	Cu XVIII
168.84[C]	Mn XIX	170.589	Co VIII	172.917	Co IX	175.812	Cr VII
168.879	Cu XVI	170.664	Fe VII	172.948	Fe VII	175.812	Ti VII
168.888	Mn VI	170.674	Mo IX	173.05	Kr XXVII	175.9[C]	V XIX
168.9	Kr XXV	170.678	V XVIII	173.091	Mo IX	175.98[C]	Cr XVIII
168.9	Kr XXV	170.695	Co IX	173.203	Fe VII	176.01	Ni XIX
168.921	Co VIII	170.850	Cr VII	173.21	Fe XXII	176.037	Cr VI
168.929	Fe VIII	170.910	Mn VI	173.22[C]	Mn XIX	176.053	Cr VII
168.967[C]	Ni XVII	170.938	Ti VII	173.31	Fe XXIII	176.10	Ni XV
169.04	Co XII	170.982	Cr VII	173.34	Cu XXVI	176.15	Kr XXVII
169.051	Co VIII	170.990	Mn VI	173.373	Co VIII	176.267	Ti XVI
169.08	Fe XXII	171.057[C]	Ti XVII	173.42	Cr XX	176.295	Cr VII
169.084	Cr VII	171.073	Fe IX	173.43[C]	Fe XX	176.345	Fe VII
169.179[C]	Ni XVI	171.107	Co VIII	173.441	Fe VII	176.42	Cr XX
169.196	Co VIII	171.14	Kr XXV	173.561	Co VIII	176.432	Mo IX
169.22[C]	V XIII	171.166	Fe VII	173.60	Kr XXVII	176.440	V XVIII
169.301	Ti VII	171.279	Fe VII	173.724	Ni XV	176.599	Fe VII
169.357[C]	Ti XVII	171.348	Mn VI	173.74[C]	Ni XIV	176.6[C]	Mn XV

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
176.613	Cr VII	179.656	Fe VII	182.048	Mn VI	184.35[C]	Fe XXII
176.620	Fe XI	179.682	Cr VII	182.050	V VI	184.356	Co VIII
176.648[S]	Mo XXXII	179.720	Fe VII	182.071	Fe VII	184.384[C]	Ni XVI
176.68	V XX	179.731	Co VIII	182.072	Ti XVII	184.41	Co XIV
176.682	Mo IX	179.762	Fe XI	182.09	Co XIII	184.41	Fe XI
176.7[C]	Mn XV	179.776	Cr VII	182.09[C]	Ti XII	184.43[C]	Fe XVI
176.741	Ni XV	179.87[C]	Fe XXI	182.14[C]	Ni XIV	184.438[C]	Fe XIV
176.744	Fe VII	179.902	Ti XVIII	182.151	Ti VI	184.48	Cr XXI
176.750	Mo IX	179.949	Co VIII	182.173	Fe XI	184.481	Mo XIV
176.86[L]	Cr IX	179.96[C]	V XVIII	182.175	Mo VIII	184.538	Mn VII
176.904	Fe VII	180.001	Cu XI	182.221	Fe VII	184.54[C]	Fe XVI
176.916	Cr VII	180.059	Fe VII	182.222	Kr VIII	184.54[C]	Fe XVI
176.928	Fe VII	180.06	Ni XV	182.27[L]	V VII	184.542	Fe X
176.98	Cu XVII	180.07	V XIX	182.286	Mn VI	184.613	Cu XVI
177.172	Fe VII	180.087	Mo XIV	182.310	Fe X	184.661[C]	Fe XIV
177.20[L]	V VII	180.10	Fe XXIII	182.355	Co VIII	184.752	Fe VII
177.235	Fe VII	180.31[C]	Fe XII	182.43[L]	V VII	184.80	Mn IX
177.238	Ti VII	180.36[C]	Co XXII	182.48	Mn XXI	184.800	Fe XI
177.243	Fe X	180.37	Cr XIX	182.499	Mn VII	184.84[C]	Cr XVIII
177.28	Ni XIV	180.407	Fe X	182.52	Co XIII	184.850	Co VIII
177.329	Fe VII	180.407	Fe XI	182.6[C]	V XIX	184.855[S]	Cu XVII
177.33[C]	Ti XII	180.422	Co VIII	182.686	Co VIII	184.861	Co VIII
177.45[C]	Ti XII	180.45	Co XII	182.686	Co VIII	184.884	Ni XV
177.503	Fe VII	180.474	Mn VI	182.692	Mn VII	184.886	Fe VII
177.555	Fe VII	180.477	Fe VII	182.740	Fe VII	184.937	Ni X
177.56	Ni XIV	180.49[C]	Co XXVI	182.76[C]	Ni XIV	184.976[C]	Ni XVI
177.586	Co XI	180.52	Ti XVIII	182.922	Kr VIII	185.03[C]	Co XXII
177.65	Kr XXVII	180.57[L]	Cr IX	182.94[C]	Mn XIX	185.041	Co VIII
177.694	Cr VII	180.58	V XX	182.945	Mn VII	185.099[C]	Fe XIV
177.895	Cr VII	180.60[C]	V XIII	183.00[L]	V VII	185.10[C]	Ti XVII
177.99	Mn XXI	180.600	Fe XI	183.003[C]	Ni XVI	185.176	Fe VII
178.010	Mo IX	180.626	Mn VI	183.11[C]	Ti XVII	185.213	Fe VIII
178.060	Fe XI	180.68[C]	V XIII	183.12[L]	V VII	185.251	Ni XVI
178.191[C]	V XVI	180.70	Cu XVII	183.141	Mn VII	185.283	Ni XXIV
178.221[S]	Co XXV	180.70	Cu XVII	183.167	Co VIII	185.29[C]	Ni XXIII
178.240	Ti XVI	180.760	Fe VII	183.17[C]	V XIII	185.3[C]	Ni XXIV
178.32	V XIX	180.817	Mn VI	183.266	Co VIII	185.389	Ni XVII
178.36[C]	V XVII	180.85	Cr XX	183.39[C]	V XVII	185.39	Co XIII
178.515	Mn VI	180.85[C]	Fe XXI	183.46[L]	V VII	185.423[C]	Fe XIV
178.572	Ti VII	180.87	Co XIII	183.485[S]	Cu XVII	185.455	Mn VIII
178.6[C]	Ni XXIII	181.104	Fe VII	183.539	Fe VII	185.461	Co VIII
178.61	Mn XV	181.140	Fe XI	183.59[C]	V XIII	185.525	Kr VIII
178.634	Mo VIII	181.15[C]	Co XXII	183.65	Co XIII	185.547	Fe VII
178.673	Ti VII	181.28	Ti XII	183.684[C]	Fe XIV	185.594	Cu XVIII
178.69	Mn XV	181.357	Mn VI	183.686	Co VIII	185.621	Mo VIII
178.779	Ni XV	181.57	Fe XXI	183.708	Mn VII	185.65	Kr XXVII
178.851	Cr VII	181.602	Mn VI	183.825	Fe VII	185.729[C]	Mn XIII
178.890	Ni XV	181.617	Mn VI	183.90	Kr XXVII	185.77[C]	Fe XIII
178.898	Fe XXI	181.64[C]	Co XIII	183.937[C]	Mn XIII	185.835	Co VIII
178.951	Mo VIII	181.646	Fe VII	183.939	Co VIII	185.87[C]	Cr XIX
178.959	Cu XVI	181.67[C]	Ti XVII	183.949	Mo XIV	185.94[C]	Ni XIV
178.98	Co XIII	181.673	Kr VIII	183.949	Mo XIV	185.96[C]	Ni XIV
178.994	Kr XXVI	181.69	Mn XXII	183.97[C]	Mn XIX	186.22[T]	Mo XXX
179.068	Co VIII	181.708	Mn VI	184.001	Mn VI	186.228[C]	Ni XVI
179.107	Ti VII	181.74[C]	Co XXIII	184.047	Mo VIII	186.32	V XIX
179.147	Co VIII	181.78	V XX	184.05[C]	V XVII	186.377	Mo VIII
179.18	Cr XIX	181.786	Co VIII	184.106	Ti VI	186.455	Co XVI
179.21	Cr XX	181.80[C]	Ti XII	184.11[C]	Co XIII	186.51[C]	Fe XII
179.265	Fe XII	181.817	Mo XIV	184.114	Fe VII	186.545	Mn VI
179.27[C]	V XIII	181.849	Mn VI	184.161	Mn VII	186.601	Fe VIII
179.273	Ni XV	181.897	Mn VI	184.203	Co VIII	186.657	Fe VII
179.330	V VI	181.90	Kr XXV	184.255[C]	Ni XXII	186.66[C]	Ni XIV
179.572	Mn VI	181.96[C]	Ti XII	184.265	Co VIII	186.69[C]	Ni XIV
179.58[C]	V XVIII	181.980	Mn VI	184.265	Co VIII	186.70	Kr XXVII
179.59	Co XIII	182.043[C]	Co XVI	184.320	Cu XI	186.79	Co XIV

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
186.79	Kr XXV	188.69^{C}	Ni XIV	191.045	Fe XII	193.43	Mn X
186.805	Mn VI	188.748	Mn VI	191.055	Ni XVI	193.501^{L}	Ti VII
186.856	Fe XII	188.8^{C}	Mn XV	191.059	Mn VI	193.509	Fe XII
186.863	Ti XVII	188.862	Mn VI	191.083	Cu XVIII	193.534^{L}	Ti VII
186.880	Fe XII	188.89	Co XIII	191.091	Mn VI	193.54	Ti XIX
186.942	Mn VI	188.9^{C}	Mn XV	191.130	Mn VI	193.585^{L}	Ti VII
186.96	Ti X	188.953	Cu XVIII	191.15^{C}	Ti XVII	193.668^{L}	Ti VII
186.976	Ni XI	189.^{C}	Mn XV	191.227	Mn VI	193.70^{C}	Cr XVIII
187.02	Cr XIV	189.017	Fe XI	191.23	Ti XVIII	193.706	Mn VI
187.092	Co VIII	189.04^{C}	V XIX	191.24	Fe XIII	193.752^{C}	Fe XIV
187.17	V XX	189.040	Co VIII	191.262	Co VIII	193.93	V XIX
187.235	Fe VII	189.06^{C}	Cr XIV	191.41^{C}	Fe XV	193.967	Fe VIII
187.237	Fe VIII	189.078	Mn VI	191.486	Ni XVI	194.01^{C}	Mn XI
187.27^{C}	Cr XIV	189.129	Fe XI	191.60	Mn IX	194.046	Ni XVI
187.278	Mn VI	189.129	Mn VI	191.645	Co VIII	194.067^{C}	Fe XV
187.30	Cr XIV	189.16	Mn IX	191.654^{C}	Ni XVI	194.28^{C}	Fe XXV
187.35	Ti X	189.21	Ni XV	191.723	Cu XVIII	194.30	Mn X
187.375	Co VIII	189.39^{C}	Ni XVIII	191.757	Co VIII	194.37	Mn X
187.398	Mn VI	189.460	Mn VI	191.76	Co XIV	194.37	Ti XIX
187.404	Ni XVI	189.47	Ti XIX	191.769	Mo VIII	194.420^{S}	Kr XXIV
187.446	Fe XI	189.472	Co VIII	191.8^{C}	Mn XV	194.60^{C}	Ti XII
187.495	Mn VI	189.54^{C}	Ni XVIII	191.806^{C}	Fe XIV	194.61	Fe XII
187.51^{C}	Ni XVIII	189.561	Fe XII	192.004	Fe VIII	194.61	Mn IX
187.55	Ti XVIII	189.569	Mn VI	192.006	Fe VII	194.662	Fe VIII
187.692	Fe VII	189.573	Fe VII	192.020	Fe XI	194.668	Ni XVII
187.695	Mn VI	189.614	Mo VIII	192.028	Fe XXIV	194.74	V XX
187.70^{C}	Fe XXI	189.628^{C}	Ti XV	192.050	Mn VI	194.76^{C}	V XVIII
187.756	Mn VI	189.66	Ti XVIII	192.08	Mn X	194.79^{C}	Co XIII
187.79	Cr XX	189.735	Fe XI	192.101	Mn VI	194.857	Mn VI
187.89	Co XIV	189.756	Fe VII	192.102^{L}	Ti VII	194.87^{C}	Co XIII
187.909	Co VIII	189.77^{C}	V XIII	192.12^{C}	Co XXI	194.900	Ti VI
187.92^{C}	Fe XXI	189.837	Mn VI	192.187	Ni XVI	194.920	Fe XII
187.955	Mn VI	189.940	Fe XI	192.2^{C}	Mn XV	195.0^{C}	Mn XV
187.990	Fe VII	189.98	Mn IX	192.20	Mn XX	195.03	Mn X
188.054	Co VIII	190.044	Fe X	192.225	Mn VI	195.119	Fe XII
188.09^{C}	Fe XII	190.06	Fe XII	192.272^{L}	Ti VII	195.119	Fe XII
188.097	Mn VI	190.14	Kr XXVII	192.286	Mo VIII	195.2^{C}	Mn XV
188.125	Fe VII	190.174	Cu XVIII	192.327	Mn VI	195.25^{C}	Ti XII
188.13	Ni XXV	190.23	Mn XX	192.332	Co VIII	195.266	Ni XVI
188.13^{C}	Cr XIV	190.241	Mo VIII	192.394	Fe XII	195.3^{C}	Mn XV
188.13^{C}	Cr XIV	190.342	Co VIII	192.441	Mn VI	195.391	Fe VII
188.137	Mn VI	190.365	Mn VI	192.461	Cu XVI	195.391	Ni XVI
188.160	Mn VI	190.45^{C}	V XIII	192.474^{L}	Ti VII	195.399	Fe X
188.165	Co VIII	190.459	Fe XII	192.53^{C}	Fe XXII	195.52	Ni XV
188.19	Cu XVII	190.466	Mo XXXI	192.599	Ni X	195.63	Kr XXV
188.215	Cu XVIII	190.480	Mn VI	192.619	Co VIII	195.66	Co XIV
188.216	Fe XII	190.515	Kr XXIX	192.629^{C}	Fe XIV	195.76^{C}	Mn XX
188.219	Fe XI	190.52^{C}	V XIII	192.641	Fe XI	195.766	Cu XVI
188.233	Mn VI	190.565	Mn VI	192.66^{C}	Fe XXI	195.802	Mn VI
188.241	Co VIII	190.574	Co VIII	192.675	Mn VI	195.85	Mn X
188.25^{C}	Cr XIV	190.574	Co VIII	192.705	Ti VI	195.91^{C}	Mn XX
188.312	Ti XVII	190.625	Mn VI	192.754	Ti VI	195.972	Fe VIII
188.345	Co VIII	190.65	Co XIV	192.76^{C}	V XVIII	196.046	Fe VII
188.38	Kr XXVII	190.689	Cu XVIII	192.819	Fe XI	196.092^{C}	Ni XVI
188.38	Kr XXVII	190.70^{C}	Ti XVII	192.82	Cr XX	196.111	Mn VI
188.396	Fe VII	190.700	Mn VI	192.92	Kr XXV	196.20^{C}	Ni XIV
188.42	Co XIII	190.75	Co XIV	192.92	Kr XXV	196.233	Mo VI
188.438	Mn VI	190.753	Mn VI	192.954	Cu XVIII	196.30	Kr XXVII
188.44^{C}	Mn XX	190.82	Co XIV	193.1^{C}	Mn XV	196.379	Cu XVIII
188.45	Fe XII	190.890	Mn VI	193.19^{C}	Ti XVI	196.38	Mn IX
188.45	Mn XXII	190.91^{C}	Mn XX	193.264^{C}	Fe XIV	196.423	Fe VII
188.48	Mn IX	190.965	Cu XVIII	193.36^{C}	Ti XVI	196.48	Co XIV
188.6^{C}	Mn XV	190.98	Cr XXI	193.4^{C}	Ti XVIII	196.525	Fe XIII
188.60	Co XIV	190.99^{C}	Cr XIV	193.412	Ni XVI	196.531	Mn VI
188.674	Co VIII	191.^{C}	Mn XV	193.421	Fe VII	196.59^{C}	Co XXII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
196.640	Fe XII	199.345[C]	Cr XII	202.06[C]	Cr XIX	205.01	Cr XIV
196.650	Fe VIII	199.37[C]	V XIII	202.086	Cu XVIII	205.01	Cr VIII
196.74[C]	Fe XV	199.509	Mn VI	202.090	Fe XII	205.08	Ni XVII
196.809	Mn VI	199.558	Co XV	202.378	Fe VII	205.084	Cr VI
196.917	Fe VII	199.612	Mn VI	202.38	Mn XI	205.084	Cr VI
196.923	Fe XII	199.759	Ti VI	202.39[C]	Mn XI	205.21[C]	V XVII
197.01	Co XIV	199.768	Mn VI	202.424	Fe XIII	205.229	Co XV
197.070	Mn VI	199.799	V V	202.442	Cr VI	205.247	Kr XXX
197.163	Mo VI	199.835	Mo VI	202.557	Ni XVI	205.350	Mn XIII
197.304	Ni XVII	199.873	Ni XVII	202.635	Cu XVIII	205.37[C]	Cr XIX
197.362	Fe VIII	199.89	Ti XIX	202.678	Mn VI	205.375	Co XV
197.38[C]	V XVII	199.911[C]	Ni XVI	202.739	Cr VI	205.492	Mn VI
197.405	Ni X	199.955	V V	202.828	Cr VII	205.5[C]	Ni XVI
197.423	Mn VI	200.021	Fe XIII	202.840	Mn VII	205.62[C]	Mn XIX
197.434	Fe XIII	200.050	V V	202.90	Ni XVII	205.65	Cr VIII
197.460	Ti VI	200.08[C]	Cr XIV	202.93	Mn X	205.691	Mo VI
197.515	Ni XVI	200.100	Co IX	202.962	Cu XVIII	205.848	Co XV
197.554	Co XV	200.15[C]	Ti XVIII	202.97[C]	Ni XIV	206.040[C]	Mn XIII
197.61	Cr XXI	200.202	V V	203.021	Kr XXXII	206.096	Fe VII
197.614	Ni XVI	200.35[C]	Ti XII	203.086	Co XV	206.10	Ti XIX
197.62[C]	Co XIII	200.35[C]	Ti XII	203.12	Mn X	206.368	Fe XII
197.620	Kr XXV	200.356	Fe XII	203.12	Ni XVII	206.70[C]	Cu XXVIII
197.635	Mn VI	200.40	Cu XVII	203.155	Cu XVI	206.708	Co XVI
197.647	Cu XVIII	200.497[C]	Ni XVI	203.194	V V	206.895[C]	Mn XIII
197.68[C]	Cr XVIII	200.546	Ni XVII	203.198	Mn VI	206.924	Co XV
197.771[C]	Cr XII	200.602[C]	Co XVII	203.200	Ti VI	206.930[S]	Mn XXIII
197.838	Ti XVIII	200.67	Mn XI	203.272	Fe XII	207.02	Mn XI
197.856	Mn VI	200.72[C]	Co XIII	203.28	Ni XVII	207.031	V V
197.909	Ni X	200.73[C]	Ni XIV	203.300	Ni XVII	207.07	Cr VIII
197.939[C]	Mn XIII	200.75	Co XIV	203.34[C]	Co XIV	207.1[C]	Ni XXIV
198.04	Mn XXI	200.794	Mo VI	203.428	V V	207.130	Mn XIII
198.15[C]	Co XIII	200.893[P]	Co X	203.434	Ti VI	207.15	Mn X
198.224	Cu XVIII	200.9	Kr VII	203.468	Co XV	207.16[C]	Ti XII
198.32[C]	Co XIII	201.00[C]	Cr XIV	203.627	Co XV	207.179	Mo XI
198.367	Mo VIII	201.007	Cr VI	203.793	Fe XIII	207.180	Co IX
198.391	Ni XVII	201.02	V XX	203.826	Fe XIII	207.291	V V
198.42	Mn X	201.04[C]	Mn XI	203.881[S]	Cu XVII	207.312[S]	Cu XIX
198.451	Co XV	201.061	Kr VIII	203.91[C]	Cr XIX	207.435	Mo VII
198.51	V XIX	201.086	Co IX	203.94[C]	Cr XI	207.458	Co XV
198.549	Fe XI	201.09[C]	Fe XX	204.0[C]	V XIX	207.489	Cr VI
198.55[C]	V XIII	201.121	Fe XII	204.017[L]	Mo XIII	207.5[C]	Mn XV
198.555	Fe XII	201.121	Fe XIII	204.059[L]	Mo XIII	207.5[C]	Mn XV
198.56	Cu XVIII	201.18[C]	Cr XIV	204.067	Mn VI	207.51	V XX
198.629[C]	Ni XVI	201.224	Cr VI	204.072	Cu XVIII	207.518	Ni XVII
198.718	Cu XVIII	201.235	V V	204.10	Co XXIV	207.519	Ni XVII
198.73[C]	Co XIII	201.24[C]	Mn XX	204.110	Cu XVIII	207.521[C]	Ni XVII
198.792	Mn VI	201.311	Ti VI	204.117	Mn VII	207.571	Mo VI
198.817	Mo VI	201.388	Cr VI	204.13[C]	Mn XXI	207.651	Cr VI
198.834	Mo VII	201.457	Mn VI	204.137[L]	Mo XIII	207.7[C]	Mn XV
198.844	Ni XVI	201.493	Fe XII	204.263	Fe XIII	207.712	Fe VII
198.867	Fe XV	201.493	V V	204.29	Mn XI	207.727[C]	Ti XVII
198.933	Mn VI	201.54	Cr VIII	204.394	Co XV	207.745	Mo VI
198.947	Mn VI	201.556	Fe X	204.418	Mo VII	207.767[C]	Ti XIII
198.977	Ti VI	201.575	Fe XI	204.43	Mn IX	207.776	Mo VII
199.03[C]	Ti XII	201.606	Cr VI	204.578	Fe VII	207.831	Fe VII
199.06[C]	Mn XII	201.733	Mo VI	204.6	Fe XVII	207.85	Co XIV
199.06[C]	V XVIII	201.737	Fe XI	204.620	Mo VI	207.892	Cr VI
199.08	Mn X	201.746	V V	204.675	Mn VII	207.93	Ni XI
199.15[C]	Cr XIX	201.776[C]	Co XVII	204.682	Cr VI	208.02	Mn XI
199.210	Ni XVI	201.82	Cr XIX	204.743	Fe XII	208.029	Co XV
199.213	Mn VI	201.865	Ti VI	204.862	Kr VIII	208.034	Fe XV
199.220[C]	Ni XVI	201.949	Mn VI	204.91	Cr XIV	208.07	Ti XVIII
199.246	Mn VI	202.044	Fe XIII	204.93[C]	Cr XIX	208.118	Ni XVII
199.297	Mn VI	202.046	Ni XVII	204.942	Fe XIII	208.167	Fe VII
199.32	Mn IX	202.057	Cr VI	204.98	Mn XI	208.242[C]	Ni XVI

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
208.318	Fe XII	211.32	Cr IX	214.079	Ni XVII	217.30	Fe XXII
208.328	Cu XVII	211.331	Fe XIV	214.196	Mo VI	217.38^{C}	Cr XIV
208.410	Fe XII	211.37^{C}	Ti XVI	214.266	Mo IX	217.39	Mn XII
208.45	Ti XII	211.42	Cr VIII	214.31^{C}	Cr XI	217.395	Mo VI
208.507^{C}	Co XVII	211.428	Ni XI	214.39^{C}	Fe XII	217.432	Mo VII
208.53	Cr IX	211.54	Mn XI	214.40^{C}	V XVIII	217.597	V VI
208.59^{C}	Ti XII	211.580	Co XVI	214.409	Mo VI	217.691	Fe VIII
208.6^{C}	Fe XXI	211.64^{C}	Mn XI	214.495	V VI	217.71^{C}	Cr X
208.63	Cr VIII	211.710	Ni XVII	214.524	Mo VII	217.838	Mo VII
208.653	Ni XVII	211.715	Ni XVI	214.63^{C}	V XVIII	217.88	Mn X
208.679	Fe XIII	211.738	Fe XII	214.721^{C}	Ti XIII	217.892	Mo VI
208.691	Mo VI	211.8^{C}	Ni XVIII	214.890	Mo VI	218.048	Mo VII
208.784^{C}	Fe XIV	211.846	Co XV	214.942	Mo VI	218.091	V VI
208.958	V V	211.870	Mn VI	215.014	Ni XVII	218.11	Mn X
209.008	Ni XVI	211.879	Co XV	215.03	Mn XII	218.14^{C}	Ti XVI
209.04^{C}	Mn XXIV	211.97	Cr IX	215.04	Cr IX	218.169	Fe XIV
209.12^{C}	Fe XII	212.1^{C}	Ni XVIII	215.145	Co XVI	218.238	Mo VI
209.160	Cu XVI	212.145	Fe XIV	215.19^{C}	Co XIII	218.25^{C}	Co XXIII
209.18	Ni XV	212.146^{C}	Ni XVI	215.30	Cu XX	218.376	Ni XVI
209.230	V V	212.154	Fe XIV	215.413	Ni XVII	218.40^{C}	V XIII
209.337	Ni XVII	212.168	Mo IX	215.46^{C}	V XVIII	218.40^{C}	V XIII
209.388^{C}	Ni XVII	212.2^{C}	Ni XVIII	215.600	Mo VI	218.49^{C}	Mo XLI
209.44	Cr IX	212.22	Ti XIX	215.600	Mo VI	218.49^{C}	V XIII
209.49^{C}	Co XIII	212.234^{C}	Ni XVI	215.642	Mo VII	218.50	Ti XIX
209.57	Mn XI	212.34^{C}	Fe XII	215.86	Mn XI	218.51	Co XVI
209.6^{C}	Ni XXIII	212.345	Fe XIV	215.905	Ni XVII	218.53^{C}	V XIII
209.617	Fe XIII	212.47^{C}	Fe XII	215.925	Ni XV	218.56	Mn XII
209.620	Co XV	212.509	Fe VII	215.97	Cr IX	218.562	Fe XII
209.776	Fe X	212.551	Cu XVIII	216.007	Co XV	218.564	Fe VIII
209.78^{C}	Cr X	212.663^{C}	Cr XII	216.01^{C}	V XVIII	218.578	Fe XIV
209.861^{C}	Ni XVI	212.664	Fe VII	216.09^{C}	Cr XIV	218.608	Ni XXIV
209.873	Co XV	212.69^{C}	V XVII	216.117	Co XVI	218.636	V VI
209.916	Fe XIII	212.75	Cu XX	216.12	Mn XII	218.675	Mo VII
210.048^{C}	Fe XIV	212.77	Mn XIV	216.182	Mo VI	218.70	Mn XII
210.06^{C}	Mn XI	212.778	Co XVI	216.384	Co XVI	218.716^{S}	Cu XVII
210.16	Mn XI	212.81	Mn XII	216.46^{C}	V XIII	218.83^{C}	Cr X
210.239	Co XVI	212.901	V V	216.57^{C}	Mn XIX	218.88	Cr X
210.375	Ni XVI	212.907	Co IX	216.576	Fe XIV	218.935	Fe IX
210.385	Cu XVI	212.939	Cu XVIII	216.59	Co XVI	218.954	Mo VI
210.387^{C}	Ti XIII	213.017	Mo VI	216.591	Fe VII	218.994	V VI
210.393^{C}	Co XVII	213.03	Cr VIII	216.6^{C}	Ti XVIII	219.062	Mo VI
210.4^{C}	Mn XV	213.044	V VI	216.60	Mn XI	219.062	Mo VII
210.41^{C}	V XIII	213.056	Mo VII	216.623^{C}	Ni XVI	219.125	Mo VI
210.43	Mn XII	213.087	Cu XVIII	216.67	Cr VIII	219.136	Fe XIV
210.51	Ti XVIII	213.10	Cr XX	216.68^{C}	V XIII	219.157	Mo VII
210.53^{C}	V XIII	213.176	Fe XIV	216.69	V XVIII	219.284^{C}	Ni XVI
210.53^{C}	V XIII	213.178	V V	216.72	Cr X	219.289	Fe XIV
210.553^{C}	Ti XVII	213.313	V VI	216.73^{C}	V XIII	219.391	Mo VI
210.568	V V	213.370	Co XVI	216.74	Co XVI	219.410	Cu XVIII
210.571	Mo VII	213.38^{C}	Co XIII	216.742^{C}	Fe XIV	219.438	Fe XII
210.571^{C}	Co XVII	213.397	Mo XIII	216.786^{C}	Ni XVI	219.474	Fe XIV
210.6^{C}	Mn XV	213.574	Co IX	216.8^{C}	Ni XVI	219.476	Mo VI
210.6^{C}	Mn XV	213.58	Ni XVII	216.80^{C}	Cr XIV	219.526	Mo XI
210.6^{C}	Ni XVI	213.6^{C}	Ni XXIV	216.88	Fe XIII	219.54	Mn XII
210.61	Cr IX	213.604	V VI	216.88	Fe XIII	219.690	Fe XIV
210.615^{C}	Fe XIV	213.611^{C}	Ti XVII	216.92^{C}	Cr XIV	219.710^{C}	Fe XIV
210.70	Cu XIX	213.75	Mn XI	216.928	Fe XIV	219.846	Mo VI
210.704	Ni XVII	213.756	Mo VI	216.928	Mo VII	219.857	Ni XVI
210.797	Fe XIV	213.767^{C}	V XI	216.97^{C}	Cr XIV	219.915	Co XVI
210.861	Co XV	213.770	Fe XIII	216.97^{C}	Cr XX	220.00^{L}	Ni XVIII
210.932	Fe XII	213.871	V VI	217.03	Kr XXV	220.02	Cr IX
210.95^{C}	V XVIII	213.893	Fe VII	217.03	Kr XXV	220.064	Kr XXVI
210.96^{C}	Mn XIX	213.906	Fe XIV	217.100	Fe IX	220.076	Fe XIV
210.97^{C}	Cr XIX	213.916	Mo VII	217.110	Fe XIV	220.137	Mo VII
211.19^{C}	Fe XII	213.980	Mo IX	217.271	Fe XII	220.202	Mo VI

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
220.22	Fe XV	223.256[C]	Fe XIV	226.23[C]	Ni XXVII	229.037	Co XVI
220.385	Mo VII	223.280	Mo VIII	226.24	Cr X	229.128	Ni XVI
220.42	Cr X	223.294[C]	Ni XXII	226.241	Cr VI	229.24[C]	Fe XII
220.424[S]	Ni XVIII	223.458	Mo IX	226.31	Fe X	229.266	Mo VI
220.446	Co XVI	223.47[C]	Cr XIV	226.31[C]	Mn XI	229.341	Fe XIV
220.530	Mo X	223.556	Mo VII	226.38	Co XVI	229.355	Mn XIII
220.59[C]	V XIII	223.56	Mn XII	226.406	Mo XI	229.38	V VII
220.632	Mo VII	223.61[C]	Cr XIV	226.42[C]	Mn XI	229.38[C]	Ti XVI
220.641	Mo VI	223.618	Fe XIV	226.45	Cr XI	229.41[C]	Co XXIV
220.67[C]	Ti XII	223.65[C]	Cr XIV	226.471	Mo VI	229.538	Mo VII
220.697	Co XV	223.823	Cu XVII	226.561[L]	Ti VI	229.606	V VI
220.734	Mo VII	223.83	Cu XX	226.656	V VI	229.607	Mo IX
220.882	Fe X	223.86	Cr X	226.747	Mo IX	229.62[C]	Co XXIII
220.890	Cr XII	223.87	Cr IX	226.772	Co XVI	229.63[C]	Co XXIII
220.902	Fe XIV	223.878	Mo VII	226.905	Mn XIII	229.653[C]	V XI
220.921	Co XVI	223.928	Co XVI	226.913	Ni XVI	229.680	Mo VI
221.08	Co XVI	223.992	Co XV	227.001[C]	Co XVI	229.71[C]	V XIII
221.1[C]	Ni XXIV	223.995	Kr XXVIII	227.172	V VI	229.726	Mo VI
221.124	Fe XIV	224.052	V VI	227.188	Co XVI	229.744	Fe XV
221.127	Mo IX	224.057	Ni XV	227.202	Cr VI	229.808	Mo VII
221.18	Cr X	224.08[C]	Mn XI	227.206	Fe XV	229.828	Fe VII
221.319	Mo VI	224.12[C]	Mo XLI	227.25[C]	Co XXI	229.856	V VI
221.33	Fe XXIII	224.13	Co XIV	227.42	Cr X	229.919	Mo VII
221.361	Mo X	224.16[C]	Ti XVII	227.436	Mo X	229.99	Fe X
221.369[S]	Cu XIX	224.222[C]	Ni XVII	227.49[C]	Cr X	230.00	V VIII
221.39	Co XVI	224.237[S]	Cu XIX	227.56[C]	Ti XVII	230.089	Fe X
221.4	Kr VII	224.305	Fe VIII	227.561	V V	230.12	V VIII
221.41	Cr VIII	224.340	Mo VII	227.576	Mo VII	230.17[C]	Mn XI
221.447[C]	Cr XII	224.354	Fe XIV	227.689	Cr VI	230.268	Mo VII
221.49[C]	Cr XIV	224.39[C]	Fe XII	227.704	Mn XIII	230.28[C]	Fe XXII
221.50[C]	Ti XII	224.483	Mo VI	227.73	Mn XIII	230.29	Cr XI
221.50[C]	Ti XII	224.500	V VI	227.734	Fe XV	230.32[C]	Mo XLI
221.574[C]	Co XVI	224.62	Mn XII	227.804	Mo VI	230.34	Co XIV
221.65	Mn XIV	224.712	Ni XXIV	227.808	Cu XXVI	230.352	Mo VI
221.69[C]	Mn XX	224.738[C]	Co XVI	227.85	Cu XX	230.398	V VI
221.702	Co XVI	224.74	Cr X	227.88	V VII	230.437	Mo VI
221.738[C]	Fe XIV	224.754	Fe XV	227.885	V V	230.463	Fe XV
221.822	Fe XIII	224.789[S]	Cu XXVII	227.918	Fe VII	230.633	Mo VI
221.88[C]	Cr XIV	224.83[C]	V VIII	227.93[C]	Ti XVII	230.64[C]	V XIII
221.946	Mo VII	224.841	Cu XVII	227.955	Co XVI	230.675	Cu XVII
221.95	V VII	224.851[C]	Mn XIII	227.98	Mn XIII	230.708	Mo IX
222.041	Co XV	224.86[C]	Cr XXIII	228.0[C]	Ni XXIV	230.79	Fe XII
222.043	Mo VII	224.913	V V	228.15	V VIII	230.8[C]	V XIX
222.08[C]	V XVIII	225.083	Co XV	228.16	Cu XVIII	230.80[C]	V XIII
222.29[C]	Cr XVIII	225.092[C]	Fe XIV	228.19[C]	Ti XVII	230.82	V VIII
222.29[C]	Mn XX	225.146	V V	228.27[C]	V IX	230.841	V VI
222.48[C]	Mn XX	225.16	V VII	228.276	Co XVI	230.854	Mo VI
222.491	Cr XII	225.21[C]	Co XXII	228.301	V V	230.92[C]	Ti XII
222.496[C]	Cr XII	225.225	V V	228.370	Mo VI	230.926[C]	Ti XVII
222.533	V V	225.327	Fe XIV	228.382	Mo XIII	231.044	Fe VII
222.593	Mo VI	225.34	Ni XIX	228.42[C]	Mn XI	231.097	Fe VIII
222.685	Mo VII	225.347	Ti V	228.50	Kr XXVII	231.110	Mo X
222.818	V V	225.40[C]	Mn XI	228.52	Mn XI	231.21	Cr X
222.84[C]	Cr XIV	225.411	Fe VII	228.584	Fe VII	231.33	V VIII
222.842	V V	225.465	V V	228.61	Mn XII	231.367	Ni XVI
222.91[C]	V XIII	225.481[C]	Fe XIV	228.62	Cr XIII	231.47	Fe XV
222.911[C]	Cr XIII	225.505	Fe VII	228.63	Mn XIII	231.522	Mo X
222.96[C]	V XIII	225.744[C]	Fe XIV	228.64[C]	Cr X	231.589[C]	Ti XIII
223.01[C]	V XIII	225.79	V VII	228.67	V VIII	231.646	V VI
223.018[S]	Cr XXII	225.886[C]	Mn XIII	228.71	Cr X	231.68	Fe XV
223.117	Ni XVI	226.040	Fe XIV	228.721[C]	Ni XVI	231.693	Fe VII
223.134	Mo XI	226.093	Ni XVII	228.76	Ni XIX	231.72[C]	Co XXIII
223.170	Cu XVII	226.093	Ni XVII	228.909	Ti V	231.728	Fe VII
223.170	Cu XVIII	226.163	Mo VII	228.943[C]	Ti XVII	231.731	Mo VI
223.222	Fe XIV	226.220	Fe XV	229.014	Mo X	231.751	Mo X

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
231.751	Mo IX	234.472	Mo VI	237.248[C]	Co XVII	239.504	Mo VII
231.842	Mo VII	234.610	Cu XVIII	237.248[C]	Co XVII	239.508	Ni XVI
231.868	Mn XIII	234.610[C]	Ti XVII	237.28[C]	V IX	239.61[C]	Mn XIX
231.87	Fe XV	234.722	Mo VII	237.31[C]	Co XXIII	239.680	Mn XIII
231.884	Fe VIII	234.744	Mo X	237.369	Mn XIII	239.734	Fe VII
231.893	V VI	234.757	Fe VII	237.470	Ni XVI	239.765	V V
231.99	V VII	234.782	Fe XV	237.50	V VII	239.778	Mo XI
231.991	Mo IX	234.90	Ni XIX	237.52	Ni XIX	239.8[C]	Ni XVIII
232.040	Mo VIII	234.90	Ni XIX	237.560	Mo IX	239.860	Fe VII
232.047	Fe VII	234.90	Ni XIX	237.57	Cu XX	239.87	Mn XXII
232.056	Mo IX	234.90[C]	V XVII	237.57	Cu XX	239.886	Mo IX
232.158	Mn XIII	234.918[S]	Co XVII	237.612[C]	Ni XVI	239.904	Ni XVI
232.18	Cr XI	234.962	Mo VII	237.685	Mo XIII	239.953	Mo IX
232.20[C]	V X	235.007	Mo VII	237.716	Mo VI	239.998	Mo X
232.239	Mo VI	235.01[C]	Fe XVI	237.765	Mo XI	240.0[C]	Ni XVIII
232.256	Fe VII	235.03	Cr XI	237.78	Mn XII	240.0[C]	Ni XVIII
232.34[C]	Mn XII	235.054	Mn XIII	237.83[C]	Co XXIII	240.028	Cu XVIII
232.442	Fe VII	235.066[L]	Ti VI	237.843	Mo IX	240.053	Fe VII
232.484	Ni XVI	235.081	Fe VII	237.843	Mo IX	240.083	Fe VII
232.5[C]	Ni XXIII	235.221	Fe VII	237.864	Ni XVI	240.159	Fe XIV
232.516	Ni XVII	235.3[C]	Ni XXIII	237.909	Mo X	240.2	Cr XV
232.542[C]	Ti X	235.310[L]	Ti VI	237.928[C]	Fe XIV	240.22	V VIII
232.558	Mo VII	235.32[C]	Fe XV	238.048	Fe VII	240.223	Fe VII
232.592	Co XV	235.34[C]	Fe XVI	238.064	Mo X	240.243	Fe X
232.613	Fe VII	235.408[L]	Ti VI	238.078[C]	Ni XVI	240.30	V IX
232.70[C]	Ti XII	235.48	Kr XXXIII	238.1	Cu XV	240.333	V XI
232.726	Mo X	235.486	Mo VII	238.114[C]	Fe XV	240.344	Mo VI
232.84	Cu XX	235.510	Mo VIII	238.167[C]	Mn XIII	240.370	Mo X
232.876	Fe VIII	235.520	Mn XIV	238.19[C]	V IX	240.40	Ni XIX
232.89[C]	Fe XX	235.53	Cr XI	238.393	Fe VII	240.42[S]	V XXI
232.946	Fe VII	235.55	Mn XI	238.459	Mo X	240.512[C]	V XII
232.96	Cr X	235.629	Mo XI	238.52	Cu XX	240.572	Fe VII
233.015	Fe VII	235.638	Fe XV	238.591	Mo IX	240.572	V V
233.117	Mo VI	235.656[C]	Ni XVI	238.60[C]	Fe X	240.586[C]	V XI
233.15[C]	Fe XVI	235.662	Fe VII	238.617	Mn VII	240.607[C]	Mn XIII
233.234	Fe XIII	235.694	Mo VII	238.675	Mn XIII	240.688	Co XVI
233.26	Cr XI	235.694	Mo VII	238.699	Ni XVI	240.713	Fe XIII
233.308	Fe VII	235.72	V IX	238.708	Fe XV	240.719	V V
233.453	Mo VII	235.74	Cr XI	238.72	Fe X	240.76	Cr XI
233.46	Fe XV	235.776	Ni XVI	238.737	Mo XIII	240.81	Fe XV
233.47	V VII	235.800[C]	Fe XIV	238.82	Ni XXV	240.858	Co XVI
233.510[C]	Mo VII	235.802	Mo XI	238.890[C]	Fe XIV	240.90	Ni XVII
233.62[C]	Ti XII	235.836[L]	Ti VI	238.892	V XI	240.933	V V
233.684	Mo XI	235.847	Mo XII	238.929	Fe VII	240.958	Mo IX
233.759[S]	Ni XVIII	235.850	Mo IX	239.017	Mo X	241.047	Mo VI
233.762	Fe VII	235.900	Mo VI	239.03[C]	Cr XIV	241.066	Fe XV
233.767	Mn XIII	235.941	Ni XVII	239.03[C]	Cr XIV	241.10	Mn XIV
233.767	Mn XIII	235.95	Kr XXIX	239.05[C]	Co XXII	241.157	Co XVI
233.780	Mo XI	235.965[C]	Co XVI	239.055	Ni XVI	241.193[C]	V XI
233.80	Cr X	236.01	V VIII	239.082[C]	Fe XV	241.228	Mo XI
233.807	Co XV	236.11	Co XIV	239.121	Mo XI	241.25	Cu XX
233.865	Fe XV	236.12[C]	Cr XIX	239.185	Mo VI	241.289[C]	Fe XV
233.91[C]	Mn XX	236.180	Fe VII	239.23[C]	Cr XIV	241.37	Kr XXVII
233.957	Mo X	236.218	Mn VIII	239.231	Fe XIV	241.384[C]	Mn XIII
234.152[S]	Ni XXVI	236.334[S]	Ni XVIII	239.253	Mo XI	241.393	Cr VII
234.18	Kr XXVII	236.492	Mo X	239.255	Mn XIII	241.41[C]	Cr XIV
234.192	Mo VI	236.723	Mn XIII	239.33	Co XIV	241.467	Fe VII
234.199	Cu XVIII	236.778	Fe VII	239.365[C]	V XI	241.49[C]	Cr XIV
234.228	Mo IX	236.798[C]	Co XVII	239.37[C]	Fe XXII	241.609	Mo XIV
234.235	Mn XIII	236.872	Fe VII	239.376	Co XV	241.64[C]	Mn XX
234.314	Mo VIII	236.88	V XI	239.381	Mn VII	241.67[C]	Cr XIV
234.337	Fe VII	237.020	Mo VII	239.407	V V	241.671	Co XV
234.356	Fe X	237.023	Mo X	239.411	Mo VI	241.739	Fe IX
234.385	Co XV	237.215	Mo VIII	239.462	Cu XVII	241.84[C]	V XXII
234.415	Mo XIII	237.24	Cr XI	239.485	V V	241.844	Mo VI

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
241.853	Fe VII	245.153	Mo VI	248.391	Mo IX	251.949	Co XV
241.87	Cr XI	245.276	Mo VIII	248.41	Mn XIV	251.949	Ni XVII
241.91	V VII	245.35	V X	248.41^{C}	Cr X	251.953	Fe XIII
241.966	Mo VI	245.40	Cu XXI	248.42^{C}	Cr XVIII	251.954	Cu XVI
241.969	Mo X	245.431	Cr VII	248.63	Mn XIV	251.97^{C}	V XIII
242.066	Mn XIII	245.469	Cr XII	248.69^{C}	V IX	252.00^{C}	V XIII
242.07	Fe XXI	245.469	Cr XII	248.73^{C}	Fe XXII	252.001	Kr XXXI
242.100	Fe XV	245.488	Fe VII	248.743	Fe VII	252.077	Mo IX
242.20^{C}	Cr X	245.602	Mo X	248.803^{C}	Fe XIV	252.162	Ti VII
242.211	Mo IX	245.65	Ni XIX	248.87	Mn XIV	252.17	V X
242.246	Mo VI	245.650	Ni XIV	248.91	V IX	252.188	Fe XIV
242.25	Kr XXVII	245.671	Ni XVI	248.996^{L}	Ni XVI	252.20^{C}	Co XXII
242.258	Mo X	245.70	Cr XI	249.189	Ni XVII	252.275	Ti VII
242.284	Fe VII	245.739	Mn VII	249.24^{C}	Ti XVI	252.276	Cr XII
242.30	Cu XXI	245.817	Mo XI	249.306	Mo XIII	252.294	Mo VI
242.354^{C}	Fe XIV	245.87	Cr XII	249.336^{C}	Fe XV	252.30^{C}	V XVIII
242.36^{C}	Fe X	245.97^{C}	Ti XII	249.35^{C}	V XIII	252.418	Mo IX
242.390	Mo XI	246.000	Fe VII	249.374	Cr XII	252.440	V V
242.461	Cr VII	246.14	Mn XIV	249.467	Cu XVIII	252.515^{C}	Mn XIII
242.548^{S}	Kr XXV	246.2^{C}	Ti XVIII	249.572	Cr XII	252.571	Ti VII
242.56	Kr XXIV	246.20^{C}	Ti XII	249.627	Fe XIV	252.638	Mo IX
242.579	Cr VII	246.20^{C}	Ti XII	249.641^{C}	Ti X	252.71^{C}	Co XXII
242.620	Fe XV	246.208	Fe XIII	249.66	Mn XIV	252.74	Cu XXI
242.646	Mn XIV	246.27	Cr XII	249.668	Mo X	252.75	Cr X
242.817	Mo IX	246.499	Mo IX	249.769	Mo IX	252.760	Mn VII
242.825^{C}	Ti IX	246.5^{C}	Ni XVIII	249.80^{C}	Co XXIV	252.819	Mo XII
242.85	Kr XXVII	246.548	Co XV	249.834^{S}	Co XVII	252.837	Cr VII
242.953	Cr VII	246.599	Cr VII	249.906	Mo IX	252.838	V V
243.006	Mo VIII	246.633	Mn XIV	250.112	Mo XII	252.89^{C}	Ti XII
243.025^{C}	Cr XII	246.713	Mo VI	250.127	Mn VII	252.936	Mo IX
243.071	Mo X	246.718	Mo IX	250.224	Co XVI	252.958	Ti V
243.235	Fe XV	246.859	Fe VII	250.28^{C}	Cr XI	252.981	Cu XVIII
243.362^{C}	Cr XII	246.86	V XII	250.311	Cr VII	252.983	Cr XIII
243.379	Fe VII	246.91^{C}	Ni XXIII	250.33	Mn XIV	252.985	Mn VII
243.46	Mn XIV	246.924	Mo X	250.39	Ni XIX	253.07	Ti XII
243.487	Mo VI	246.943	Fe VII	250.39	Ni XIX	253.155^{C}	Ni XVI
243.545^{C}	Fe XIV	246.97^{C}	Cr X	250.429	Cu XIV	253.168	Cr XII
243.58	V IX	246.973	Mo VIII	250.45	Mn XIV	253.17	Fe XXII
243.69	Mn XXI	246.991	Cu XVIII	250.48^{L}	Cu XXI	253.19^{C}	Ti XII
243.69	V VIII	247.00	Cu XX	250.482	Ti VI	253.19^{C}	Ti XII
243.705	Fe VII	247.065	Cr XII	250.53	V X	253.2^{C}	Mn XV
243.772	Mo VI	247.09^{C}	Fe XXI	250.6^{C}	Ni XVI	253.21	V X
243.794	Fe XV	247.098	Fe VII	250.65^{C}	V XIII	253.21	V IX
243.93	Mn XIV	247.19	Fe XXII	250.912	Mo IX	253.219^{C}	Ni XVI
243.983	Mo XIII	247.199	Co XVI	250.913	Ti VII	253.239	Co XV
244.030	Fe VII	247.304	Mo IX	250.969	Mn VII	253.326	Co XV
244.098	Fe VII	247.441	Mo X	251.061^{S}	Fe XVI	253.457	Mo VIII
244.10^{C}	Cr X	247.450	Ti VI	251.071	Ti VI	253.492^{C}	Ti IX
244.14^{C}	Cr X	247.458	Fe VII	251.085	Mo VIII	253.654	Mn VII
244.19^{C}	Cr X	247.473	Mn VII	251.088	Ni XVI	253.681	Ni XIV
244.2^{C}	Ni XVIII	247.540^{S}	Co XVII	251.124	Cr VII	253.731	Mo X
244.233^{S}	Co XXV	247.65^{C}	Co XXVI	251.223	Cr XII	253.770	Mo VI
244.274	Co XV	247.65^{C}	Fe XXII	251.250	Mo XI	253.811	Ti VII
244.46	V IX	247.67	Cr X	251.30	Ni XIX	254.022	Ti VII
244.480	Co XV	247.70	V IX	251.351	Mo XI	254.10	Ni XIX
244.541	Fe VII	247.740	Co XV	251.361	Mn XIV	254.10	Ni XIX
244.565	Cr VII	247.92^{C}	V IX	251.405	Mo IX	254.139	Ni XVI
244.7^{C}	Ni XVIII	248.037	Ti VII	251.530	Mo X	254.15	Cr X
244.708	Cr XII	248.060	Mo VI	251.578	Cr XII	254.17	V IX
244.766	Mn VII	248.07	Kr XXIV	251.609	Ni XVI	254.177	Cr VII
244.89	V IX	248.117	Fe XIV	251.655	V V	254.2^{C}	Mn XV
244.911	Fe IX	248.125^{C}	Fe XIV	251.725	Mo XI	254.201	Mo X
244.935	Mn VII	248.134	Mo XI	251.744	Cr XII	254.474	Mo X
244.959	Mo X	248.282	Mo X	251.82	V IX	254.48	Fe XVII
245.153	Fe VII	248.36^{L}	Fe XVI	251.83^{C}	V XIII	254.517	Mn VII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
254.628	Ni XVI	257.503	Mo IX	261.247	Cu XVI	265.324	V XI
254.687	Ti VII	257.597	Mo VIII	261.274	Fe XIV	265.36[C]	V IX
254.702	Mo IX	257.676	Cr VII	261.359	Cr XIII	265.36[L]	Ni XX
254.75	Fe XVII	257.842	Ni XVI	261.450	Fe XIV	265.597	Mo X
254.768	Cr XII	257.854	Mo X	261.494	Ti X	265.649[C]	Ni XVI
254.798[C]	Ni XVI	257.855	Ti VI	261.544	Mo XIV	265.697	Fe VII
254.821	Mo X	257.993	Mo XIV	261.552[C]	Ti VIII	265.70	V X
254.851	Ni XVII	258.049[C]	Cr XII	261.557	Mo X	265.72	Cu XX
255.076	Ti VII	258.088	Fe XV	261.598	Cr VII	265.729	Co XVI
255.113	Co XV	258.10	Mn XIV	261.725	Ti VIII	265.83	Mn XIII
255.113	Fe XXIV	258.18	Cu XX	261.820	Cu XVIII	265.860	Mo IX
255.156	Mo X	258.227	Fe XIV	261.851	Ti VII	265.951	Ti VII
255.164	Ni XVI	258.24	Ti XII	261.890[C]	Ti X	265.988	V XI
255.210	Cr VII	258.28	V X	261.95	Cr XIII	265.990	Co XV
255.24	V X	258.36[C]	V XVII	262.04	V X	266.062	Ni XVII
255.25[C]	Ti XII	258.410	Mo XI	262.087	Cu XVIII	266.1[C]	Ni XXIV
255.279[C]	Mn XIII	258.48[C]	Cr XX	262.103	Mo IX	266.172	Cr VII
255.355	Mo X	258.610	Ti VIII	262.12	Cu XXI	266.181	Mn VIII
255.36	Mn XIV	258.610	Ti VIII	262.249	Co XV	266.19	Ni XX
255.365[C]	Cr XII	258.87[C]	V XIII	262.36	Cr XIII	266.202	V XI
255.375	Ti VI	258.89[C]	V XIII	262.413	Mo IX	266.258	Cu XVIII
255.443	Mo VI	258.95[T]	Mn XXI	262.7[C]	Mn XV	266.365	Mo XI
255.447	Cr VII	259.07[C]	V XIII	262.718	Ti VIII	266.37[C]	Mn XXII
255.456	Cr XII	259.181	Cr VII	262.894	Mo IX	266.377	Fe XV
255.50	V XII	259.232	Ti VI	262.976[S]	Fe XVI	266.41	Cr XII
255.54	V X	259.292[S]	Ti XX	263.246	Ti VI	266.416	Co XV
255.54	V X	259.33	Mn XII	263.363[C]	Ni XVI	266.429[C]	Mn XIII
255.545	Cr VII	259.360	Cr VII	263.39[C]	Mn XXI	266.43	Fe XVII
255.741	Ni XVI	259.38[C]	V XIII	263.41	Co XIII	266.502	Ti VII
255.762[T]	Co XV	259.432	Cr VII	263.507[C]	V XI	266.583[C]	Mn XIII
255.828	Co XV	259.467[C]	Cr XII	263.564	Ti VIII	266.61[C]	Fe XVI
255.852	Co XV	259.47	Ni XX	263.579	Ni XVII	266.656	V XI
256.015	Mo XI	259.569	Mo IX	263.58[C]	V IX	266.72[C]	Ti XII
256.202	Cu XVIII	259.6	Fe XVII	263.685	Fe XV	266.762	V XI
256.21[C]	Ti XII	259.6[C]	Fe XXI	263.70	Fe XIV	266.913[S]	Mn XXIII
256.21[C]	Ti XII	259.60	Cu XXI	263.765	Fe XXIII	266.97[C]	Fe XVI
256.32	Cr XI	259.636	Cr VII	263.88	Cu XXI	267.01[C]	Fe XVI
256.370	Cr XII	259.66	Cr XIII	263.944	Ti VII	267.085	Mo X
256.38	Fe X	259.667	Mo IX	264.028[C]	V XI	267.136	Ti VII
256.40[C]	Mn XX	259.742[C]	Ni XVI	264.043	Mo XIV	267.303	Fe XV
256.42	Fe XIII	259.77[C]	V XIII	264.078	Cr VI	267.343	Ti VI
256.45[C]	Ti XII	259.807	Kr XXX	264.126	Mo XIV	267.401	Ti VIII
256.497	Mn XIII	259.857	Cu XVI	264.151	Mo VI	267.468	Ni XIII
256.566[C]	Ni XVI	259.857	Cu XVIII	264.26	Mn XII	267.54[C]	Cr XIX
256.612	Cu XVIII	259.898	Mo X	264.306[C]	Fe XVII	267.64[C]	V IX
256.749	Mo XI	259.950[C]	Mn XIII	264.403	Mo X	267.658	V XI
256.841[C]	Mn XIII	259.97	Cr XXI	264.512	Mo X	267.66	Mn XIII
256.86	Co XVI	260.11[C]	Ti XXI	264.6[C]	Kr XXXV	267.74	Cr XIII
256.989	Mo X	260.13	Cr XII	264.71	Mn XIV	267.896	Mo X
257.112	Cr XII	260.142	Ti X	264.729	Co XV	267.93[C]	Mn XX
257.127	Fe XV	260.429	Cr XII	264.73	Cr XIII	267.93[C]	Ti XII
257.178[C]	Fe XIV	260.45	Mn XIV	264.732	Cr VI	267.93[C]	Ti XII
257.202	Mo IX	260.501	Mo XIV	264.785	Fe XIV	267.941	Ti IX
257.234	Mn XIII	260.510[C]	Ti X	264.8[C]	Mn XV	267.95	Cr XIII
257.24	Mn XIV	260.52	Ni XX	264.823	Ti VII	268.035	Ti VII
257.24	Mn XIV	260.704	Ti VII	264.997	Ti VII	268.106	Ti VII
257.262	Fe X	260.77[P]	Mn XX	265.003[S]	Fe XVI	268.13	Ti XI
257.282	Cr XII	260.777	Mo X	265.042	Cr XIII	268.178	Ti VIII
257.377	Fe XIV	260.78[C]	V XIII	265.059	Ti VII	268.38	Cr XIII
257.384	Fe XV	260.792	Mo IX	265.096	Mo VII	268.402	Mo X
257.418	Mo XI	260.825[C]	Ti VIII	265.1[C]	Mn XV	268.424	Co XV
257.422	Cr VII	260.916	Ti IX	265.11[C]	V IX	268.493	Ti VII
257.43[C]	Ti XII	260.923	Mo XIII	265.145	Cu XVIII	268.647	Cu XVII
257.464	Cu XVIII	260.926[C]	Mn XIII	265.157	Mo X	268.702	Ni XVII
257.50	Cu XXI	261.027[C]	Ti XI	265.196	V XI	268.771	Mo X

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
268.771	Mo IX	271.572	Mo IX	275.330[C]	Co XVII	278.55[C]	Co XXI
268.79[C]	V IX	271.572	V XI	275.353[C]	Ni XVII	278.68[C]	Fe XVI
268.81[C]	Cr XIII	271.591	Ti VIII	275.361	Co XV	278.713	Ti IX
268.852	Cr VII	271.638	Ni XVI	275.448[C]	V XI	278.806	Ti VIII
269.038	Cr VII	271.72	Cr XX	275.55	Ni XX	278.824	V XI
269.05[C]	Ni XV	271.773	V XI	275.563	Cr VII	278.86	Cr XIII
269.070[C]	Ni XVII	271.820[C]	Cr XII	275.572	Mo XI	278.936[C]	Cr XII
269.118[L]	Ni XVI	271.83[C]	Co XV	275.6	Fe XVII	279.03	Ti XII
269.189[S]	Mn XV	272.037	Ti VIII	275.635	Cr VII	279.03[C]	Mo XLII
269.294	Mo VIII	272.1	Fe XIV	275.71	Mn XIV	279.074	Ti IX
269.32[C]	Mn XXI	272.10	Ni XIX	275.756	Cr VII	279.1	Fe XVII
269.352	Mo VIII	272.120	Cu XVIII	275.77	Cr XIII	279.12	Ni XVII
269.357[C]	Fe XIV	272.154	Mn XIII	275.78	Mn XII	279.154	Cr VI
269.397	Cr VII	272.159	Co XV	275.792	Cr VII	279.163	Ni XVII
269.41	Fe XVII	272.30	Cu XVIII	275.813	Cu XVIII	279.40	Cu XX
269.411	Cr XIII	272.30	Cu XX	275.851	Mo VI	279.40	Cu XXI
269.417	Ni XVII	272.332	V XI	275.867	Ti IX	279.477	Mo VIII
269.47	Cr XIII	272.36	Cr XII	275.869	V XI	279.48	Cr XIII
269.533	Ti VIII	272.369	Ti VIII	275.926	Cr VII	279.516	Ti VII
269.614[C]	Co XVII	272.389	Co XV	276.00	Cr XIII	279.739[S]	Cr XXII
269.645[L]	Ni XVI	272.54	Kr XXIV	276.032	Mo IX	279.778	V XI
269.687[C]	Co XVII	272.543	Mo IX	276.08	V IX	279.8	Kr XXXV
269.690	Co XV	272.568	V XI	276.131	Mn XIV	279.84	Cr XIII
269.718	V XI	272.61	Cr XIII	276.191	Cr XII	279.90	Mn XIII
269.759	Ti VII	272.70	Fe XV	276.213	Mo VI	279.940	Ti VIII
269.776	Cr VI	272.740	V XI	276.364[C]	Fe XI	280.02[C]	V XIII
269.78[C]	Mo XLI	272.843	Ti VIII	276.44	Cr XIII	280.10[C]	V XIII
269.82	Mn XII	272.855	Co XV	276.517	Mo VI	280.133	Mo IX
269.828	V XI	273.000	Fe XIV	276.541	V XI	280.141	Ti IX
269.88	Fe XVII	273.093	Ni XVII	276.701	Ti VIII	280.143	Cr VI
269.906[C]	Co XVII	273.10	Ni XX	276.785	Ti IX	280.20	Fe XVII
269.926	Fe XIV	273.116	Co XV	276.818	Cr XII	280.20	Fe XVII
270.251	V XI	273.178	Ti VIII	276.821	Cu XVI	280.25[C]	V XIII
270.262	Mo IX	273.215	V XII	276.932[C]	Co XVII	280.253	Mo X
270.295[C]	Ni XVII	273.23	Cr XII	276.963	V XI	280.269	Mo X
270.316	Cu XVIII	273.23	Cr XIII	276.978	Mo IX	280.411[S]	Mn XV
270.35[C]	Ti XVI	273.269	Cr VII	277.02[C]	Mn XIX	280.466	Mo X
270.363	Fe VII	273.354[S]	Cu XIX	277.09	Mn XIII	280.488[C]	V XI
270.378	Co XV	273.48	Cr XII	277.103	Mo XI	280.571	Cr VII
270.38	V IX	273.511	Mo VI	277.11	Mn XIV	280.572	Cr XI
270.413	Mo X	273.538	Fe XIV	277.145[C]	Ni XVII	280.739	Fe XIV
270.431[C]	Ti XVII	273.74	Cr XIII	277.168	Mo X	280.823	Cr VII
270.497	Mo XI	273.741	Co XV	277.347	Mo IX	280.87[C]	V XVIII
270.511	Fe XIV	273.888	V XI	277.38	Ni XX	280.879	Cr VI
270.52	Fe XXI	273.898	Mo VI	277.469	Mn XIII	281.07	Mn XIII
270.530	Ti VIII	273.952	Cr VII	277.593	Mo X	281.09	V XII
270.707	Mo X	274.01	Cu XVIII	277.6[C]	Ni XXV	281.11	Fe XVII
270.748	Ti VII	274.08	Ni XVII	277.775	Ni XV	281.33[C]	Cr XIX
270.765	Fe XIV	274.203	Fe XIV	277.778	V XI	281.344	Mo VI
270.897	Cr VII	274.27[C]	Ti XVII	277.778	V XI	281.446	Ti IX
270.954	Mo X	274.303[C]	Cr XII	277.79[C]	Co XXIII	281.468	Ni XVII
271.057	Co XVI	274.34	Cr XIII	277.80	Mn XXII	281.472[C]	Mn XVI
271.070	Cr VII	274.351	V XI	277.813	Ti VIII	281.485	V XI
271.088	Mo VI	274.376[C]	Ni XVII	277.914	Mo IX	281.62	V XX
271.11	Ni XX	274.411	Ti IX	277.964	Co XV	281.635	Fe XIV
271.12[C]	Fe XXV	274.546[C]	Mn XIII	278.019	Mo IX	281.668	V XI
271.126	Co XV	274.725[C]	Co XVII	278.148[C]	Cr XII	281.67[L]	Cr XIV
271.16	Co XIII	274.743	Mo X	278.18[C]	Cr XIX	281.82[C]	Fe XVI
271.22[C]	V X	274.779	Cu XVIII	278.19[C]	V XIII	281.898	Ti VII
271.267	Co XV	274.797	Fe XIV	278.19[C]	V XIII	281.902	Co XVI
271.27	Fe XV	274.883	V XI	278.386	Ni XV	281.905[C]	Cr XII
271.404[C]	Fe XIV	274.885	Mo IX	278.40[C]	V XIII	282.03[C]	Cr XX
271.41[C]	Mn XXII	274.967	Ni XVII	278.411[C]	V XI	282.038	Cu XIV
271.437	Co XVI	275.1[C]	V XIX	278.458	Mo VII	282.184[S]	Mn XV
271.464[C]	Mn XVI	275.305	Mo XI	278.485	Mo X	282.215	Ti VI

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
282.230	Fe XIV	286.8395	V V	290.36[P]	Mn XX	295.251	V XI
282.444	Mn XIV	286.998[C]	Mn XVI	290.443	Mo VI	295.321	Ni XII
282.613	Ti IX	287.003[C]	Cr XII	290.45[C]	V XVIII	295.366	Mo XIV
282.728	Mo XI	287.09	Cu XX	290.528	Ti X	295.405	V XII
282.728	Mo IX	287.156	Co XV	290.539	Mn XIII	295.518	Co XV
282.84	Cr XIII	287.19[C]	Cr XIV	290.574	Ni XIII	295.55[C]	Ni XIV
282.880	V XII	287.2	Ti X	290.63	V XII	295.556	Ti X
282.898	Ti VII	287.291	Mo IX	290.747	Fe XIV	295.668[C]	Ti X
283.122	Ni XVII	287.417	Mo X	290.91[C]	Cr XXI	295.841	V XII
283.167	Mo VIII	287.440	V VI	290.93	Ti X	295.910	Mo VIII
283.169	Mo IX	287.537	Mo IX	290.971	Ti VIII	295.92[C]	Ti XVII
283.19[C]	Ti XVII	287.564	Co XV	291.010	Fe XII	295.934	V XI
283.20[C]	Cu XXVIII	287.564	Co XVI	291.037	Ti X	295.993[C]	Fe XIV
283.24	Mn XIII	287.62[C]	Cr XX	291.32[C]	Ti XII	296.040	Ti X
283.30	Ni XIX	287.756	Mo XI	291.450	Mo VI	296.056	Ti VII
283.30	V XII	287.859	Fe XIV	291.492	Fe XIV	296.07	Cu XX
283.403	Mo VI	288.003	Mn XVI	291.576	Mo X	296.072[C]	Ti VIII
283.586	Ti VI	288.145[C]	Kr VIII	291.60	V XII	296.073	Mn XIII
283.64	Fe XII	288.149	Ni XVI	291.652	Fe XIV	296.184[C]	Co XVI
283.64	V XII	288.18	Cr XII	291.697	Ni XVII	296.28	V XII
283.795	Fe XIV	288.279	Mo VI	291.705	Cu XVI	296.280[C]	Ti IX
283.984	Mn XIII	288.355	Ti VI	291.735	Co XVI	296.3	Fe XVII
284.01	Fe XVII	288.44	Cr XII	291.738	Cr VII	296.339	Ti X
284.07[C]	Mo XLII	288.512	Fe XIV	291.913[C]	Ni XVII	296.6	Cu XV
284.075	V V	288.585[C]	Kr VIII	291.920	Mo VI	296.62[C]	Ti XII
284.164	Fe XV	288.65	V XII	291.938	Ti X	296.634[C]	V XI
284.35	Cr XII	288.650[C]	Ti X	291.985	Ni XVIII	296.66	Co XIV
284.357[C]	Fe XVII	288.684	Kr VIII	292.036	Fe XIV	296.677	Mo VI
284.434	Co XVI	288.838	Mo VIII	292.275	Fe XV	296.677	Mo VI
284.494	V V	288.878[C]	Fe XIV	292.399	Ni XIV	296.724	V V
284.581	V V	288.887	Mo VI	292.46	Fe XXII	296.728	V XII
284.627	Fe XIV	288.894	Ni XIV	292.5[C]	Ti XVIII	296.743	Mo VI
284.70	Cu XX	288.921	Mo VI	292.644	Mo VII	296.75[C]	Ti XII
284.752	Mn XIV	288.94	Cu XX	292.748	Mo X	296.786	Mo VIII
284.988	Cr XI	288.94	Fe XVII	292.77[C]	Ti XII	296.83[C]	Mn XXIV
285.08	Ti XIII	289.123	Fe XIV	292.943	Mo VIII	296.89	Cr XIII
285.128	Ti IX	289.140	Mo IX	293.15	Cr XXI	296.95[C]	Ti XII
285.317	Co XV	289.175	Co XV	293.268	Mn XIII	297.055	Ti XI
285.346	Mo IX	289.22	V XII	293.270	Mn XVI	297.077	Kr VIII
285.375	Cr XV	289.255	Mo X	293.321	Fe XIV	297.138	Ti X
285.4[C]	V XIX	289.285[C]	Mn XIII	293.336[C]	Ti X	297.197	Ti VIII
285.477	Fe XIV	289.375	Ti VIII	293.374	Mo XIV	297.22	V XII
285.492	Mn XIV	289.495	Mo X	293.44	Co XVI	297.23	Ni XX
285.534	Mo X	289.520[C]	Fe XIV	293.448[C]	V XI	297.276	V V
285.619	Ni XVII	289.56	Mn XIV	293.58	Cu XXI	297.631	Cr XIII
285.698	Fe XIV	289.576	Ti X	293.581	Mn XIII	297.698	Mn XVI
285.755[C]	Fe XVII	289.577[C]	V XII	293.627	Mo VI	297.698	Mn XVI
285.77	Co XVI	289.579	Ti IX	293.643[C]	Ti X	297.73	V XII
285.877	Fe XIV	289.697	Fe XIV	293.662	Mo VI	297.73	V XII
285.88[C]	Ni XIV	289.742[S]	Cr XIV	293.665	Ti X	297.89[C]	Cr XIV
285.933	Mo X	289.743	Ni XVII	293.721[C]	Co XVI	297.897[C]	V XI
285.9791	V V	289.774	Mn XIII	293.74[S]	V XXI	297.90	Ni XIX
286.05	V XII	289.85	V XII	293.956	Ti X	297.918	Mo VIII
286.112	Ti IX	289.977	Fe XIV	294.139	Mo VI	297.972	Ti X
286.13	Cr XII	290.004	Ni XVII	294.185	Co XVI	298.037	Co XVI
286.287	V XII	290.108	Mo IX	294.271	Mo X	298.059	Cr XI
286.30[C]	Cr XIV	290.114	Mn XIII	294.328	Ti X	298.11	Cr XV
286.302	Mo VI	290.18	Cr XV	294.412[C]	V XI	298.11	Cr XV
286.49[C]	Cr XXI	290.21	V XII	294.526	Mo VIII	298.15	Ni XV
286.490	V V	290.226	Ti X	294.575[C]	Co XVI	298.162	Cu XVI
286.6	Ti X	290.232	Ni XVII	294.655[C]	Cr XII	298.242	Mo XI
286.64	Co XII	290.239	Cu XVII	294.758	Cr XII	298.30	Co XVI
286.670	Mo VIII	290.239	Fe XV	294.90[C]	Co XXIV	298.303	Ti X
286.70[C]	Mn XXII	290.31	V XII	294.985	Mn XIII	298.42	Co XIV
286.748	Mo X	290.323	Cr XI	295.141[C]	Ti VIII	298.42	Ni XIX

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
298.444	Co XVI	302.844	Ni XIII	307.300	Co XVI	311.587	Cr XII
298.64	Cr XII	302.86^{C}	Ti XII	307.35	Cr XII	311.639	Mn XIV
298.648	Mn XVI	302.86^{C}	Ti XII	307.403	Fe XIV	311.67^{C}	Fe XVI
298.649	Ti X	302.9^{C}	Mn XV	307.467	Mo X	311.676	V XIV
298.839	Mo XI	302.94	Co XVI	307.73	Fe XIV	311.71^{C}	Cr XIX
298.853	Cr XIII	303.066	Mo X	307.730	Fe XV	311.748	Mn VI
298.960	V XI	303.148	Mo IX	307.739	Mo VI	311.756	Ni XV
298.968	Mo VI	303.150	Mo VI	307.842	Mn VI	311.8^{C}	V XX
299.081	Mo X	303.17	Mn XIII	307.89^{C}	Co XXII	311.875^{C}	Cr XII
299.122	Mo X	303.2^{C}	Mn XV	307.90	Ni XIX	312.03^{C}	Ni XV
299.13	Ti X	303.355^{C}	Fe XIII	307.996	Ti XI	312.090	Mo VII
299.223	Ti X	303.549^{S}	Cu XIX	307.999	Mn VI	312.164	Fe XIII
299.500^{C}	Fe XIV	303.573	Fe XIV	308.049	Ni XIII	312.22^{C}	Fe XVI
299.505	Mo X	303.75	Cr XII	308.07^{C}	Co XIII	312.261	V XI
299.548	V XI	303.80	Ni XIX	308.24	Ti XI	312.394	V V
299.840	Ti X	303.853	Mo VI	308.3^{C}	V XX	312.556	Fe XV
300.11^{L}	Mn XIII	303.960	Cr XIII	308.32^{C}	Ti XII	312.559^{S}	Co XVII
300.120	Cr XII	304.03^{C}	V XVIII	308.53	Ti XI	312.66	Ni XX
300.13^{C}	Cr XIV	304.211	V XIV	308.542	Ni XIII	312.692	Mn VI
300.287^{S}	Cr XIV	304.233	Ti X	308.544	Fe XI	312.722	Mo VII
300.30	Cr XV	304.3^{C}	Ni XVI	308.560	Mn VI	312.782	V XI
300.33^{C}	Cr XIV	304.303	Mo VI	308.568	Ti IX	312.802	Mn XIII
300.417	Cu XVIII	304.436^{C}	Ni XVI	308.599^{C}	Co XVI	312.949	Cr XII
300.488	Mo VII	304.498	Ti IX	308.770	Mo VII	312.949	Cr XII
300.746	Mo X	304.81^{C}	Fe XVI	308.853	Mn VI	313.04^{C}	Ti XVI
301.0^{C}	V XIX	304.84	Mn XIV	308.895	Cr XV	313.19^{C}	Fe XXIII
301.028	Ti X	304.867	Ti X	308.895	Mn XIII	313.213^{C}	Ni XVI
301.170	Mo XII	304.894	Fe XV	308.903	V X	313.22	Ti XI
301.180^{C}	V XI	304.93	Fe XVII	308.922^{C}	Mn XIII	313.22^{C}	Ni XXVII
301.19	Cr XII	304.974	V X	308.998	Fe XIV	313.234	Fe IX
301.254	Ti X	304.990^{C}	Ti XVII	309.099^{S}	Ti XX	313.305^{S}	V XIII
301.283	V X	304.995^{C}	Fe XV	309.196	Ni XVI	313.319	Cr XV
301.286^{C}	Fe XIV	305.01	Ti XIX	309.26	Fe XX	313.337	Mn XIII
301.297	Ti VIII	305.09^{C}	Fe XVI	309.440	Mn VI	313.34	Mn XIII
301.4^{C}	Ti XVIII	305.149	Mo VII	309.52^{C}	Mn XVIII	313.376	V V
301.45	V XII	305.15	Fe XV	309.579	Mn VI	313.432	Mo VII
301.46^{T}	V XII	305.205	Cr XV	309.680^{C}	Ni XVI	313.69	Ti XI
301.487	Mo VI	305.37^{C}	Fe XVI	309.849	Co XV	313.724	Ni XVI
301.513	Mn XVI	305.429^{C}	Ti X	309.85	Co XVI	313.777	Mn XI
301.525	Mn XIII	305.44	Cu XXI	309.857	Mn XIII	313.801	Mn XIII
301.589^{C}	Ti X	305.544	Mo VI	310.0^{C}	V XX	313.91	Co XIII
301.604	V V	305.634	Mo IX	310.016	Ni XVI	313.92	Kr VII
301.680	V XII	305.730	Ti VII	310.058	Mn VI	313.950	Mo VI
301.680	V XII	305.816	Cr XII	310.182	Mn VI	313.985^{C}	Ti XI
301.763^{C}	Ni XVI	305.83	Cr XV	310.324	Co XVI	313.990	V X
301.819^{S}	Cr XIV	305.84	Cr XII	310.324	Co XVI	313.993	V V
301.913	Ti VI	305.87^{T}	Cr XIII	310.547	Mn XI	314.049	Mo X
301.939	Mo IX	305.940^{C}	Fe XV	310.55	Cr XIII	314.12^{C}	Fe XVI
302.024	Ti X	305.945^{C}	V XI	310.67	Co XIII	314.19	Co XII
302.024	Ti X	306.14	Ti XI	310.68	Mn XIII	314.379	Mo VIII
302.080	V XII	306.182	Mo IX	310.747^{C}	V XI	314.446	Mo IX
302.080	V XII	306.30	Ni XIX	310.774	Mo X	314.656	Mo VII
302.264	Ni XIV	306.448	Cr XIII	310.807	Mo VII	314.805	Ti XI
302.272	Ti VIII	306.458	Mn XI	310.85	Ti XI	314.961	Mo VI
302.334	Fe XV	306.59^{C}	Mn XX	310.908	Mn VI	314.979^{T}	Mn VI
302.406	Cu XIV	306.637	Mo XI	310.908	Mn VI	314.99	Fe XV
302.406	Cu XVIII	306.71^{C}	Ti XII	310.908	Mn VI	315.01	Ni XIX
302.500^{C}	V XI	306.758	Ti X	311.144	Ti XI	315.1^{C}	Mn XV
302.509^{C}	Mn XVI	306.79^{C}	Cr XXI	311.209	Mo X	315.162	Mo X
302.519^{C}	Ti X	306.8^{C}	V XIX	311.236^{C}	Mn XIII	315.300	Mo VII
302.52^{C}	Ti XII	307.109	Mn VI	311.26	Kr VII	315.341^{C}	Fe XV
302.56	Cu XXI	307.15^{C}	Ti XII	311.312^{C}	Mn XIII	315.458	Mo XI
302.584^{C}	Ni XVI	307.166	Mo VIII	311.53	Cu XX	315.51	Cr XV
302.659	Co XVI	307.202	Mo XII	311.552	Fe XIII	315.559	Fe XV
302.7^{C}	Mn XV	307.241	V XI	311.563	Fe IX	315.75	Ti XI

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
315.98	Mn XIV	320.598	Mn VI	324.975	Fe XV	328.714	Mo VI
315.998^{C}	Fe XV	320.626	V XI	324.98^{C}	Cr XXIII	328.838	Mo VII
316.113	Ni XIV	320.681	Mn VI	325.146^{T}	Mn VI	328.844^{C}	Fe XV
316.210	Mo VIII	320.800	Fe XIII	325.176	Mo VIII	328.872	Mo VI
316.23	Ti XI	320.874^{T}	Mn VI	325.177	Cr XII	328.92	Ti XI
316.466	Cr XII	320.915	V VI	325.188	Mo IX	328.954	V XII
316.466	Cr XII	320.94	Ti XII	325.22	Mn XIV	329.043	Mn VI
316.62^{C}	Co XIII	320.979	Mn VI	325.220	Mo XI	329.12^{C}	Ti XII
316.666	Mo VI	321.141^{C}	Mn XIII	325.328	Mo VI	329.12^{C}	Ti XII
316.772	Mo VII	321.176	Mn VI	325.697	V VI	329.12^{C}	Ti XII
316.79^{C}	Mn XX	321.244	Cr XV	325.70	Co XIII	329.159	Ti IX
316.811	Ni XVI	321.30	V XII	325.743	Ti X	329.177	Mn VI
316.87	Ti XI	321.425	V VI	325.9	Cr XV	329.28	Mn XII
317.006	V VI	321.455^{C}	Fe XIII	325.904^{C}	Ni XVI	329.294	Mo VII
317.043	Fe X	321.541	Mn VI	325.945	V XI	329.320	Mn VI
317.194	Fe IX	321.661	Mo VII	325.946	Mo VI	329.414	Mo XII
317.308	Mo VI	321.766	Fe X	325.946	Mo VI	329.810	V VI
317.393^{C}	Fe XV	321.766	Fe X	325.96^{C}	Ni XIV	329.832	Mo VI
317.404	Cr XV	321.771	Fe XV	325.97	Cu XXI	329.861	Mo VII
317.43	Ti XI	321.810	V VI	325.97	Ni XX	329.890	Fe IX
317.475	Ni XII	321.881	Ni XIII	326.0^{C}	Ni XXV	329.94	Fe XV
317.514	Mo VI	321.96	Ti XIII	326.12	Co XII	330.027	V VI
317.563	Cu XVIII	322.00	Ti XI	326.255	Mo X	330.247	Co XV
317.597	Fe XV	322.033	Ni XVII	326.263	Mo VII	330.25^{C}	Mn XX
317.63	Cu XX	322.158	Mo XI	326.285	Ti X	330.314	V XI
317.682	Cr XV	322.393^{T}	Ti XI	326.29	Ti XIII	330.41	Mn XIV
317.704	Mo IX	322.40	Ti XI	326.3^{P}	Mo XXIX	330.43^{L}	Mn XIII
317.709	Mo X	322.427	Mn XI	326.33^{C}	Ti XII	330.44	Cu XX
317.798	Mo VII	322.469^{C}	Ni XVI	326.33^{C}	Ti XII	330.486	V XII
317.992	Ti VIII	322.513	V XII	326.48^{C}	V XIII	330.62	Co XII
318.09	V XI	322.6	Ti XVIII	326.571	Mn VI	330.67^{C}	Mn XX
318.209^{C}	V XI	322.645	Mo VIII	326.571	Mn VI	330.703	Ti VI
318.21	Fe XIII	322.67	Ni XX	326.616	Mo VII	330.78	V XII
318.265	V VI	322.69	Ti XI	326.72^{C}	Ti XII	330.797^{C}	Ti X
318.439	Cr XV	322.690^{C}	Mn XIII	326.741	Mo XIII	330.913	V XI
318.584	Mo VI	322.698	Ti VIII	327.024	Fe XV	331.072	Mo X
318.586	Fe IX	322.96^{C}	Cr XV	327.131	Mn VI	331.083	Fe XV
318.599	Fe X	323.001	Mo VI	327.131	Mn VI	331.14^{C}	Mn XX
318.599	Fe X	323.189^{S}	V XIII	327.18	Ti XI	331.43	Mn XIII
318.6^{C}	Mn XV	323.209	V VI	327.266	Mo VII	331.444	Mo VII
318.722	Cr XII	323.219^{C}	Ti X	327.267	Cr IX	331.511	Mo VII
318.822	Mo VIII	323.221	Mo VII	327.288	Mn XI	331.623	Mo VII
318.85	Co XI	323.225	Mo VI	327.288	Mn XIV	331.65	Kr VI
319.047	Fe XV	323.365	Ti V	327.322	V VI	331.67^{C}	Ti XIX
319.063	Ni XV	323.47	Ti XI	327.39	Cr XII	331.683	Mo X
319.149	V VI	323.556	Co XV	327.55^{C}	V XIII	331.687	Cr XII
319.426	Fe IX	323.571	Ti XI	327.55^{C}	V XIV	331.689	Mo VI
319.463	Ti VIII	323.633	V XI	327.634^{C}	Ti X	331.767	Ti VI
319.473	Mo VII	323.65	Fe XVII	327.85	Mn XIV	331.812	Co XV
319.630	Mo X	323.782	Mn VIII	328.0^{C}	V XX	331.876^{C}	Cr XII
319.70	Fe XV	323.811	V X	328.043	Ti XI	332.01	Co XII
319.76	Mn XIII	323.85^{C}	V XIV	328.129	Mn VI	332.02	Cu XXI
319.933	Mo VI	323.940	Mo VIII	328.232	Mn VI	332.081	Ti VII
319.936	Fe X	324.014	V XII	328.24	Ni XIX	332.126	Cr XII
319.938	Mo VII	324.105	V VI	328.253	Ti XI	332.358	V XI
320.13	Cr XV	324.207	Ti VIII	328.267	Cr XIII	332.373	V XIV
320.134	V VI	324.35^{C}	Ni XV	328.278	Ti XIX	332.570	Mo VI
320.141	Mo VI	324.496^{S}	V XIII	328.342	V XIV	332.604	Mo VII
320.146	Mn VI	324.575	V VI	328.40	Ti XI	332.66^{T}	Co XII
320.191	Cr XII	324.638	Mo VII	328.431	Mn VI	332.673	Mo VI
320.40	Co XIII	324.65^{C}	Ni XV	328.543	Ti XI	332.83	Kr VI
320.41	Kr VII	324.712	Ti IX	328.558	Mn VI	332.83	Kr VI
320.410^{C}	Ti X	324.726	Fe X	328.577	Mo VII	332.854	Fe XV
320.416	Mo IX	324.748^{C}	Ti X	328.611	Mo VII	332.878	V VI
320.558	Ni XVIII	324.87^{L}	Ti XII	328.69	Cu XX	332.984	V VI

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
333.035	Cr X	338.264	Mo IX	342.705	Mo VII	347.404	Mn XI
333.069	Mo VII	338.309[C]	Ti VI	342.73	Cr XIII	347.55	Ti XIV
333.18[C]	Fe XII	338.392	V VI	342.78[C]	Mn XIX	347.563	Ti XIII
333.385	Ti IX	338.420	Mo VII	342.783[C]	V XIV	347.602	Mn VIII
333.62[C]	Co XV	338.504	Mo VII	342.97[C]	V XIII	347.683	Mo X
333.652	Mo VII	338.65[C]	Ni XIV	342.982	V XI	347.74[C]	Cu XXVIII
333.687	Mo VII	338.681	V XI	342.982	V XI	347.787	V XI
333.798	Mn X	338.689	Cr XII	343.007	Mo X	347.911	V VI
333.943[C]	Ti X	338.745[C]	Ti X	343.21[C]	V XIII	347.96	Fe XVII
334.002	Cu XVIII	338.80	Co XIII	343.3[C]	Ni XVI	348.024	V VI
334.03[C]	Mn XXII	338.831	Mo VI	343.43	Mn XIV	348.05	Ni XIX
334.080	Mo VI	338.899	Mo VII	343.646	V VI	348.124	Fe IX
334.14[C]	Ti XIX	338.971	V XI	343.659	Mo VII	348.135	Mo VI
334.171	Fe XIV	339.10	Mn XIV	343.715	V XIV	348.184	Fe XIII
334.21	Co XIV	339.187	V VI	343.84	Mn XIV	348.356	Cr XV
334.255	Ti X	339.23	Cr XII	343.84	Ti XIII	348.45	Kr VI
334.3	Ni XIX	339.25	Mn XIV	343.86	Co XII	348.547	Fe XIV
334.457	Ti VI	339.351	Mo VII	343.998	Mo VII	348.8[C]	Mn XV
334.52[C]	Ni XIV	339.38	Cr XII	344.093	Mo XII	349.046	Fe XI
334.64	Cr XII	339.446	Cr XI	344.493	Mn VIII	349.077	Mo XI
334.740	Co XV	339.516[S]	Co XVII	344.569	Mo X	349.128	Mo XV
334.81[C]	V XVIII	339.60	Mn XIV	344.65[C]	Co XXIV	349.2[C]	Mn XV
334.852	Co XV	339.664	Mo VII	344.723[C]	Cr XII	349.217	Mo VII
334.97	V XII	339.81	Co XI	345.03[C]	Co XXIV	349.220	Mo VI
335.017	Cr XII	339.838	Fe IX	345.113[C]	Fe XIV	349.3	Fe XXII
335.06	Fe XII	339.852	V XIV	345.40	Cr XII	349.3[C]	Mn XV
335.123	Cr VI	339.9[C]	Ni XXIV	345.405	V VI	349.365	Mo VI
335.142	Mo VII	340.114	Mn VIII	345.478	Mo VI	349.426	Mo X
335.294	Fe IX	340.12	Fe XVII	345.542	Cu XVIII	349.44	Mn XIV
335.409[S]	Fe XVI	340.181	Cr X	345.57	Cr XII	349.56[C]	Co XIII
335.449	Mo VI	340.20[C]	Fe XII	345.617	Mn VIII	349.574	Ti VI
335.516	Mo VII	340.234	Mn VIII	345.63[C]	Mn XX	349.67	Mn XIV
335.6[C]	Ni XVI	340.392	V XIV	345.723	Fe X	349.82	Ti XI
335.737	Mo VII	340.47	Fe XVII	345.882[C]	Cr XII	349.917[S]	Ti XII
335.831	V VI	340.622	V VI	345.996	Co XVI	350.58	Fe XVII
335.98	Mn XIV	340.668[S]	Ti XII	346.04	Mn XII	350.610	Ti X
335.995	Mo VII	340.7[C]	Ni XXIV	346.102	Mo VI	350.659	V VI
336.029	Ti XIII	340.77	Cu XX	346.123	V XI	350.781	V VI
336.177	V XIV	340.79[C]	V XIII	346.161[C]	V XIV	350.79[C]	Ti XIX
336.184	Cr VI	340.909	Mo XIII	346.163	Ti XIII	351.012[S]	Ti XII
336.246[C]	Cr XII	340.953	V VI	346.181[C]	Ti X	351.092	Cr X
336.308	Cr XIII	340.954	V XIV	346.189	Cr XV	351.143	Mo VII
336.459[C]	Cr XII	340.955	Mo VII	346.222	Mo VII	351.15	Cr XIII
336.520	Mo VII	341.087	Ti X	346.25	Cu XXI	351.290	Mo VI
336.580	V XI	341.109	Ti VI	346.34[C]	Co XXVI	351.356[C]	Fe XIV
336.584	Mo VII	341.113	Fe XI	346.40[C]	Mn XII	351.58	Ti XIII
336.639	Mo XII	341.150	Fe IX	346.43	Ni XIX	351.69	Fe XVII
336.639	Mo XII	341.23	Ni XVII	346.44	Cu XVIII	351.782	Ti XI
336.895	Ti IX	341.36	Cr XII	346.50	Ni XX	351.93	Kr VI
336.94[C]	Mn XII	341.390	Fe IX	346.647	Mo VII	351.944	Mo VII
336.995	Mn XI	341.400	Mo XI	346.69	Kr VI	352.028	Mo XII
337.185	Cr VI	341.494	Mo VII	346.728	Ti VI	352.072	Fe IX
337.29	Mn XII	341.524	Mo VII	346.77[C]	Cr XIV	352.107	Fe XII
337.450	Mo VI	341.691	Ti IX	346.84	Mn XIII	352.334	V XI
337.467	Co XV	341.770	Mn VIII	346.842	Mn VIII	352.541	Mo VI
337.490	Cr X	341.929	Mn XI	346.852	Fe XII	352.661	Fe XI
337.53	V XIV	342.102	Mo VII	347.0[C]	Ni XVI	352.70[C]	Mn XIX
337.674	Mo XII	342.131	Mo VII	347.01[C]	Cr XIV	352.73	Mn XIV
337.772	Cr XII	342.15[C]	Co XXIII	347.12	Mn XVI	352.736	Cr XIII
337.790[C]	V XI	342.21	Co XIV	347.17	Cr XII	352.738	Mo XII
337.946	Mo VII	342.501	Mn VIII	347.19[C]	Cr XIV	352.868	Mo XIII
338.061	Mo XII	342.58	Mn XIV	347.204[C]	Cr XII	352.994	Mo XIII
338.116	Cr XII	342.595	Ti VI	347.265	V VI	353.026	Ti X
338.205	Ni XVII	342.67	Mn XII	347.339	Mo XV	353.234	Mo VII
338.263	Fe XII	342.7	Cu XVII	347.34[C]	Co XXIII	353.421	Mo XV

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
353.483	Mo X	359.311	Ti XIII	364.468	Fe XII	369.064	V IX
353.484	Ti XI	359.342	Fe XIV	364.589	Fe X	369.09	Ti XIII
353.494	Mo VII	359.454	V VIII	364.639	V XI	369.10[C]	Mn XIX
353.773	Ni XVII	359.500	Mo XV	364.666	Mo VII	369.154	Fe XI
353.777	Mo VII	359.511	Ti XI	365.097[C]	V XI	369.22	Cr XIII
353.82	Ni XX	359.526	Ti XI	365.134	V XII	369.260	Fe IX
353.829	Fe XIV	359.63	Fe XIII	365.144	Fe X	369.37	Ti XIII
353.84	Cr XIII	359.643	Mo XIII	365.154	V VI	369.384	V XI
353.877	Ti VI	359.79[C]	Ni XV	365.169	Mn XVI	369.531	Ti XIII
353.942	Ti IX	359.8	Ti XVII	365.23[C]	Co XXIII	369.58[C]	Ni XIV
353.945	Mo VII	359.837	Fe XIII	365.333[C]	V XI	369.612	V X
354.100	Mo XV	360.003	Mo VII	365.518	V X	369.93[C]	Mn XVIII
354.29	Mn XIV	360.133	Ti X	365.543	Fe X	369.96	Ti XIII
354.474	Mo VII	360.15	Ti XIV	365.628	Ti X	370.063	Mo VII
354.594	Mo XII	360.208[C]	Fe XIV	365.63	Ni XX	370.314	V VI
354.788	Ti XIII	360.250	V VI	365.63[C]	Mn XX	370.351	Mo VII
354.824	Fe X	360.373	Mn VIII	365.659	Mo VII	370.52[C]	Ti XIII
354.892	Mo XV	360.4[C]	Mn XV	365.680	Mo XV	370.696[C]	Fe XIV
355.012	Cr VII	360.54[C]	Co XIII	365.718	Cr X	370.722	Mn VIII
355.054	Mo XV	360.56[C]	Fe XXII	365.74	Ti XIII	370.808[C]	Mn XIII
355.07	V XII	360.635	Mo VII	365.779	Mn VIII	370.936	V VI
355.1[C]	Ni XVI	360.741	V VI	365.924	Mo XV	370.959	Cr XI
355.112	Cr X	360.758[S]	Fe XVI	366.028	V XI	370.989[C]	Fe XVII
355.119	Ti X	360.827	Fe XIV	366.060	Mn XI	371.086	Cr X
355.132	Mo VII	360.833	Fe X	366.085	Cr XI	371.090	Mn VIII
355.494	V XI	360.987[S]	Mn XV	366.17	Kr VI	371.244	Mo XII
355.78[C]	V XXII	361.1	Ti XVIII	366.197	V XI	371.271	V IX
355.815	Ti X	361.15	Cr XII	366.403	V XI	371.30	Cr XIII
355.837	Fe XI	361.16	Cu XVII	366.48	Cr XIII	371.523	V VI
355.883[C]	Fe XIV	361.223	Co XVI	366.491	Cr XI	371.586	Mn VIII
355.886	Ni XVII	361.249	V XI	366.569	Ti XIII	371.695	Mn VIII
356.10	Cr XIII	361.32	Ni XIX	366.579	V XI	371.905	Mn X
356.11	Cr XII	361.409	Fe X	366.667	Fe X	371.979	Mo XI
356.232[C]	Fe XIV	361.659	Mn XIII	366.734	Mo VII	372.03[C]	Fe XIII
356.28	Cr XII	361.668[C]	Mn XI	366.77	Cr XIII	372.240[C]	Fe XIII
356.3[C]	Ni XXIV	361.956	Ti X	366.80	Ni XVII	372.702	Mo VII
356.505	Fe XIV	362.0	Kr VII	366.910	Ti XIII	372.798	Fe XV
356.519	Fe XI	362.356	V XI	366.942	Cr XI	372.833	Ni XVII
356.60	Fe XIV	362.518	Ti XIII	367.04[C]	Cr XIV	372.87[C]	Ti XIII
356.729	Mo XI	362.547	Fe X	367.126	V XI	373.17	V XII
356.76[C]	Mn XXI	362.66	Cr XIII	367.173	V VI	373.3	Ti X
356.8[C]	Co XXI	362.717	V VI	367.366	Mo VII	373.3	Ti XIV
356.80	Cr XII	362.86	Ti XIII	367.37	Fe XVII	373.41	Fe XVII
357.04[C]	Co XIII	362.87	Cr XII	367.404	V VI	373.45[C]	Cu XXVIII
357.10[C]	Mn XX	362.889	Mo XIII	367.516	V XI	373.455	Mo VII
357.12	Cr XII	363.077	Mo VII	367.526	Mo VII	373.487	Cr XV
357.14[C]	Cr XXI	363.145	Ti V	367.543	V VI	373.525	Mn XVI
357.175	Mo VII	363.153	V VI	367.61	Ti XIII	373.647	Mo XIV
357.59[C]	Mn XX	363.2	Kr VI	367.683	V VI	373.69	Ti XIII
357.824	Mo VII	363.271	Cr IX	367.813	V XI	374.031	Ti X
357.884	V XI	363.285	V VI	367.819[C]	Ti X	374.031	Ti X
357.99	Kr VI	363.40[C]	Cr XIV	367.877	Mn XI	374.2	Kr VI
358.144	V XI	363.510	Mn XI	367.89	Ti XIII	374.463	Mo VI
358.3[C]	Mn XV	363.68	Ti XI	367.98[C]	Cr XIII	374.504[C]	V XI
358.31	Mn XIV	363.764	Mo IX	367.996[C]	Fe XIV	374.605	Fe IX
358.32	Fe XVII	363.78[C]	Ni XXVII	368.10	Cr XIII	374.69	Mn XIII
358.386	Ti XI	363.91[C]	Fe XXIII	368.12	Fe XIII	374.705	V VI
358.414	Fe X	363.918	Mn XVI	368.19[C]	Cr XX	374.74	Kr VI
358.621	Fe XI	363.943	Ti X	368.36[C]	Mn XXII	374.747	V VI
358.681	Fe XIV	363.98	Co XVI	368.457	V XI	374.85	Ti XIII
358.846	V XI	364.00	Cr XIII	368.482	Ti IX	374.851	V VI
358.867	Fe X	364.073	V XI	368.540[C]	Ni XVI	374.927	Cr XI
359.1[C]	Mn XV	364.296	V IX	368.564	Ti X	375.11	Cr XIII
359.203[C]	Cr XI	364.427	Mn VIII	368.869	Mo X	375.243	Mo XIII
359.234[C]	Ni XVII	364.45	Cu XVII	369.038	Ti X	375.356[C]	Cr XI

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
375.391	V XI	380.23	Ti XIII	386.683	Mo VII	394.87	Ti XIV
375.425	Cr VII	380.48	Kr VI	386.722	V XI	395.273[C]	Mn XIII
375.464	Mo XI	380.501	Mn XIII	387.0	Cu XVII	395.400	Mo XIII
375.563[C]	V XI	380.537	V IV	387.01	Ti XIV	395.473	Mn IX
375.584	Cr X	380.70	Cr XIII	387.086	Fe XV	395.67	Cu XVIII
375.715	Mo VII	380.70	Ti XIV	387.17	Kr VI	395.69[C]	Mn XXI
375.773	Fe IX	380.759[C]	Co XVI	387.36	Fe XVII	395.984	Cr X
375.886	Co XVI	380.78	V XII	387.40	Cr XIII	396.0[C]	V XX
376.03	Ti XIV	380.897	Cr VII	387.56	Cu XVI	396.264	Mo VI
376.07[C]	Fe XII	381.005	Mo VII	387.585	Mn XIII	396.288	Cr VII
376.073	Cr VII	381.005	Mo VII	387.585	Mo VII	396.402	Mn XVI
376.202	Mn XVI	381.125	Mo XII	387.657	V IX	396.53	V XII
376.23	Kr VI	381.24[C]	Co XXVI	387.7	Mo XXVIII	396.628	Mo VI
376.281[C]	Ti XV	381.284	Mo XI	387.72	Kr VI	396.68[C]	Ti XII
376.341	Mo VII	381.526	V XI	388.24	Ni XIX	396.68[C]	Ti XII
376.513	Mo VII	381.59[C]	Cr XXI	388.414	Ti X	396.734	Mo VII
376.778	Mn IX	381.7	Ti XIV	388.51	Ti XIV	396.991	V IV
376.873	Mo VI	382.01	Kr VI	388.51	Ti XIV	397.016	Mo VII
376.913	Mo XI	382.01	Kr VI	388.58	Mn XII	397.093[L]	Ti X
376.96[C]	Ti XII	382.049	V VI	388.70	Ti XIV	397.097	V IV
377.154	Mn XI	382.142	Mn XI	388.820[C]	Ni XVI	397.122	V IV
377.217	Mo VII	382.185	V VI	388.988	Mn X	397.2	Mo XXVII
377.330	Mo VII	382.33	Ti XIV	389.237	Ti X	397.397	Ti X
377.414	Mn XVI	382.462	V XII	389.25	Fe XVII	397.42	Ti XIV
377.443	Fe IX	382.666	Mn VIII	389.29	Kr VI	397.450	Mo XV
377.534	Mo VI	382.76[C]	Fe XXV	389.36	Ti XIV	397.46	Mn XII
377.65	Cr XIII	382.83	Fe XII	389.50[C]	Ti XXI	397.622[C]	Mn XIII
377.687	Cr VII	382.845[C]	Mn XIII	389.54	Fe XV	397.72	V XII
377.779	Co XVI	383.0[C]	V XX	389.657[C]	Mn XIII	397.72	V XII
377.934	Mo VII	383.036	Mn X	389.862[S]	Cr XIV	398.150	Cr X
378.0	Cr XVIII	383.12	Ti XIV	389.9	Mo XXVIII	398.174	Ti X
378.081	V VI	383.486[C]	Mn XIII	389.929	Mo XIII	398.204	V VIII
378.117	Mo VI	383.53	V XII	390.016	Ti X	398.322	Mn X
378.135	Ti X	383.575	Cr VI	390.44[C]	Ni XXVII	398.4	Cr XIX
378.20[C]	Ti XII	383.913	Ti X	390.533[C]	Co XVI	398.498[C]	V XII
378.366	Mo VII	384.015	Mo VI	390.70	Kr VI	398.624[C]	V XII
378.482	Mn VIII	384.219	Mo VII	390.837	Mo XV	398.994	Ti X
378.629	Fe IX	384.255	Mo VII	390.9[C]	Co XX	399.025[C]	Ti X
378.678	V IV	384.382	V IX	390.959	Cr XV	399.12	Ti X
378.679	Mo VII	384.68[C]	Co XIV	391.362	V IV	399.218	Ti XI
378.687	V VI	384.691	Mo IX	391.552	Mo XIII	399.406	Mo XI
378.79	Cr XIII	384.743[S]	Mn XV	392.012	Ti X	399.54	Kr VI
378.834	V VI	384.827	Mn X	392.16[T]	Ti XIII	399.63	Ti XIII
378.929	V IV	384.939	Mo VII	392.26	Ti XIV	399.70	V XII
378.993	V IV	385.015	Cr VI	392.26	Ti XIV	399.707	Cr X
379.093	V IV	385.06[C]	Cu XXIX	392.359	Mo VII	399.719	V X
379.133	Mo XV	385.2[C]	Kr XXXV	392.37	Ti XIV	399.719	V IX
379.153	Cr VII	385.298	Mo VII	392.428	V IV	399.797	Ti X
379.20	Ti XIII	385.35[C]	Fe XII	392.53	V XII	399.797	Ti X
379.353	V IV	385.373[C]	Ni XVI	392.546	Mo VII	400.041	Ti IX
379.368	Mn X	385.42	Ti XIV	392.602	V IV	400.056	V X
379.372	V IV	385.47	V XII	392.81	Cr XV	400.075	Mn VIII
379.393[C]	Mn XIII	385.51	Kr VII	392.990	V VI	400.14[C]	Cr XIV
379.395	V IV	385.816	Mo X	393.028	Cr XII	400.30[C]	Fe XXV
379.512	V IV	385.827	Mn XIII	393.217	V IV	400.37[C]	Cr XIV
379.613	V IV	385.83[C]	Mn XXII	393.30	V XII	400.390	V X
379.68[C]	Fe XXII	385.935	V XI	393.469	V X	400.452	Cr VII
379.682	V IV	386.06	Ti XIII	393.743	Mn XI	400.49[C]	Cr XIV
379.694	V XIV	386.067	V XI	393.790	V IV	400.502	Mo X
379.780	Ti X	386.14	Ti XI	393.793	Ti X	400.74[C]	Mn XII
379.959	Mo XV	386.27	Mn XII	394.011[C]	Fe XIV	400.781	Mn VIII
380.070	Mo X	386.316	Mn X	394.03[C]	Ti XII	400.851	Fe XV
380.079	Fe IX	386.370	V XI	394.383	Ti X	400.965	Ti X
380.101	V IV	386.405[C]	Mn XIII	394.441	V IV	401.07	Ti XIV
380.219	Cr VII	386.442	Mo VII	394.473[C]	Cr X	401.347	Ti X

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
401.543	Mo VII	409.64	V XII	416.92	Ni XV	425.16	Ti XIV
401.658	Cr VII	409.797	Mo VII	417.006	Cr XII	425.242[C]	Ti XV
401.739	Ti VIII	409.84[C]	Cr XXI	417.258	Fe XV	425.26	Cr XII
401.773[C]	Fe XIV	409.91	Fe XVII	417.373	Mo XV	425.78	Ti XI
402.14[C]	V XIII	410.220	Ti X	417.734	Ti XI	426.258	Ti VIII
402.171	Co XVI	410.374	Mn VIII	417.828	Mo VII	426.532[C]	Cr XII
402.25[C]	V XIII	410.46	Cu XVI	417.89	Ti XI	426.939	Mo VII
402.346	Cr XV	410.542[C]	Ni XVI	418.041	V VI	427.11	Ti XIV
402.446	Mn VIII	410.59	Kr VI	418.227	Mo VII	427.551	Cr X
402.48	Fe XV	410.6	Cu XVII	418.290	Cr IX	427.611	Mo VII
402.58[C]	V XIII	410.880	Ti X	418.406	Cr XII	427.660	Mo VIII
402.7	Ti XIV	410.989	Cr XII	418.51	Mn XIV	427.785	Mo XI
402.885	V IV	410.994	Mo VII	418.925	Cr IX	428.14[C]	Mn XVIII
402.90	V XII	411.05	V XII	419.104	Cr VII	428.23[C]	Fe XXV
402.96	Mn XIV	411.28	Cr XV	419.42	Kr VI	428.544[C]	Cr XII
403.239	V XIV	411.430[C]	Cr XII	419.458	V VI	428.56	Kr VI
403.273	Ti X	411.473	Mn VIII	419.49	Ti XI	428.94	Ti XI
403.419	Mo X	411.655	Cr X	419.92[C]	Fe XIII	428.959	Mo IX
403.43	Kr VI	412.00[C]	Ti XIX	420.0	Cu XXII	429.13	Mn XIV
403.497	Mn VIII	412.047[S]	Cr XIV	420.270	Mo XV	429.232	V XI
403.608	Mo VII	412.340	Mo VII	420.352[C]	Cr XII	429.62	Ti XI
403.963	Mo VII	412.363[C]	Ni XVII	420.370	V VI	429.873	Mo VII
404.106	V X	412.49[C]	Ti XIX	420.396[C]	Cr XII	429.98	Kr VII
404.357	Mo XIII	412.623	Mo VII	420.499	Cr VI	430.44	Cu XVIII
404.51	Ti XIV	412.629	Cr XI	420.737	Ti X	430.46	Kr VI
404.79	V XII	412.662[C]	Mn XI	420.80[C]	V XIII	430.61	Mn XIV
405.035	Cr XV	412.679	Mo VII	420.82	Ti X	430.713	Cr VIII
405.035	Cr XV	412.859	V XI	420.940	V VI	431.154	Cr XI
405.145[C]	Fe XV	412.938[C]	Cr XII	421.02	V XII	431.539[C]	Ni XVI
405.272	Ti IX	412.98[C]	Fe XIII	421.020	Ni XVII	431.956	Mo VII
405.46	Cr XII	413.04[C]	Mn XIX	421.025	Ti X	432.429	Mo XI
405.461	V IX	413.112	Cr VIII	421.057	Cr IX	432.440	Cr IX
406.319	Mo IX	413.382	Mn XVI	421.1[C]	Mn XXIV	432.663[C]	V IX
406.369	Cr VII	413.582	Mn VIII	421.352	Ti X	433.0422[C]	Ti IV
406.480	Mo X	414.1	Cu XXIV	421.581	Mo XV	433.119	Cr V
406.756	Ti VIII	414.273	V VI	422.083	Cr XI	433.202	Ti V
406.811[C]	Fe XI	414.30	Fe XVII	422.232	Mo VII	433.49	Ti XIV
406.838[C]	Fe XIV	414.37[C]	Cr XIV	422.282	Cr XI	433.52	Ti XI
407.138	Cr VII	414.582	Cr VII	422.33	Cr XV	433.567	Ti IX
407.188[C]	Mn XI	414.602	Cr IX	422.465	Mo VII	433.6346[C]	Ti IV
407.198	Ti X	414.764	Mo XII	422.69[C]	Mn XXIV	433.7599[C]	Ti IV
407.393	Mo VII	414.97[C]	Cr XIV	422.784[S]	V XIII	433.79	Kr VI
407.515	Mo VII	414.972[C]	Mn XI	422.899[C]	Cr XII	433.83	Ti XI
407.637	Cr IX	415.041[C]	Cr XII	423.259	Mo VII	433.885[C]	Cr XI
407.677[C]	Ni XVI	415.08	Ti XI	423.478	Mo VII	433.930	V IX
407.905[C]	Ni XVI	415.348	Mn VIII	423.4860[C]	Ti IV	434.016[C]	Ti XI
407.918	Cr VII	415.44	Ti XIII	423.559	Cr VI	434.081[C]	Mn XIII
407.957[C]	Ti X	415.458	Mo XII	423.576	Mo XIV	434.092[C]	Cr XI
408.019	Cr VII	415.504	Mo VII	423.601	Mo VII	434.124	Kr VIII
408.206	Mn VIII	415.80[C]	V XVII	423.634	Mo VII	434.140	Kr VII
408.29	Ti XI	415.861	V VI	423.649	Ti VIII	434.156	Mo VII
408.304	V X	415.932	Ti X	423.677	Mo VII	434.180	Cr V
408.40[C]	Cr XV	415.994	Mo XV	423.800	Mo IX	434.2[T]	V XVIII
408.528	Ti VIII	416.031	Mo XIII	423.856	Mo VII	434.306	Cr V
408.630	V X	416.064	Mo VII	423.92	V XIV	434.312[C]	Ni XVI
408.65	V XII	416.08[C]	Cr XX	424.146	Cr IX	434.377	Mo VII
408.65[C]	Co XXVI	416.179	Mo VII	424.1598[C]	Ti IV	434.55	Kr V
408.685	Mn VIII	416.23[C]	Cr XIV	424.1724[C]	Ti IV	434.754	Mo VII
408.864[C]	Ti X	416.35	Mn XIV	424.184	Mo XV	434.8	Cu XXIII
408.89	Cr XII	416.418	V VI	424.26	Fe XIX	434.835	Mo VII
408.943	Mo XV	416.59	Cr XV	424.50[C]	V XIII	434.881	Mo VII
409.070	Mo X	416.69	Ti X	424.782	V V	434.887	V XIV
409.097	V IX	416.690	Cr X	424.901	Ti X	434.90	Ti XI
409.172	Ti X	416.805	Mo VII	424.91	Kr VI	434.91[C]	V XIV
409.270	Mn VIII	416.856	Mo X	425.038	Mn XIII	434.98	Fe XV

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
435.018	Kr VII	444.087	Mo VII	451.516[C]	V XI	461.94	Kr VI
435.042[C]	Ti XI	444.19[C]	Ni XXVIII	451.585	Mo XIII	461.955	V XI
435.143	Cr V	444.25	Fe XIV	451.607	Cr V	462.112	V VIII
435.636	Cr V	444.288	Mo VI	451.61	Ti XIV	462.31	Kr VI
435.684	Mo IX	444.56	Ti XIV	451.69	Cr XIII	462.565	Ti V
435.699	V IX	444.565	Mo X	451.865	V XIV	462.63	Kr VII
435.856	Mo VII	444.634	V VI	451.890	V VI	462.675	Mo VII
435.9[C]	V XX	444.643	Ti V	452.132	V IX	462.77	Kr V
436.351	Cr V	445.0	Kr VI	452.43	Ti XIV	462.830[C]	V XI
436.388	Mo VII	445.309	Kr VII	452.522	V X	462.95	Cr XIII
436.601	Cr V	445.450	Mo XIII	452.64	Mo XII	462.982	Ti V
436.786	Mo VII	445.49[C]	Mn XII	452.660	V VI	463.004[C]	Ti XV
436.839	Ti V	445.751	Cr V	452.800	Mo VI	463.105	Mo VII
436.978	V XIV	446.015	V XI	452.972	Kr VI	463.418	V VI
437.005	V IX	446.248	Mo VII	453.006	Ti V	463.553	Mo VII
437.212	Ti XIII	446.265	V XI	453.09	Mo XIII	464.015	Cr V
437.30	Fe XVII	446.30	Ti XI	453.162	V XI	464.143	Ti V
437.32	Cr XIII	446.493	Ti V	453.183	Cr VII	464.25[C]	Mn XIX
437.420	Cr V	446.672	Cr V	453.360	Kr VIII	464.449[C]	V XI
437.516	V XIV	446.700	Kr VII	453.502[C]	Ni XVI	464.562	Ti V
437.655	Cr V	446.71	Ti XI	453.641	Ti X	464.67	Ti XIV
438.0[C]	V XIX	446.790	Mo VII	454.195	V XI	464.69[C]	Ti XIX
438.052	Mo VII	446.9	Mo XXIX	454.325	V XI	464.86[C]	V XIII
438.189[C]	Mn XIII	447.36	Fe XIV	455.355	Ti XIII	464.92[C]	Cr XIII
438.46[C]	Ti XVI	447.484	Ti IX	455.419	Ti V	465.09[C]	V XIII
438.577	Mn XVI	447.529	Cr X	455.554	V XI	465.1[C]	Ti XVIII
438.618	Cr V	447.606	Kr VII	455.852	Mo VII	465.11	Kr V
438.618	Cr V	447.701	Ti IX	456.040[C]	V XI	465.27	Kr VI
438.618	Cr V	447.792	Cr VII	456.10[C]	Ti XVI	465.29[C]	V XIII
438.976	Mo VII	447.881	V XI	456.134	V VIII	465.4	Ni XXIII
439.15	Cr XV	447.882	Cr VII	456.272	Cr V	465.493	V VIII
439.302	Ti IX	447.983	Mo VII	456.284	V VII	466.181[C]	Ni XVI
439.344	V VI	448.411	Mo VII	456.357	Cr V	466.198	Mo VII
439.513	Ti IX	448.445[C]	V XI	456.637	Cr V	466.224	Ti V
439.54	Ti XI	448.502	Kr VI	456.743	Cr V	466.290	Mo VII
439.745	Ti IX	448.668	Kr VI	457.010	V IX	466.37[C]	Cr XXIII
439.75	Ti XI	448.729	Cr VII	457.028	Cr V	466.43	Kr V
439.86	Ni XV	448.754	Mo VI	457.15	Kr V	466.749	Ti V
440.038	Kr VI	448.822	Ti V	457.223	Mo VII	467.143	V IX
440.121	Cr VII	448.95	Kr VI	457.321	Ti V	467.25	Kr VI
440.192	Kr VI	448.956	Mo IX	457.504	Cr V	467.40	Fe XIV
440.244	Cr VII	449.063	Ti V	457.6	Kr VII	467.45	Kr V
440.361	Ti VII	449.129	V VI	457.781[C]	Cr XII	467.9	Ti XIV
440.687	Ti VIII	449.15	Kr VI	457.81[C]	Mn XVIII	468.257	Ti V
440.722	Cr XV	449.3[C]	Mn XXIV	457.84[C]	Ti XIII	468.30[C]	Ti XII
440.84[C]	Mn XIX	449.386	Cr VII	457.963	Mo VI	468.533	Mo VI
440.840	Kr VI	449.391	Co XVI	458.487	V VI	468.78	Ti XII
441.056	Cr V	449.479[C]	Cr X	458.5	Kr VII	469.00[C]	V XXII
441.289	Ni XVII	449.541	Ti V	458.6	Mo XXVII	469.11[C]	Ti XII
441.44	Kr V	449.629	V VIII	458.861	Ti V	469.11[C]	Ti XII
441.466	Mo VII	449.633	Ti VIII	459.177[C]	V XI	469.20	Kr V
441.584	Cr VII	449.795	V VI	459.35	Ti XIII	469.311	Cr V
441.680	Cr VII	449.83	Cr XIII	459.47	Kr VI	469.634	Cr V
442.1	Cr XVIII	450.00	Ti XIV	459.647	V VIII	469.711	Mo VII
442.243	Cr V	450.20	Kr VI	459.799	V VIII	469.808	Ti V
442.28	Kr VI	450.314	Cr VII	460.37	Ti XIV	469.893	Cr V
442.779	V XIV	450.321	Mo VII	460.39	Ti XI	470.0	Mo XXVIII
443.062	Cr X	450.397	Ti V	460.746[S]	Ti XII	470.166[C]	Fe XV
443.388	Mo IX	450.581	Kr VI	460.775	Cr XII	470.173	Mo VII
443.427[S]	V XIII	450.649	Kr VIII	461.059	V X	470.183	V X
443.51	Ti XI	450.74	Ti XIV	461.146[C]	V XI	470.191	Kr VI
443.512	Ti IX	450.742	Mo VII	461.245	V X	470.20	Kr V
443.601	V VI	450.922	Mo VII	461.414	Ti V	470.484	Mo IX
443.858	Kr VI	451.141	Cr V	461.515	Ni XVII	470.487	Mo XIII
443.95[C]	Cr XXIII	451.429	Ti V	461.69	Cr XIII	470.54[C]	Ti XVII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
470.567	Cr V	482.55	Mn XIII	495.138	V VI	506.824[C]	Ti X
470.697	Cr V	482.702	Kr VI	495.46	Kr VI	507.023	Mo VII
470.719	Mo VII	482.917	Mo VII	495.671	Ti X	507.174	Ti IX
470.868	Cr XII	483.0098	V V	495.940	V VI	507.23	Kr V
470.976	Cr V	483.166	Mo VII	496.06[C]	Mn XXII	507.382[C]	Ti IX
471.15	Ni XXI	483.274[C]	Cr XI	496.180	V VI	507.630	Mo VII
471.21	Kr V	483.992	Ti V	496.23	Ti XIII	507.64	Ti XIII
471.30	Cr XV	484.090	Mo VII	496.237	Kr VI	507.683	Ti V
471.574	Ti X	484.142[C]	Cu XXVII	496.32	Ti XIV	507.740	Mo VII
471.622[C]	Ni XVI	484.2[C]	Mn XXI	496.543	Co XVI	507.82	Kr VI
471.64	Ti XIV	484.5108	V V	496.57[C]	Ti XXI	508.29[C]	Ti XVI
471.8[C]	Co XXI	484.553	Mo VI	496.647	Ti X	508.3	Cr XII
471.884	V XIV	484.581	Mo VII	496.89[C]	V XXII	508.575	Ti VI
471.94	Mn XIV	484.60	Fe XIV	496.92	Ti XIV	508.625	V XIV
472.088	Ti XIII	484.64	Kr V	496.97	Ti XII	508.80	Mo XII
472.14[C]	Cr XXIII	485.04[C]	V XIII	496.985	V VI	509.127	Ti VII
472.19	Kr V	485.110	V IX	497.009	Mo VII	509.260	V VI
472.476[C]	V X	485.175	Ti V	497.999	Ti X	509.511	Ti VII
472.672[C]	V X	485.511	Mo VI	498.01	Ti X	509.697	V V
472.828	V VII	485.58[C]	Mn XII	498.050	Ti V	510.1	Ti XIV
472.839	V VIII	485.623	Ti XIII	498.061	Kr VI	510.12	Fe XIII
472.99[C]	V XVII	485.67[C]	V XIII	498.099	Mo VII	510.798	Mo XII
473.381	Ti XIII	487.08	Fe XIII	498.2	Mo XXVIII	511.442	Ti VII
473.59	Kr V	487.115	Ti V	498.2[C]	Ni XXV	511.54[C]	Mn XIX
473.955	Mo X	487.217	V VI	498.260	Ti V	511.61	Ti XIV
474.030[C]	Cr XII	487.4	Kr VII	498.286	Mo VII	511.79	Kr VI
474.124	Ti V	487.40[C]	V XIII	498.398	Mo VII	512.64	Ti XII
474.209	Kr VI	487.654	Ti X	498.56	Ti XIV	513.260	Mo VII
474.45	Ti XIII	487.845	Ti V	498.623	Mo VII	513.315	V XI
474.5	Ti XIV	488.050	Mo VII	499.38	V XII	513.374	Ti V
474.611	Ti XIII	488.120	V VI	499.479	Ti IX	513.395	Mo VII
474.619	Mo XIII	488.462	V VI	499.75	Kr V	514.0[C]	V XXII
474.690	Ti V	488.47	V XII	499.853	Ti VII	514.01	Cr XIII
474.941	Mo VIII	488.582	Ti V	500.116	Ti VIII	514.206	Ti VIII
475.197	Mo IX	488.735	V IX	500.265[C]	V XI	515.008	Ti VII
475.62	Kr VI	488.971	Ti X	500.448[C]	V XII	515.04[C]	Co XXVII
475.75	Kr V	489.197	Ti X	500.644	V VI	515.35	Kr V
476.181	Mo VII	489.231	Mo VII	500.84	Kr V	515.518	Mo VII
476.78	V XII	489.360	V VI	501.20	Mn XIII	515.796[C]	V XI
477.3[C]	Kr XXXV	489.731	Mo VII	501.23	Ti XIV	516.215	Ti IX
477.6	Ni XXII	489.738	Kr VI	501.631	Ti V	516.96	Kr VI
477.82	Kr V	490.08	V XII	501.944	Mo VI	517.26	Ti XII
477.930[C]	Ti VIII	490.1	Mo XXX	502.077	Ti V	517.56	Mn XIII
478.016	Kr VI	490.496	V V	502.147[C]	V XII	518.05	Mn XIV
478.455	Ti V	490.680	Mo VI	502.23	Ti XIV	518.100	Ti IX
478.70	Ti XIII	490.763	Mo VI	502.45	Kr V	518.331[C]	Ti IX
478.971	Ti VIII	490.81	Kr V	502.602	V XI	518.92	Mo XIII
479.264	Kr VII	490.9[C]	Fe XXIII	502.711	Ti V	519.12[C]	Cr XI
479.27	Mn XIII	491.314	Mo VI	503.031	Ti V	519.18[C]	Ti XVI
479.497	Ti V	491.358	Ti V	503.73	Kr V	519.2[C]	V XX
479.883[S]	Ti XII	491.608[C]	Cr XI	503.845	Mo VII	519.508[C]	Fe XIV
480.376	Ti VIII	491.746	V V	504.19	Ti X	519.575	Ti V
480.63	Kr VI	491.981	Ti V	504.23	Ti XIV	520.83	Cr XII
480.63	Ti XIII	492.0	Ti X	504.665	Ti V	520.89[C]	Mn XX
480.820	Mo XIII	492.225	Mo VII	504.801	Ti VIII	521.561	Ti VII
481.428	Ti VIII	492.51	Ti XIII	505.431[C]	Ti X	521.87	Kr V
481.493	Fe XV	492.61[C]	Co XXIV	505.571	Mo XII	522.1[C]	Co XXI
481.5564	V V	492.731	Mo VII	505.82[C]	Ti XVI	522.30	Kr VI
481.72	Kr V	492.80	Ti XII	505.899	Ti VII	522.4	V XII
481.818	Ti V	493.552[C]	Fe XV	505.94[C]	Cr XXI	522.67	Ti XI
482.11[C]	Ti XVI	493.783	Ti V	506.0	Ti X	522.8	Cu XXV
482.17	Cr XIII	493.783	Ti V	506.18	Ti XIII	523.050	Ti V
482.19	Kr VII	493.8	Cr XVII	506.429	V V	523.26	Cr XII
482.302	Ti X	494.286[C]	Ti X	506.462	Mo IX	523.3[C]	Co XXII
482.447	Ti V	494.909	V VI	506.468	Ti V	523.9[C]	Ti XXI

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
524.113	Ti VI	544.183	Mo VII	565.221[C]	Ti X	598.864[C]	Cr V
524.578	Ti V	544.304[C]	Fe XIV	565.317	Mo VI	598.990[C]	Cr V
525.04	Kr VI	544.38	Ti XI	565.627	Ti V	599.26	Kr VI
525.1	Ti XIV	545.448	Mo VII	565.9[C]	Ti XXI	599.60	Mo VII
525.435	Mo VII	545.801[C]	Ti XI	566.461	Ti V	599.79	Kr VI
525.49	Kr V	546.062	Ti V	566.620	Mo VI	599.994[C]	Cr V
525.7[C]	Kr XXXVI	546.081	Mo XII	567.408[C]	Ti XV	600.320	Mo VII
526.076	Ti V	547.426	Mo VII	567.76	Fe XX	600.42[C]	Fe XXVI
526.266	Ti V	547.642	Ti V	568.98	Ti XI	600.7	Cr XI
526.570	Ti V	548.107	Kr VI	569.13	Kr VI	601.145[C]	Cr V
527.26[C]	Mn XIX	548.229	Mo VI	569.354	Kr VI	602.011	Cr VI
527.439	V X	548.343	Mo VII	569.8	Mo XXVII	602.4[C]	Fe XXIII
528.3[C]	Co XX	548.4[C]	Mn XXI	570.87[C]	Mn XX	604.880	Fe IX
528.457	Kr VI	548.470	Mo VII	571.095	Ti V	605.400[C]	Cr XII
528.92	Ti XIV	548.533	Ti V	571.190	V VI	605.79[C]	Ti IX
529.315	Ti V	549.083	Ti V	571.203	Kr VIII	606.726	Kr VI
529.635	Ti V	549.553	Mo VII	573.62	Ti XII	607.239	Cr VI
529.742	Cr V	550.485[C]	Ti X	573.67	Kr V	609.20	V XII
529.79	Mn XII	551.0[C]	Mo XLI	574.85	Ti XII	609.8	Mo XXXI
529.893	Kr VIII	551.410	Ti V	576.50	Ti XII	609.9	Ni XXIV
529.9	V XVI	551.51	Kr V	577.272	Mo IX	610.828	Kr VI
530.04	Ti XIV	551.60	Ti XIII	577.5	Mo XXXI	611.36[C]	Ti XVI
530.167	Ti V	551.922	Mo VII	577.68	Kr VI	612.4	Kr VI
530.3	Mo XXIX	552.079	Ti V	578.0	Cr XI	612.8	Ti X
532.935	Ti V	552.090	Ti X	578.800	Mo VII	614.028	Cr VI
533.28	Ti XIV	552.185	Ti V	578.905	Ti V	614.05	Kr VI
533.457	Ti V	552.84	Mn XII	579.246	Kr VIII	614.8	Ni XXIII
533.54	Ti XI	553.122	Ti V	579.518	Ti V	614.9	Kr VI
533.651	Kr VIII	553.514	Mo VII	579.896	Ti IX	615.002	Mo VII
533.753	Kr VIII	553.857	Ti V	580.616	Mo VI	615.07	Kr VI
533.809	Mo VI	554.135	Mo VII	580.63	Kr VI	615.57[C]	Mn XIX
534.297	Ti V	554.3	Kr VII	581.214	V VI	617.18	Kr VI
534.89	Ti XI	554.51	Kr VI	582.12	Mn XIV	617.189	Kr VII
534.9	Mo XXVI	554.582	Mo VII	583.723	Mo VII	617.315	Mo VII
535.381	Ti VIII	554.650	Mo VII	584.958	Kr VI	617.379	Kr VI
535.836	Ti V	555.0	Cr XII	585.0	Cu XXIII	617.573	Mo VII
535.888	Ti V	555.164	Ti V	585.14	Kr VI	618.0[C]	Mn XXI
536.34	Kr V	555.2	Kr VII	585.361	Kr VII	618.44	Ti XI
536.406	Ti V	555.224	Mo VII	585.8	Fe XXI	618.5	Mo XXIX
536.418	Fe XV	555.742	Mo VII	586.969	Kr VIII	618.664	Kr VII
537.29[C]	Ti XIX	556.5	Kr VII	587.121	Kr VIII	620.324	Mo VII
537.3[C]	Kr XXXVI	556.562	Ti V	587.147	Mo VII	622.020	Mo VII
537.34	Ti XIV	556.855	Kr VII	587.94	Kr VI	622.187	Mo VII
537.990	Mo VII	557.052	Mo VII	588.31	Kr VI	622.8	Kr VI
538.241	Ti VIII	557.115	Ti V	590.563	Mo XII	623.6	Ti X
538.511	Ti V	557.3	Kr VII	590.650	Mo VII	624.069	Mo VII
540.0	Cu XXIV	557.35[C]	Ti XVI	592.234	Fe XIX	625.16[C]	Mn XIX
540.12	Ti XIV	558.221	Kr VII	592.28	Kr VI	625.8	Ti X
540.145	Ti V	558.329[C]	V X	592.3	Cu XXI	626.220	Kr VI
540.35	Kr V	559.323	Ti V	592.68	Kr VI	626.486	Kr VII
540.587	Kr VI	559.431[C]	Mn XIII	593.08[C]	Mn XX	627.20[C]	Ti XVI
541.0	Cr XII	559.569	Mo VII	593.56	Kr VI	627.627	V VI
541.181	Ti V	560.056	Ti V	594.2[C]	Ni XVIII	627.668	Kr VII
541.286	Mo VI	560.157	Mo VII	594.618	Kr VI	629.572[C]	Ti III
541.35	Fe XX	560.18	Cr XIII	594.899	Kr VII	629.957[C]	Ti III
541.374	Mo VII	560.85[C]	Mn XX	594.921[C]	Cr V	630.086[C]	Ti III
541.459	Ti V	561.10[C]	Mn XIX	595.932	Mo VII	630.199[C]	Ti III
541.711	Ti V	561.221	Mo VII	595.970	Kr VI	630.685[C]	Ti III
543.103	Ti V	561.297	V VI	596.7	Kr VI	630.692[C]	Ti III
543.339	Ti V	562.25	V XII	596.725[C]	Cr V	630.769[C]	Ti III
543.50	Ti XI	562.572	Cr VI	596.947	V VI	630.875[C]	Cr V
543.522	Mo VII	563.358	Ti X	597.024	Mo VII	630.891[C]	Ti III
543.689	Kr VI	563.383[C]	Ni XXVI	597.047[C]	Cr V	630.982[C]	Ti III
543.858	Ti V	563.44	Kr VI	597.1[C]	Co XXI	631.135[C]	Ti III
544.02	Kr VI	563.49	Kr V	598.171[C]	Cr V	631.164	V VI

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
631.3[C]	Ni XVIII	672.220[C]	Ti III	704.057[C]	Kr VIII	758.90[C]	Mn XIX
631.421[C]	Ti III	672.631[C]	Co XVII	705.85	Kr VI	761.020	Mo VI
631.830[C]	Ti III	674.36	Kr V	708.85	Kr V	763.8420[C]	Ti IV
632.084	V VI	674.419	Mo VII	710.73[C]	Cr XXI	764.151	Cr V
632.509	V VI	674.944	Mo VII	710.77	Kr V	765.1[C]	Mn XV
632.509[C]	Ti III	675.033	Kr VI	711.911	V IV	765.995	Mo VII
634.08[C]	Mn XXII	675.469	V IV	712.71[C]	Fe XVI	766.72	Kr VI
634.78	Cr XIII	675.722[C]	Ti III	712.96[C]	V XVII	766.847	Mo VII
634.8	Ni XXII	675.982[C]	Ti III	714.754	Mo VII	767.595	Mo VI
636.173[C]	Co XVII	675.989[C]	Ti III	717.9[C]	Co XXIII	768.251	Cr V
637.1	Mo XXVIII	676.013[C]	Ti III	719.06[C]	Fe XVI	768.4181[C]	Ti IV
638.68	Kr VI	676.27[C]	Mn XX	720.456[C]	V XIV	768.468[C]	Ti XI
638.922	Mo VII	677.345	V IV	720.5[C]	Ti XVIII	768.6461[C]	Ti IV
639.[C]	Mo XLI	677.667[C]	Ti III	720.771	Cr VI	769.2[C]	Ti XVIII
639.8[C]	Ni XVIII	677.681[C]	Ti III	722.1	Cr XVIII	771.0[C]	Mn XV
640.135	V VI	677.709	Mo VII	722.912	V IV	771.25	Kr V
640.25[C]	Mo XLI	677.878[C]	Ti III	723.045	V IV	773.223	Cr VI
641.7	Ti X	678.01[C]	Mn XX	723.537	V IV	773.51[C]	Mn XIX
641.88	Kr V	678.740	V IV	723.652	V IV	774.079	Cr V
642.394	Mo VII	679.24[P]	Fe XX	723.675	Cr VI	774.2	Ti X
643.0	Mo XXVIII	679.647	V IV	724.068	V IV	775.308	Cr V
643.603	V V	679.763[C]	Co XVII	724.42	Ti IX	775.53	Kr V
644.[C]	Mo XLI	679.95[C]	Fe XVI	724.677	Mo VII	776.554[C]	Fe XXIV
645.417	Mo VII	679.99[C]	Mn XX	724.809	V IV	776.743	Cr V
645.45[C]	Mn XX	680.1[C]	Co XXI	725.[C]	Cu XXVIII	776.762	Ti IV
645.847	Kr VII	680.632	V IV	725.0261[C]	Ti IV	777.147	Mo VII
645.85	Kr V	681.145	V IV	729.3529[C]	Ti IV	777.82	Kr V
645.925	Mo VII	682.455	V IV	729.4	Kr VI	777.873	Cr V
647.484	Mo VII	682.586	Mo VII	730.614	Mo VII	778.253	Cr V
648.0	Cu XXVI	682.923	V IV	731.1	Cr XIX	778.433	V IV
648.934	Mo VII	684.368	V IV	733.1[C]	Mn XV	778.670	Mo VI
651.566	Kr VIII	684.368	V IV	733.2	Kr VI	778.946	Mo VII
652.905	Kr VII	684.450	V IV	733.7[C]	Ni XVIII	779.074	Ti IV
653.[C]	Mo XLI	684.748	Mo VII	734.344	V IV	779.209	Cr V
653.037	Mo VII	685.879[C]	Kr VIII	735.1	Kr VI	779.5	Ni XXI
654.189	Kr VII	686.543[C]	Ti III	735.316	Kr VI	780.2	Ti X
654.2	Ti X	686.76	Kr VII	737.854	V IV	780.37	Ti XII
654.96[C]	Mn XX	686.8[C]	V XX	738.9	Kr VI	780.428	Cr V
655.174	Mo VII	688.89	Kr VII	739.096	Kr VI	780.429	Mo VI
655.78[C]	Mn XX	690.01	Kr V	739.327[C]	Ti III	780.92	Kr VI
656.112[C]	Cr V	691.530	V IV	740.75	Cr XVII	781.730	Ti IV
657.20	Kr VI	691.84	Kr V	741.889	Cr VII	782.912	Mo VI
657.685[C]	Cr V	692.22	Kr VII	742.83	Kr VI	783.45[C]	Mn XX
657.7	Cu XXII	693.128	V IV	744.3	Kr VI	784.690	Mo VI
657.898[C]	Cr V	693.169	Mo VII	744.575	Mo VII	785.85[C]	Mn XX
659.39[C]	Co XXV	693.57	Kr V	745.12[C]	Ti XIII	786.1	Fe XXI
660.067[C]	Cr V	694.64	Ni XX	745.165	V IV	786.210	Cr V
660.284[C]	Cr V	694.986[C]	Ti III	747.33[C]	Mn XX	787.216[C]	Co XVII
660.477	Mo VII	695.027	Mo VII	748.70	Kr VI	789.27[C]	Cr XIV
662.43	Kr VII	695.170	Mo VII	749.641	V IV	789.492	Cr V
663.1	Cr XVIII	695.918	Kr VIII	750.110	V IV	790.659	Mo VI
663.541[C]	Ti III	696.07	Kr V	750.277	Kr VI	791.872	Cr V
663.789[C]	Ti III	696.083[C]	V XII	750.522	Mo VI	792.282	Mo VII
663.97[C]	Mn XVIII	696.5[C]	Co XXII	750.6[C]	Co XXI	792.948	Ti V
664.2954[C]	Ti IV	697.088[C]	Mn XVI	750.809	V IV	793.4	Cr XVIII
665.6905[C]	Ti IV	697.9	Kr VII	751.10	Kr VI	793.43	Kr V
666.191	Mo VII	699.497	V IV	751.908	V IV	794.19	Kr V
667.08	Ti XI	700.06	Kr VI	752.038	V IV	795.5[C]	V XX
668.097[C]	Cr V	700.1	Kr VII	752.568	V IV	795.621	Mo VII
668.288	Mn VIII	700.1	Kr VII	754.521	Cr V	796.75[C]	Mo XLI
669.926[C]	Ti III	702.035	V IV	755.586	Mo VII	797.77[C]	Mn XIX
670.13	Ti XII	702.96[C]	Cr XV	755.74	Ti X	799.714	Ti V
671.6[C]	Ti XVIII	703.04[C]	Fe XVII	756.786	Cr VI	799.8	Kr VI
671.788[C]	Ti III	703.68	Ti IX	756.9	Cu XXIV	801.182	Mn VI
672.042[C]	Ti III	704.027[C]	Mn XXV	757.396	Mo VI	801.277	Cr VII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
804.233	Mo VI	848.517	Cr VII	881.960	Mo VII	934.50	Ti XII
804.5[C]	Ni XVIII	849.54	Ti XII	882.083	Mo VII	936.183	Mn VI
806.573	Mo VII	849.687	Mo VII	883.472	Mo VII	936.492	Cr VII
807.347	Ti V	850.388	Mo VII	884.02[C]	V XIII	936.557	V VI
810.23	Kr V	850.92[C]	Mn XXII	884.146	V IV	939.329	Mn VI
810.65	Kr VI	851.14[C]	V XIII	884.982	Ti V	942.610	Cr VI
812.564	Mo VII	851.705	Mn VI	884.994	Mo VII	944.05	Kr VI
813.34[C]	V XVIII	852.120	Kr VII	885.438	Mo VII	944.410	Mo VI
814.148	Cr V	852.996	Mn VI	886.537	Mo VII	944.6	Cu XV
814.580	Mn VI	853.8	Kr XXIII	887.370	Mo VII	945.665	Mo VI
815.474	Cr VII	855.056	Mn VI	887.39[C]	Ti XIX	950.335	Mo VI
817.246	Cr V	855.066[C]	Co XVII	887.930	Mo VII	950.816	Mo VI
818.43	Kr V	856.531	Mo VII	892.597	Mo VII	951.753	V VI
818.73[C]	Cr XIV	856.935	Mn VI	892.709	Mo VII	952.684	Mo VII
818.803	Cr V	857.136	Ti V	893.798	Mo VII	952.8	Cu XVI
818.803	Cr V	857.55	Ti XII	897.124	V V	952.8[C]	Mn XXI
819.019	Mo VII	858.073	Ti V	898.030	Mo VII	954.576	Mo VII
819.153	Cr V	858.43	Ti XII	898.53	Kr V	955.11[C]	Cr XXI
819.25	Kr V	859.396	Mn VI	899.171	Ti V	956.615	Kr VI
819.9[C]	Co XIX	859.65	Kr VI	899.4	Kr VI	957.009	Cr VI
820.239	Cr VII	859.956	Mo VII	899.560	Mo VII	958.156	V VI
820.859	V V	860.274	Mo VII	901.404	Mo VII	958.716	V VI
821.202	V V	861.681	Mn VI	901.692	Ti V	959.093	Cr VI
821.788	Cr VII	861.85[C]	Ti XVI	905.06[C]	Co XXIV	959.316	Mo VII
822.176	V V	862.786	Ti V	906.29[C]	Mn XIX	959.945	Ti XII
822.668	V V	863.043	Cr VII	908.536	Mo VII	960.638	Kr VII
822.8	Kr VI	863.763	Mo VII	908.63	Kr V	961.376	Ti V
822.927	V V	865.060	Mn VI	908.740	Ti V	961.41	Ti XII
823.84	Kr VI	865.79	Ti III	909.405	Mo VII	962.[C]	Cu XXVIII
823.99[C]	Cr XIV	865.800	Cr VII	909.63	Kr V	962.[C]	Kr XXXV
824.826	Mo VII	865.806	Ti V	909.84[C]	Fe XVI	962.031	V V
825.600	Cr V	865.967	Mo VII	910.47	Kr VI	964.039	Mo VII
825.891	V V	866.662	Mn VI	911.0	Ni XXIII	964.341	V VI
825.98	Kr VI	866.676	Ti V	912.0	Kr XXII	964.35	Ti XII
826.180[C]	V XVI	867.030	Mo VII	912.4[C]	Mn XV	965.093	Kr VI
826.458	V VI	867.236	Mn VI	914.461	Mo VII	968.436	Mo VII
826.546	Mo VII	868.96	Kr VI	914.507	Mo VII	968.703	Cr V
826.92[C]	V XVII	869.615	Cr VII	915.050	Mn VI	968.80[C]	Ti XVI
828.791	V V	870.980	Cr VII	916.099	Mo VII	968.986	Mo VII
829.483	V V	871.085	Ti V	917.[C]	Kr XXXV	970.2	Kr VI
830.11	Kr VI	871.118	Mn VI	917.506	Mo VII	971.700	V VI
830.841[C]	Cr XXIV	871.296	Cr VII	918.14	Kr VI	971.8[C]	Mn XV
832.309	Cr V	872.130	Mo VII	918.446	Kr VII	972.188	Ti V
832.682	Kr VII	872.240	Mn VI	919.73	Ti XV	972.930	Mo VI
834.17	Kr VI	873.618	Ti V	919.934	Kr VI	973.357	Ti V
834.199	Ti V	874.485	Mo VII	920.802[C]	Mn XXIII	974.86	Fe XVIII
836.33[C]	V XVII	875.489	Ti V	920.983	Kr VII	976.767	V VI
836.644	Cr VII	876.064	Mo VII	921.600	Mn VI	978.064	Cr V
836.656	Ti V	876.378	Mo VII	921.920	Mo VII	978.166	V V
837.157	Cr V	876.405	Mo VII	922.955	Mo VII	978.985	Mo VII
837.429	Mo VII	876.686	Ti V	923.400	Mn VI	979.1	Cr XIX
838.315	Ti V	877.057	Mo VII	923.560	Mo VII	979.547	V V
839.451	Mo VII	877.817	Mo VII	926.520	Cr VII	979.590	Cr V
839.655	Mo VI	878.257	Mn VI	927.4	Kr VI	979.934	Cr V
839.926	Ti V	879.268	Ti V	927.614	Mn VI	980.411	Kr VI
841.691	Ti V	879.28[C]	Cr XVIII	928.507	Ti V	981.585	Ti V
841.747	Cr VII	879.332	Mo VII	929.485	Mo VII	982.736	Cr V
841.9[C]	Mn XXI	879.51[C]	V XIII	930.9[C]	Co XX	983.632	V VI
842.195	Cr V	879.819	Mo VII	931.4	Kr VI	984.111	Mn VI
844.198	Mo VII	880.20[C]	Mn XX	931.652	Ti V	984.419	V VI
844.989	Cr VII	880.244	Mo VII	932.162	Mo VII	984.462	Mo VII
845.5	Kr VII	880.275	Mo VII	932.476	Mn VI	984.530	Ti V
845.55	Fe XXII	880.555	Mo VII	933.125	Mo VI	985.951	Mn VI
848.10[C]	Fe XVI	881.012	Cr VII	933.176	Mo VII	986.035	Cr V
848.282	Mo VII	881.379	Ti V	933.785	Mn VI	986.681	V VI

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
987.36^{C}	V XXIII	1057.438	V VI	1123.288	Ti V	1182.^{C}	Ti XXII
992.330	V V	1058.298	Cr V	1126.090	Cr V	1182.14	Mo VI
995.800	Mo VI	1059.41	Kr VIII	1127.631	Cr V	1183.323	Mo VII
996.521	V V	1060.^{C}	Ni XXVII	1127.836	V IV	1183.635^{C}	Ti IV
997.61^{C}	V XVII	1060.651	Cr V	1128.546	Ti V	1184.130	V VI
997.7^{C}	Cr XI	1061.069	Kr VI	1129.2	Ti XVI	1186.561	Cr VII
997.709	Cr V	1062.933	Cr V	1130.^{C}	Kr XXXV	1188.159	V VI
998.8^{C}	Cr XVIII	1064.^{C}	V XX	1131.255	V IV	1188.161	V V
1000.019	Mo VII	1071.054	V IV	1132.237	Ti V	1188.7^{C}	Ti XII
1001.^{C}	Cr XI	1073.367	Cr V	1134.17^{C}	Co XIII	1188.796	Ti V
1001.237	Mo VII	1073.953	Fe VII	1134.768	Cr V	1189.640	Cr VII
1001.714	V VI	1077.236	Ti III	1136.041	Ti III	1189.952	Mo VII
1002.024	Cr V	1078.2	V XVIII	1136.050	Ti V	1190.4	Cu XIV
1002.371	Ti III	1079.3	Fe XXIII	1137.529	Cr V	1190.867	Cr VII
1002.8	Kr VI	1080.637	Fe VII	1138.177	Cr V	1191.1	Ni XXI
1004.361	V VI	1080.736	Fe VII	1139.275	Ti V	1191.195	Ti V
1004.669	Ti III	1081.204	Ti III	1140.489	Cr V	1191.59	Kr VIII
1005.797	Ti III	1082.^{C}	Mo XLI	1141.435	Fe VII	1192.353	Ti V
1006.4^{C}	Mn XXI	1082.896	Ti III	1142.737	V V	1193.492	Cr VII
1007.163	Ti III	1083.917	V VI	1143.395	V V	1193.492	Cr VII
1008.119	Ti III	1085.742	V VI	1145.256	Ti V	1193.950	Cr V
1008.709	V VI	1086.382	V IV	1146.668	Cr V	1194.462	V IV
1009.758	V VI	1086.681	Cr VI	1147.571	Ti V	1194.950	V VI
1010.260	Fe VII	1087.861	Fe VII	1150.^{C}	Kr XXXV	1195.208^{C}	Ti IV
1011.14	Kr VI	1089.079	Cr V	1152.509	Ti V	1196.042	Cr V
1011.20	Mo VI	1092.00	V V	1153.20	Fe XVII	1197.1	Kr VII
1014.565	V VI	1094.583	Ti V	1153.274	Ti V	1197.598	Ti V
1015.77	Kr VI	1094.583	Ti V	1153.274	Ti V	1198.481	Cr VII
1016.072	Fe VII	1095.343	Fe VII	1154.992	Fe VII	1198.659	Ti V
1016.204	V VI	1096.375	V IV	1157.575	V V	1199.22	Kr VIII
1019.216	Mo VII	1096.77	Kr VIII	1157.60	Kr VIII	1200.834	Cr V
1019.249	V VI	1097.585	Ti V	1159.516	V V	1201.556	Cr V
1019.257	Mo VII	1098.222	V V	1163.516	Cr VII	1202.7	Kr VII
1019.76	Mo VI	1100.0^{C}	Cr XXII	1163.520	Ti V	1203.011	Ti V
1024.663	V VI	1102.2^{C}	Co XXII	1163.879	Fe VII	1204.126	Cr V
1027.219	V VI	1103.390	Cr V	1163.947	Cr VII	1205.9	Cr XX
1029.044	V VI	1103.926	Cr VI	1164.146	Cr VI	1207.866	Cr VII
1029.842	Cr V	1104.225	Ti III	1164.634	Ti V	1208.375	Fe VII
1031.105	Cr V	1104.296	Cr V	1165.508	Mo VII	1210.290	Ti V
1033.452	Cr V	1104.300	V VI	1166.183	Fe VII	1210.499	Cr V
1035.037	Cr V	1105.^{C}	V XVII	1166.6	Kr VII	1214.000	Ti V
1037.905	Mo VII	1106.250	Cr V	1166.982	Ti V	1215.373	Ti V
1038.64	Mo VI	1106.646	Ti III	1167.222	Cr VI	1215.38	Mo VI
1038.953	V VI	1107.225	Cr VI	1168.043	Ti V	1215.483	Mo VII
1039.125	Ti V	1108.322	Cr V	1168.8	Kr VII	1216.43	Fe XIII
1039.543^{C}	V IV	1109.731	Cr V	1168.927	Ti V	1217.779	Ti V
1039.690	Mn VI	1110.720	V IV	1169.3	Kr VII	1218.134	Mo VII
1040.980^{C}	V IV	1111.^{C}	Mn XIX	1169.9^{C}	Ti IX	1221.^{C}	Co XX
1041.121	Mn VI	1112.199	V IV	1170.^{C}	Kr XXXV	1222.352^{C}	V IV
1042.544	Cr V	1112.436	V IV	1170.^{C}	Mn XVII	1222.359	Ti V
1042.544	Cr V	1112.452	Cr V	1170.143	Cr VII	1224.1	Ti XVI
1045.044	Cr V	1113.952	Ti V	1171.4^{C}	Ti IX	1224.469	Ti V
1045.23	Kr VI	1114.114	Cr VI	1172.340	Ti V	1225.05	Ni XII
1045.711	V V	1114.350	Cr V	1172.8	Kr VII	1225.178	V VI
1045.733	Cr V	1116.478	Cr V	1173.915	Fe VII	1226.523	V IV
1046.294	Cr V	1117.559	Cr V	1174.1^{C}	Ti XIX	1226.588	Ti V
1046.364	Cr V	1117.580	Fe VII	1174.72	Ni XIV	1226.653	Fe VII
1046.542	Cr V	1118.060	Fe XIX	1177.469	Cr VI	1227.07	Mo VI
1047.18	Mo VI	1118.157	Cr V	1177.719	Ti V	1230.^{C}	Mn XIX
1047.494	Cr V	1118.518	Cr V	1179.541	Ti V	1230.361	Ti V
1048.236	Cr V	1119.037	Mo VII	1180.^{C}	Co XXVI	1233.387	Ti V
1050.901	Cr V	1120.^{C}	Kr XXXV	1180.823	Fe VII	1235.461	Ti III
1052.591	V VI	1120.6^{P}	Co XIV	1181.192	Ti V	1236.230	Mn VI
1053.3	Kr VI	1121.066	Cr V	1181.192	Ti V	1237.028	Ti III
1054.991	Cr V	1122.255	Cr V	1181.920	Cr VII	1237.4^{C}	Ti XII

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
1239.690	Fe VII	1293.483	V VI	1354.08	Fe XXI	1426.335	V VI
1239.958	Ti V	1293.710	Ti V	1355.131	V IV	1426.644	Cr VII
1239.958	Ti V	1294.698	Ti III	1356.529	V IV	1426.654	V IV
1241.^{C}	Ti XVI	1294.698	Ti III	1356.724	Ti V	1427.755	Mo VII
1241.671	Ti V	1295.883	Ti III	1356.852	Mn VI	1429.114	V IV
1241.671	Ti V	1296.225	Mo VII	1359.^{C}	Mn XVIII	1429.222	Ti V
1242.00	Fe XII	1298.^{C}	Mn XVIII	1359.59	Mn XI	1432.593	V VI
1242.248	V IV	1298.659	Ti III	1360.504	Cr VI	1433.189	V VI
1243.718	V IV	1298.659	Ti III	1361.923	V VI	1433.276	V IV
1244.287	V IV	1298.970	Ti III	1363.^{C}	Ti XVIII	1434.092	V IV
1244.405	Ti V	1300.^{C}	Cu XXIX	1363.148	Ti V	1434.842	V IV
1244.442	Fe VII	1300.^{C}	Fe XXV	1365.021	Ti III	1439.834	V IV
1246.131	Ti V	1302.551	Cr VII	1367.797	Ti V	1440.^{C}	Mn XXIV
1247.069	V IV	1304.173	V IV	1367.897	Mo VII	1440.01	Cr XI
1250.918	V IV	1304.917	Mo VII	1368.442	Ti III	1440.2	Ti XV
1253.079	Ti V	1305.018	Ti V	1368.7^{C}	Co XII	1441.426	Ti V
1255.186	Mo VII	1305.420	V IV	1370.52	Ni XII	1441.713	Ti V
1255.766	Mn VI	1306.108	Ti V	1378.552	Ti V	1447.120	V IV
1255.832	Cr VI	1307.696	Cr VII	1379.960	Ti III	1448.457	Cr VII
1257.442	Ti V	1308.061	V IV	1380.^{C}	Co XXVI	1449.681	V IV
1258.^{C}	Mo XLI	1308.42	Ti XII	1380.105	V VI	1450.^{C}	Fe XXV
1258.413	Mn VI	1309.502	V IV	1380.935	Ti V	1450.358	Ti III
1258.5^{C}	Co XIII	1312.307	Cr VII	1386.9^{C}	V XVI	1450.49	Mn XI
1259.986	Cr V	1312.717	V IV	1391.105	V IV	1451.042	V IV
1260.^{C}	Cu XXVIII	1313.339	Mo VII	1391.173	Mn VI	1451.496	V IV
1260.278	V V	1315.712	Ti V	1391.218	Mn VI	1451.517	V VI
1261.128	Cr VI	1317.566	V IV	1393.366	Cr VII	1451.736	Ti IV
1263.501	Cr V	1319.885	Cr VII	1395.001	V IV	1454.000	V IV
1263.844	Fe VII	1320.^{C}	Ni XXVII	1396.708	Mn VI	1455.194	Ti III
1264.04	Mo VI	1320.33	Mo VI	1400.416	V IV	1455.282	Cr VI
1264.101	Mn VI	1321.08	Ti XII	1403.280	Ti V	1455.734	Ti III
1264.659	Ti V	1321.719	V IV	1403.562	Ti V	1457.6	V XIX
1264.746	Cr VI	1321.917	V IV	1403.618	V IV	1458.660	Mn VI
1265.138^{C}	Ti IV	1322.23	Mn XII	1404.376	V VI	1460.723	Ti V
1266.272^{C}	Ti IV	1322.58	Ti XII	1405.156	Mn VI	1460.991	V VI
1267.68	Kr VIII	1322.58	Ti XII	1405.911	Ti V	1462.65	Kr XXIII
1268.490	Ti V	1324.5^{C}	V XXI	1408.312	Mn VI	1463.^{C}	Ni XXVIII
1268.51	Mo VI	1326.279	Ti V	1408.381	V VI	1463.49	Fe X
1268.7	Kr XXI	1326.666	V IV	1408.639	V IV	1465.683	Ti V
1269.^{C}	Cu XXIX	1326.807	V IV	1410.018	V IV	1465.861	Cr V
1270.^{C}	Co XXI	1327.592	Ti III	1410.054	V VI	1466.460	V VI
1271.153	V IV	1328.572	Ti V	1410.60	Cr XVI	1467.06	Fe XI
1272.444	Mn VI	1329.288	V IV	1411.309	Ti V	1467.338	Ti IV
1272.972	V IV	1329.837	Ti III	1412.686	V IV	1467.588	Mo VII
1273.529	V IV	1329.968	V IV	1414.409	V IV	1469.188	Ti IV
1276.94	Kr VIII	1330.355	V IV	1414.842	V IV	1476.458	Mo VII
1277.23	Ni XIII	1331.665	V IV	1416.416	V VI	1477.769	Cr V
1281.091	Ti V	1332.381	Fe VII	1417.659	Cr VI	1479.17	Mo VI
1281.439	Cr VI	1332.459	V IV	1418.533	V IV	1481.651	Cr V
1281.439	Cr VI	1333.874	Mn VI	1418.921	V IV	1482.757	Cr V
1281.439	Cr VI	1334.039	V VI	1419.580	V IV	1484.666	Cr V
1281.541	Ti V	1334.493	V IV	1420.036	Ti III	1488.755	Mn VI
1282.195^{C}	Ti IV	1336.^{C}	Cr XVIII	1420.440	Ti III	1489.04	Cr X
1282.484	Ti III	1336.317	Mo VII	1421.413	Mo VII	1489.711	Cr V
1283.334^{C}	Ti IV	1338.494	Mo VII	1421.631	Ti III	1490.107	V V
1283.463	Ti V	1339.335	V IV	1421.767	Ti III	1491.978	Ti III
1285.^{C}	Mn XX	1339.691	Ti III	1422.278	Mo VII	1496.597	Ti III
1285.102	Mn VI	1340.^{C}	Mn XX	1422.405	Ti III	1497.421	Mo VII
1286.036	Ti V	1340.7	Cr XVII	1423.100	V VI	1497.966	Cr V
1286.238	Ti III	1341.162	Mo VII	1423.420	V IV	1498.697	Ti III
1286.365	Ti III	1342.741	Cr VI	1423.719	V IV	1499.173	Ti III
1289.299	Ti III	1344.493	V IV	1424.140	Ti III	1499.596	V V
1291.622	Ti III	1345.494	Mn VI	1424.197	V IV	1500.^{C}	Mo XLI
1293.2^{C}	Mn XXII	1347.030	V IV	1424.916	V IV	1500.^{C}	Ni XXVIII
1293.228	Ti III	1349.40	Fe XII	1425.525	V VI	1502.311	Ti III

Finding List – Continued

Wavelength (Å)	Spectrum
1504.621	Ti III
1504.974	Ti III
1506.084	Ti III
1510.51	Ni XI
1512.655	V VI
1515.020	V VI
1516.104	V VI
1517.931	V VI
1518.181	Ti V
1519.030	Cr V
1520.[C]	Mn XXIV
1520.142	V IV
1522.493	V IV
1525.756	V IV
1527.223	V IV
1527.721	V IV
1536.373	V VI
1538.546	Ti V
1548.430	Mn VI
1550.435	Mo VII
1564.10	Cr X
1564.685[C]	Ti IV
1564.850[C]	Ti IV
1565.[C]	Cr XXI
1569.423	Ti V
1573.0[C]	V X
1574.2[C]	Mn X
1579.696	Cr V
1582.56	Fe X
1584.942	V VI
1590.[C]	Cr XXIII
1590.506	V VI
1590.568	Mo VII
1591.721	Cr V
1595.45	Mo VI
1598.697	Ti V
1600.[C]	Cr XXIII
1600.353	Ti V
1600.726	Ti V
1601.915	V IV
1603.191	Cr V
1603.21	Fe X
1605.93	Ni XI
1607.035	Cr V
1609.1[C]	Ti XX
1611.330	Cr V
1611.70	Fe X
1611.879	V IV
1622.607	Cr V
1624.[C]	V XVII
1629.786	V VI
1630.613	Ti V
1630.989	Cr V
1633.3[C]	V IX
1633.780	Ti V
1638.495	Cr V
1639.403	Cr V
1640.158	Mo VII
1644.053	Cr V
1652.256[C]	Ti III
1652.595	Cr V
1655.639	Cr V
1656.3	Cr XVII
1656.78	Kr VIII
1660.935[C]	Ti III
1661.22	Mo VI
1665.[C]	Ti XVIII
1673.99	Mo VI
1675.150	Ti V
1678.[C]	Mn XX
1680.204	V V
1684.647[C]	Ti III
1686.74	Ni XII
1687.165	Ti V
1689.501[C]	Ti III
1691.0	Cu XXIII
1693.9[C]	Cr IX
1694.1[C]	V IX
1695.2[C]	Co XXVII
1696.031	Ti V
1696.29	Mo VI
1700.[C]	V XXII
1705.629	Cr V
1705.968	Cr V
1711.331[C]	Ti III
1715.352[C]	Ti III
1716.725	V V
1717.396	Ti V
1717.42	Ni XI
1718.07	Mo VI
1719.4	V XV
1720.[C]	Cu XXVIII
1720.712	V V
1724.7[C]	Ti IX
1724.994	V V
1728.497	Cr V
1731.73	Mo VI
1736.182	V V
1736.4[C]	Mn XXII
1740.[C]	Co XXVII
1747.639	Ti V
1748.671	Ti V
1756.36	Kr VII
1757.523[C]	Ti III
1758.994[C]	Ti III
1759.561[C]	Ti III
1759.757	Ti V
1760.[C]	V XXII
1764.[C]	Mn XIX
1764.5[C]	Cr XV
1766.99	Kr VIII
1770.644[C]	Ti III
1771.452	Ti V
1776.0	Cu XXIV
1777.672[C]	Ti III
1778.1	Ti XVIII
1778.651[C]	Ti III
1782.007[C]	Ti III
1783.644[c]	Ti III
1784.450[C]	Ti III
1785.88	Mo VI
1787.418[C]	Ti III
1788.979[C]	Ti III
1792.589[C]	Ti III
1792.672[C]	Ti III
1792.992	V V
1797.159[C]	Ti III
1797.5[C]	Ti VIII
1797.646	V V
1797.765[C]	Ti III
1799.082	Ti V
1800.[C]	Kr XXXV
1800.[C]	Ti XXI
1803.080[C]	Ti III
1806.184	V IV
1809.854	V IV
1810.566	V IV
1811.185[C]	Ti III
1811.425	V V
1813.050	V IV
1817.45	Kr VI
1817.676	V IV
1820.76	Mo VI
1825.406[C]	Ti III
1825.836	V IV
1827.899	Ti V
1828.252[C]	Ti III
1828.292	Ti V
1829.415[C]	Ti III
1829.605[C]	Ti III
1830.4[C]	V VIII
1831.426[C]	Ti III
1831.875	Ti V
1832.274[C]	Ti III
1832.5[T]	Kr VII
1833.550[C]	Ti III
1834.721	Mo VII
1837.436	Ti V
1837.442	Cr V
1841.490	Ti V
1841.57	Fe IX
1845.4[C]	Ti VIII
1847.5[T]	Kr VII
1849.961[C]	Ti III
1855.765	Ti V
1861.558	V IV
1864.451	Ti V
1866.75	Ni XIV
1871.3	Cu XVI
1877.911[C]	Ti III
1878.458	Ti V
1878.894[C]	Ti III
1881.886	Ti V
1884.638[C]	Ti III
1890.[C]	Ni XXVII
1895.[C]	Mn XVIII
1901.417[C]	Ti III
1907.462	Cr VI
1908.[C]	V XX
1910.062	V V
1916.7	Kr VIII
1917.21	Fe IX
1917.47	Ni XXIII
1917.686	V V
1918.25	Fe X
1920.163	Ti V
1921.915	V V
1924.089	Cr VI
1925.823[C]	Ti III
1928.88	Ni XXII
1929.10	Kr VIII
1929.138	V V
1929.448[C]	Ti III
1930.[C]	Ti XXI
1932.783	Cr VI
1933.955	Cr VI
1935.306[C]	Ti III
1939.065	V IV
1940.009[C]	Ti III
1940.909[C]	Ti III
1941.510[C]	Ti III
1943.978[C]	Ti III
1944.271[C]	Ti III
1946.[C]	Mo XLI
1946.322[C]	Ti III
1946.434	Ti V
1946.563	Mo VII
1946.772	V IV
1947.540[C]	Ti III
1948.508	Ti III
1948.909[C]	Ti III
1950.20	Kr VI
1950.612[C]	Ti III
1950.640[C]	Ti III
1951.432	V IV
1956.009[C]	Ti III
1956.108[C]	Ti III
1957.172[C]	Ti III
1960.154	Mo VII
1962.154	V V
1962.969[C]	Ti III
1963.103	V IV
1963.730	Mo VII
1965.298[C]	Ti III
1966.244	V IV
1969.475	Mo VII
1970.017[C]	Ti III
1971.471	V IV
1975.1[C]	Fe XXVI
1978.981[C]	Ti III
1979.814	Mo VII
1982.422	V IV
1985.5	Kr VII
1988.750	Ti V
1989.4[C]	Ti VII
1990.712	V IV
1991.915	Mo VII
1993.[C]	Ti XVI
1997.722	V IV
1999.320	V IV
Air	
2000.4	Ni XI
2002.480	V IV
2003.14	Mo VI
2007.360	Ti III
2007.604	Ti III
2010.800	Ti III
2011.180	V IV
2014.199	V IV
2015.[C]	Mn XIX
2016.880	Mo VII
2017.614	Ti V
2027.[C]	Fe XXVI
2027.144	V IV
2033.572	Mo VII
2042.35	Fe IX
2042.454	V IV
2042.7	V XVI

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
2044.777	Cr VI	2176.648	Cr VI	2356.369	V IV	2544.7	Cu XVI
2044.777	Cr VI	2179.154	Mo VII	2356.624	V IV	2545.08	Ti XV
2044.777	Cr VI	2184.26	Ni XIV	2359.142	Ti IV	2546.228	V IV
2045.858	Ti V	2186.394	V IV	2359.499	Ti IV	2546.880	Ti IV
2049.8	Kr VII	2187.562	V IV	2364.512	V IV	2547.314	Ti IV
2051.06	Kr VI	2188.0^{C}	Mn XXI	2370.260	V V	2548.01	Ti III
2055.376	Mo VII	2192.39	Ti III	2373.4^{C}	Co XII	2548.588	Ti III
2056.8	Kr VII	2193.25	Mo VI	2373.458	V V	2548.765	Ti III
2060.113	V IV	2193.60	Ti III	2374.986	Ti III	2550.971	V IV
2063.563	V IV	2195.388	V IV	$2377.^{C}$	Mn XXV	2556.567	Ti III
2067.564	Ti IV	2199.223	Ti III	2378.290	V IV	2556.915	V IV
2068.3	Kr VII	$2200.^{C}$	Kr XXXV	2381.712	V IV	2557.897	V IV
2068.7	Kr VIII	2200.862	Mo VII	2384.634	Ti V	$2559.^{C}$	Mn XX
$2070.^{C}$	Co XXVI	2204.859	Mo VII	2384.729	V IV	2563.436	Ti III
2073.3	Kr VII	2205.8^{C}	Mn XXI	2387.663	V IV	2565.423	Ti III
2076.3	Kr VII	2214.740	Ti V	2395.450	V IV	2565.93	Fe XII
2078.973	Mo VII	2219.9	Kr VIII	2402.855	V IV	2567.556	Ti III
2079.300	V IV	2225.59	Ti III	2405.68	Fe XII	2569.812	V IV
2084.433	V IV	2236.4^{C}	Mn XXI	$2410.^{C}$	Cu XXVIII	2570.724	V IV
2085.3	Cu XV	2236.90	Ti III	2413.256	V IV	2576.470	Ti III
2085.51	Ni XV	2237.2	Kr VIII	2413.524	V IV	2577.127	V V
2086.073	V IV	2237.773	Ti III	2413.989	Ti III	2578.77	Fe XIII
2088.737	V IV	2239.62	Ti III	2416.552	V IV	2580.456	Ti III
2090.9	Cr XIX	2245.5^{C}	Co XIII	2418.3^{L}	Kr VIII	2584.636	V IV
2091.104	Ti V	$2247.^{C}$	Co XXI	2421.317	V IV	2587.258	V IV
2097.299	Ti III	2248.554	Mo VII	2425.3^{L}	Kr VIII	2592.747	V IV
2098.042	Ti V	$2268.^{C}$	Mn XIX	2431.885	V IV	2595.858	V IV
2099.862	Ti III	2268.298	V IV	2432.518	V IV	2596.761	V IV
2103.106	Ti IV	$2270.^{C}$	Cu XXVIII	2433.530	V IV	$2598.^{C}$	Co XIII
2103.60	Ti III	$2270.^{C}$	Fe XXV	$2440.^{C}$	Cu XXVIII	2598.287	V IV
$2104.^{C}$	Co XXII	2273.28	Mo VI	2446.017	V IV	2599.983	V IV
2104.857	Ti III	2273.428	Mo VII	2446.802	V IV	2603.213	V IV
2105.092	Ti III	2276.5	Kr VIII	2449.404	V IV	2605.523	V V
2105.709	V IV	$2280.^{C}$	Cu XXVIII	2449.723	V IV	2606.4	Cr XVIII
2106.560	V IV	$2280.^{C}$	Ti XVI	2450.329	V IV	2607.633	V IV
2114.018	Mo VII	2285.4	Mo XXVIII	2450.869	V IV	2610.098	V V
2117.15	Ti XIV	2290.2^{C}	Co XIII	2463.796	V IV	2610.323	V IV
2120.052	V IV	2292.2	Kr VIII	2464.720	V IV	2614.154	V IV
2125.50	Ni XIII	2293.43	Mo VI	2467.287	V IV	2620.320	V IV
2129.58	Ti III	2295.7^{T}	Kr VIII	2478.119	V IV	2620.5	V V
2129.934	V IV	2298.0	Fe XXI	$2480.^{C}$	Mn XXIV	2623.483	V IV
2136.330	V IV	$2300.^{C}$	Kr XXXV	2480.739	V IV	2624.213	V IV
2136.433	Cr VI	2313.236	V IV	2487.4^{C}	Mn XXII	2628.090	V IV
2137.741	V IV	$2314.^{C}$	Mn XXV	2494.351	V IV	$2634.^{C}$	V XVIII
2137.8	Kr VIII	2318.95	V V	2495.708	Cr VI	2636.401	V IV
2138.90	Ti III	$2320.^{C}$	Kr XXXV	2497.049	V IV	2636.936	V IV
2141.199	V IV	2320.4^{P}	Co XIV	2497.5	Fe IX	2644.946	V IV
2146.828	V IV	2321.962	V IV	2506.969	V IV	2645.541	V IV
2149.852	V IV	2322.259	V IV	2509.606	V IV	2648.71	Fe XI
2150.231	V IV	2326.291	V IV	$2510.^{C}$	Ni XXVII	2650.613	V IV
2150.231	V IV	2326.749	V V	2511.377	V IV	2655.408	V IV
2150.819	Mo VII	2327.019	Ti III	2512.242	V IV	2656.868	V IV
2151.039	Mo VII	2331.352	Ti III	2516.053	Ti III	2665.1	Fe XX
2151.087	V IV	2331.66	Ti III	2519.803	V IV	2667.837	V IV
2152.3^{T}	Kr VIII	2334.340	Ti III	2527.8	Kr VIII	2669.483	V IV
2155.336	V IV	2338.032	V IV	2527.840	Ti III	$2674.^{C}$	Mn XII
$2157.^{C}$	Cr XXI	2339.000	Ti III	2529.9	Kr VIII	2686.5	Mo XXIV
2159.055	V IV	2339.548	V IV	2530.520	V IV	2688.32	Ti IV
2160.222	V IV	2340.140	V IV	2532.982	V IV	2689.39	Ti IV
2162.498	V IV	2340.704	V IV	$2535.^{C}$	Mn XII	$2690.^{C}$	Ni XXVII
2167.200	V IV	2344.6	Ti XIX	2538.3^{C}	Mn XI	2692.158	Ti III
2169.08	Fe XII	2346.786	Ti III	$2540.^{C}$	Ni XXVII	2694.4^{C}	Cr X
2170.384	V IV	2350.8	Mo XXVII	2540.057	Ti III	2701.956	Ti III
2173.893	V IV	2351.934	V IV	2541.786	Ti IV	2703.933	V IV
2175.449	Mo VII	2353.639	V IV	2542.444	Ti III	2703.933	V IV

Finding List – Continued

Wavelength (Å)	Spectrum
2716.594	V IV
2717.[C]	V XX
2718.64	Ti III
2718.722	V IV
2720.[C]	Mn XVIII
2720.[C]	Ni XXVII
2722.[C]	Ti XVI
2727.780	V IV
2728.[C]	Cr XXIV
2730.[C]	Cr XXIII
2740.545	V IV
2740.669	V V
2740.966	V IV
2743.523	V IV
2751.528	V IV
2758.4[C]	Cr XI
2763.860	V IV
2764.219	V IV
2773.3[C]	Cr XI
2773.72	Ti III
2774.0[C]	Ti XIII
2774.997	V V
2777.[C]	Cr XXI
2780.[C]	Co XXVI
2780.139	V V
2786.01	Ti III
2791.7[C]	Co XIII
2798.72	Ti III
2798.910	Ti III
2799.3[C]	Cr XI
2802.94	Ti III
2803.15	Ti III
2806.[C]	Cr XXIV
2807.20	Ti III
2809.[C]	Co XXIV
2812.57	Ti III
2818.52	Ni XXI
2818.992	Ti III
2820.[C]	Co XXVI
2820.78	Ti III
2821.69	Ti III
2824.131	V IV
2824.45	Ti III
2825.90	Ti III
2834.089	V IV
2836.972	Ti IV
2841.1	Mo XXIX
2847.26	Ti III
2850.160	V IV
2861.[C]	Mn XII
2862.596	Ti IV
2874.2[C]	Cr XI
2885.4	Cr XIX
2888.14	Ti III
2889.36	Ti IV
2899.575	V IV
2925.9[C]	Mn XI
2927.2	V V
2929.961	Ti IV
2930.490	Ti III
2931.2	V V
2937.328	Ti IV
2949.2	Kr VIII
2950.134	V V
2956.0[C]	Mn X
2957.306	Ti IV
2970.4	Kr VIII
2973.5	Kr VIII
2984.747	Ti III
2992.0	V V
3000.[C]	Cu XXVIII
3000.[C]	V XXII
3000.	Fe IX
3004.2	V V
3005.3[C]	V X
3007.6	Cu XVII
3010.[C]	Co XXVI
3014.5[C]	V X
3020.1	Fe X
3033.8[C]	V X
3034.27	V IV
3040.[C]	Co XXVI
3040.513	Ti III
3052.346	V IV
3055.864	V IV
3060.146	V IV
3066.51[C]	Ti III
3067.85	V IV
3070.[C]	Fe XXV
3072.0	Fe XII
3077.476	V IV
3084.36	V IV
3092.641	V V
3096.226	V IV
3099.2[P]	Co XIV
3101.5[C]	V X
3110.416	V IV
3113.022	V IV
3121.304	V IV
3122.43	Mo VI
3124.0	Fe IX
3133.32	Mo VI
3135.192	V IV
3139.94	V V
3140.[C]	Fe XXV
3140.[C]	Ni XXVII
3150.317	Ti III
3154.[C]	V XX
3154.518	Ti III
3156.718	Ti IV
3167.0	Ni XII
3167.828	Ti III
3170.955	Ti IV
3177.9[C]	Cr XI
3184.839	Ti III
3189.4	Kr VIII
3190.580	Ti III
3191.[C]	Ti XVI
3193.771	Ti III
3200.888	Ti III
3227.507	V IV
3227.945	Ti III
3228.887	Ti III
3229.92	V IV
3230.047	Ti III
3234.251	V IV
3235.282	Ti III
3239.77	Ti III
3240.[C]	V XXIII
3240.6[C]	Mn XI
3240.71	Ti III
3241.460	V IV
3245.589	Ti III
3246.628	Ti III
3254.881	Ti III
3259.[C]	Mn XIX
3263.426	Ti III
3267.1[C]	Ti XV
3268.077	V IV
3272.50	Ti IV
3272.773	Ti IV
3274.931	V IV
3278.31[C]	Ti III
3278.754	Ti III
3280.[C]	Co XXVI
3284.560	V IV
3284.6[C]	Ti IX
3290.[C]	Ti XXI
3293.00	Mo VI
3293.29	Mo VI
3294.259	V IV
3295.501	V IV
3295.764	Ti III
3297.7[C]	Ti IX
3298.371	V IV
3301.1[C]	Cr IX
3303.719	V IV
3307.[C]	V XVIII
3310.904	Ti III
3313.008	Ti III
3314.175	V IV
3315.742	Ti III
3316.470	V V
3318.788	V IV
3320.943	Ti III
3323.74	Mo VI
3326.4[C]	Cr X
3328.527	V IV
3331.105	Ti III
3332.252	Ti III
3333.457	Ti III
3333.986	V IV
3334.79	V IV
3337.4	Kr VIII
3338.5	Ni XI
3340.[C]	V XXIII
3340.202	Ti III
3343.20	Mo VI
3346.182	Ti III
3346.82	Ti III
3350.[C]	Fe XXV
3354.71	Ti III
3355.1	Fe IX
3357.922	Ti III
3358.101	Ti III
3359.9[C]	Ti IX
3363.517	V V
3370.625	Ti III
3370.8	Ti XVII
3371.089	V V
3371.623	Ti III
3371.971	Ti III
3376.007	Ti III
3377.686	Ti III
3377.896	Ti III
3380.[C]	Cu XXVIII
3381.7[L]	Kr VI
3381.9[C]	Mn XI
3382.714	Ti III
3385.336	V IV
3386.98	Mo VI
3388.5	Fe XIII
3390.[C]	Fe XXV
3390.222	Ti III
3392.945	Ti III
3394.7[L]	Kr VI
3395.387	Ti III
3395.981	Ti III
3396.432	Ti III
3397.235	Ti III
3400.[C]	Mn XXIV
3400.891	Ti III
3404.462	Ti III
3408.60	Mo VI
3411.404	Ti III
3417.621	Ti III
3421.161	Ti III
3433.52	V IV
3438.[C]	Ti XIX
3438.[C]	V XVII
3448.410	V IV
3450.[C]	Fe XXV
3452.741	V IV
3454.2	Fe X
3455.325	V IV
3459.40	V IV
3471.6	Fe IX
3471.989	V IV
3473.458	V IV
3476.60	Mo VI
3483.5	Kr VIII
3484.77	Mo VI
3486.9	Kr VIII
3487.63	V IV
3487.669	Ti III
3488.773	Ti III
3489.51	V IV
3490.913	V IV
3496.419	V IV
3500.4	Cu XIII
3500.57	V IV
3504.10	V IV
3505.70	V IV
3506.2	Kr VIII
3514.25	V IV
3525.89	V IV
3533.6	Fe X
3541.361	Ti IV
3545.98	V IV
3550.[C]	Mn XXIV
3550.718	V IV
3553.3	Mo XIII
3558.8[T]	Kr VIII
3576.438	Ti IV
3576.70	Ti III
3577.1	Fe X
3581.392	Ti IV
3590.0	Kr VIII
3597.[C]	Ti XVIII
3600.[C]	Mn XXIV

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
3601.23	Ni XVI	3948.365	Ti III	4218.518	Ti III	4320.^{C}	Mo XLI
3608.2^{C}	Cr X	3966.156	Ti IV	4220.^{C}	Cr XXIII	4321.91	Ti III
3609.269	V V	3966.598	V V	4220.282	Ti III	4325.93	Ti III
3615.039	V V	3970.204	Ti III	4221.357	Ti III	4326.824	Ti III
3617.966	V V	3979.12	Ti III	4222.98	Ti III	4326.824	Ti III
3633.^{C}	Ti XIX	3986.400	Ti III	4224.127	Ti III	4327.62	Ti III
3642.7	Fe IX	3986.8	Fe XI	4224.575	Ti III	4328.25	Ti III
3642.887	V V	3989.471	V V	4231.070	Ti III	4329.496	Ti III
3648.724	V V	3991.^{C}	Ti XXII	4231.2	Ni XII	4330.^{C}	Cr XXI
3677.8^{T}	Kr VIII	3995.525	Ti III	4232.04	Mo VI	4330.0^{C}	V X
3681.04	V IV	3996.8	Cr XI	4234.415	Ti III	4332.7^{L}	Kr VIII
3684.1	Kr VIII	4011.047	Ti III	4240.^{C}	Ni XXVII	4333.542	Ti III
3685.5	Mn XII	4012.631	Ti III	4241.29	Ti III	4335.81	Ti III
3690.^{C}	Ni XXVII	4014.1^{C}	V IX	4241.29	Ti III	4337.7	Kr VIII
3691.236	V IV	4030.^{C}	V XXII	4243.89	Ti III	4338.1	Kr VIII
3692.8^{C}	V VIII	4038.6	Cr XVIII	4243.89	Ti III	4338.22	Ti III
3702.9^{T}	Kr VIII	4047.538	Ti III	4246.24	Ti III	4338.712	Ti III
3708.1	Mo XVI	4060.^{C}	Co XXVI	4247.147	Ti III	4338.712	Ti III
3710.5	Kr VIII	4060.208	Ti III	4247.615	Ti III	4343.246	Ti III
3712.7	Kr VIII	4062.04	Mo VI	4248.540	Ti III	4348.04	Ti III
3725.8^{C}	Cr X	4066.169	Ti III	4249.^{C}	Co XX	4348.40	Ti III
3727.4	Kr VIII	4069.538	Ti III	4250.086	Ti III	4350.6	Co XV
3735.32	Mo VI	4069.538	Ti III	4252.121	Ti III	4352.282	Ti III
3746.36	V V	4069.992	Ti III	4254.114	Ti III	4357.27	Ti III
3755.5^{C}	Mn XXII	4079.958	Ti III	4257.045	Ti III	4358.89	Ti III
3759.0	Kr VIII	4098.879	Ti III	4258.472	Ti III	4359.4	Fe IX
3760.^{C}	Cr XXIII	4100.050	Ti III	4259.009	Ti III	4361.15	Ti III
3770.^{C}	Mn XXIV	4110.7^{C}	V IX	4260.763	Ti III	4362.34	Ti III
3770.2^{C}	V IX	4119.140	Ti III	4261.904	Ti III	4363.740	Ti III
3770.7	Kr VIII	4123.5	Mo XVII	4262.441	Ti III	4363.740	Ti III
3779.793	Ti III	4130.^{C}	V XXII	4262.93	Ti III	4365.33	Ti III
3800.^{C}	Mn XXIV	4131.215	Ti IV	4264.4^{C}	Ti VIII	4365.33	Ti III
3800.8	Fe IX	4133.779	Ti IV	4269.84	Ti III	4367.68	Ti III
3801.2	Co XII	4133.96^{C}	Ti III	4270.^{C}	Ti XXI	4368.56	Ti III
3816.178	Ti III	4134.5^{C}	Mn XXI	4270.95	Ti III	4375.1	V V
3820.^{C}	Cr XXIII	4136.72	V IV	4271.86	Ti III	4376.93	Ti III
3828.735	Ti III	4139.424	Ti III	4272.95	Mo VI	4377.77	Ti III
3833.74	V IV	4144.772	Ti III	4275.528	Ti III	4378.08	Ti III
3834.4	Ti XVII	4145.050	Ti III	4275.823	Ti III	4378.938	Ti III
3836.42	Ti III	4156.67	Ti III	4276.35	Ti III	4380.^{C}	V XXII
3840.9	Kr XXIII	4160.42	Ti III	4281.563	Ti III	4380.734	Ti III
3849.043	Ti III	4165.721	Ti III	4284.090	Ti III	4395.92	Ti IV
3857.^{C}	Mo XLI	4176.540	Ti III	4284.67	Ti III	4397.327	Ti IV
3872.495	Ti III	4180.^{C}	Cr XXIII	4285.61	Ti III	4398.729	Ti III
3873.491	Ti III	4180.02	Ti III	4286.516	Ti III	4400.570	Ti III
3876.^{C}	Ti XXII	4180.22	Ti III	4288.66	Ti III	4402.53	Ti III
3881.212	Ti III	4183.4	Cu XIV	4289.25	Ti III	4403.451	Ti IV
3893.629	Ti III	4183.58	Ti III	4291.925	Ti III	4406.197	Ti III
3896.330	Ti III	4191.091	Ti III	4293.34	Ti III	4407.31	Ti III
3897.250	Ti III	4192.141	Ti III	4293.735	V V	4414.489	Ti III
3910.^{C}	Cr XXIII	4200.061	Ti III	4295.03	Ti III	4424.399	Ti III
3915.253	Ti III	4200.322	V V	4295.03	Ti III	4428.298	Ti III
3915.472	Ti III	4201.662	Ti III	4295.42	Ti III	4428.298	Ti III
3921.384	Ti III	4203.410	Ti III	4296.702	Ti III	4430.635	Ti III
3921.611	Ti III	4203.410	Ti III	4299.5^{L}	Kr VIII	4433.912	Ti III
3922.953	Ti III	4204.916	Ti III	4304.505	Ti III	4439.23	Ti III
3924.092	Ti III	4207.491	Ti III	4308.39	Ti III	4440.^{C}	Cu XXVIII
3924.860	Ti III	4210.133	Ti III	4309.40	Ti III	4440.^{C}	Fe XXV
3929.2^{L}	Kr VIII	4212.47	Ti III	4310.481	Ti III	4440.657^{T}	Ti III
3938.456	Ti III	4212.95	Ti III	4311.^{C}	Ti XVIII	4442.25	Ti III
3940.^{C}	Cu XXVIII	4213.257	Ti III	4311.8	Fe X	4446.559	Ti III
3940.570	Ti III	4214.29	Ti III	4312.163	Ti III	4450.75	V IV
3941.6	Cu XVIII	4214.923	Ti III	4317.98	Ti III	4462.558	Ti III
3943.559	Ti III	4215.525	Ti III	4318.44	Ti III	4466.078	Ti III
3946.843	Ti III	4215.950	Ti III	4319.561	Ti III	4466.693	Ti III

Finding List – Continued

Wavelength (Å)	Spectrum
4479.195	V IV
4479.969	Ti III
4480.359	Ti III
4484.8	V V
4496.510	Ti III
4505.17	V IV
4507.112	Ti III
4508.67	V IV
4510.4	V V
4511.579	Ti III
4514.697	Ti III
4515.9	V V
4518.363	Ti III
4518.58	V IV
4519.42	Ti III
4520.^{C}	Kr XXXV
4520.375	Ti III
4521.146	Ti III
4533.26^{C}	Ti III
4540.216	Ti III
4544.314	Ti III
4545.976	Ti III
4549.842	Ti III
4555.456	Ti III
4555.777	Ti III
4560.^{C}	Ti XXI
4565.63	V IV
4572.204	Ti III
4572.204	Ti III
4572.85	Ti III
4576.532	Ti III
4578.521	Ti III
4579.642	Ti III
4581.730	Ti III
4585.3	Fe IX
4590.^{C}	Co XXVI
4601.51	Ti III
4608.15	V IV
4609.506	Ti III
4610.477	Ti III
4611.041	Ti III
4615.931	Ti III
4616.57	V IV
4618.114	Ti IV
4619.782	Ti III
4628.067	Ti III
4634.166	Ti III
4639.^{C}	Ti XVI
4643.985	V IV
4649.00	Ti III
4649.452	Ti III
4652.861	Ti III
4663.462	Ti III
4667.9	Kr VIII
4671.816	Ti III
4673.396	Ti III
4677.58	Ti IV
4680.580	Ti III
4690.^{C}	V XXII
4695.44	Ti III
4701.59	Ti III
4703.18	Ti III
4718.98	Ti III
4720.^{C}	V XXII
4720.90	Ti III
4731.11	Ti III
4744.^{T}	Ni XVII
4760.11	Ti III
4763.58	Ti III
4767.36	Ti III
4768.29	Ti III
4769.064	V V
4771.46	Ti III
4774.35	Ti III
4780.787	V V
4784.09	Ti III
4791.035	Ti III
4793.17	Ti III
4793.503	Ti III
4800.273	Ti III
4801.54	V IV
4802.32	Ti III
4810.61	Ti III
4821.80	Ti III
4824.531	Ti III
4828.990	V IV
4831.33	Ti III
4838.25	Ti III
4841.26	V IV
4845.21	V IV
4849.658	Ti III
4854.49	Ti III
4855.05	V IV
4856.22	Ti III
4858.129	Ti III
4865.938	Ti III
4873.995	Ti III
4880.^{C}	Ti XXI
4884.321	Ti III
4885.299	V V
4886.36	V IV
4891.52	V IV
4892.840	Ti III
4897.69	Ti III
4899.56	V IV
4900.^{C}	Mn XXIV
4900.^{C}	Ni XXVII
4906.280	V IV
4907.61	Ti III
4908.395	Ti III
4913.083	V IV
4914.315	Ti III
4916.94	V IV
4929.533	Ti III
4930.533	V V
4930.735	Ti III
4932.674	Ti III
4942.^{C}	Mn XX
4944.040	Ti III
4946.000	Ti III
4950.^{C}	Fe XXV
4950.104	Ti III
4954.408	V IV
4960.10	Ti III
4961.36	Ti III
4963.65	Ti III
4970.^{C}	Kr XXXV
4970.348	V IV
4971.194	Ti III
4971.941	V IV
4974.79	Ti III
4976.04	Ti III
4976.8	V V
4985.653	V IV
4988.36	Ti III
5005.16	Ti III
5008.80	Ti III
5008.80	Ti III
5010.14	Ti III
5018.92	Ti III
5020.43	Ti III
5021.^{C}	Mn XIX
5024.52	Ti III
5035.460	V IV
5042.77	Mo VI
5043.55	Mo VI
5049.98	Ti III
5064.00	Ti III
5068.22	Ti III
5069.39	Ti III
5074.90	V IV
5079.413	V V
5080.0	V V
5083.80	Ti III
5097.25	Ti III
5109.81	Ti III
5115.8	Ni XIII
5119.08	Ti III
5121.31	Ti III
5127.^{C}	V XX
5127.35	Ti III
5128.06	Ti III
5130.67	Ti III
5130.78	V IV
5136.66	Ti III
5146.502	V IV
5147.31	Ti III
5147.52^{C}	Ti III
5155.04	Ti III
5161.19	Ti III
5162.55	Ti III
5168.^{C}	Co XI
5172.^{C}	V XVII
5175.48	Ti III
5175.950	V IV
5193.42	Ti III
5200.^{C}	Ti XXI
5200.^{C}	Ti XXI
5205.96	Ti III
5212.6^{C}	Ti XV
5218.43	Ti III
5222.93	V IV
5226.28	Ti III
5227.89	V IV
5240.84	Ti III
5245.06	Ti III
5247.45	Mo VI
5247.49	Ti III
5256.77	Ti III
5257.33	Ti III
5262.164	V IV
5267.045	V IV
5276.86	Mo VI
5278.12	Ti III
5278.33^{C}	Ti III
5278.70	Ti III
5282.14	Ti III
5290.^{C}	Ti XVIII
5293.60	Ti III
5293.95	Ti III
5294.115	V V
5298.43	Ti III
5300.^{C}	Cr XXIII
5301.20	Ti III
5302.86	Fe XIV
5306.88	Ti III
5310.77	V IV
5323.53	Ti III
5328.40	Ti III
5349.91	Ti III
5352.320	V IV
5352.39	Ti III
5353.090	V IV
5355.75	Ti III
5356.070	V V
5356.51	Ti III
5358.53	Ti III
5366.750	V V
5367.17	Ti III
5375.8	Cu XVI
5387.210	V IV
5389.05	Ti III
5395.69	Ti III
5398.93	Ti IV
5400.^{C}	Co XXVI
5400.^{C}	Mn XXIV
5404.94	Ti III
5404.94	Ti III
5416.76	Ti III
5442.704	V V
5448.82	Mo VI
5468.98	Ti III
5470.98	Ti IV
5481.31	Ti III
5492.51	Ti IV
5496.67	V IV
5509.19	V IV
5517.72	Ti IV
5520.63	V IV
5533.01	Ti III
5539.1	Fe X
5566.58	Ti III
5608.71	V IV
5710.10	V IV
5800.^{C}	Cr XXIII
5817.44	Ti III
5848.8^{T}	Kr VIII
5877.79	Ti IV
5885.96	Ti IV
5891.15	Ti IV
5900.^{C}	Cu XXVIII
5900.^{C}	V XXII
5940.12	V IV
6000.^{C}	Fe XXV
6004.3^{C}	Mn XXI
6020.741	V V
6035.62	Mo VI
6056.3	Kr VIII
6065.5	Kr VIII
6066.620	V V

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
6085.^{C}	Ti XIX	7072.64	Ti III	7552.05	Ti III	8238.57	Ti III
6100.^{C}	Ni XXVII	7084.57	Ti III	7554.86	Ti III	8241.10	Ti III
6135.907	V V	7100.^{C}	Mn XXIV	7566.25	Ti III	8252.85	Ti III
6188.67	Mo VI	7100.^{C}	Mn XXIV	7578.26	Ti III	8263.67	Ti III
6188.907	V V	7124.13	Ti III	7579.^{C}	Ti XVI	8267.32	Ti III
6200.^{C}	Cu XXVIII	7141.76	Ti III	7595.511	V V	8267.32	Ti III
6231.62	Ti IV	7141.9^{T}	Ni IX	7595.75	Ti III	8267.32	Ti III
6246.65	Ti IV	7171.79	Ti III	7625.26	Ti III	8267.32	Ti III
6247.74	Ti IV	7175.92	Ti III	7652.12	Ti IV	8267.32	Ti III
6262.86	Ti IV	7203.66	Ti III	7687.67	Ti III	8276.20	Ti III
6292.41	Ti IV	7205.90	Ti III	7704.80	Ti III	8278.69	Ti III
6300.^{C}	V XXII	7211.94	Ti III	7706.85	Ti IV	8300.^{C}	Ti XXI
6319.^{C}	Co XII	7217.50	Ti III	7720.39	Ti III	8301.8^{C}	Ti III
6336.04	Mo VI	7225.55	Ti III	7742.64	Ti III	8305.41	Ti III
6374.51	Fe X	7228.40	Ti III	7773.19	Ti III	8305.41	Ti III
6385.56	Ti III	7228.7^{C}	Mn XXI	7775.95	Ti III	8305.41	Ti III
6400.^{C}	Co XXVI	7234.39	Ti III	7794.49	Ti III	8311.38	Ti III
6400.^{C}	Ni XXVII	7243.29	Ti III	7797.34	Ti III	8316.71	Ti III
6400.^{C}	Ti XXI	7252.88	Ti III	7805.03	Ti III	8338.54	Ti III
6447.73	Ti III	7270.67	Ti III	7809.53	Ti III	8358.45	Ti III
6462.734	V V	7288.98	Ti III	7842.22	Ti III	8394.20	Ti III
6478.300	V V	7292.86	Ti III	7867.90	Ti III	8400.^{C}	Ti XXI
6490.14	Ti III	7306.02	Ti III	7874.28	Ti III	8406.15	Ti III
6499.86	Ti III	7308.^{C}	Mn XX	7875.79	Ti III	8439.19^{C}	Ti III
6504.60	Ti III	7315.14	Ti III	7881.83	Ti III	8440.8^{P}	Co XIV
6536.3	Mn XIII	7316.30	Ti III	7891.8	Fe XI	8457.555	V V
6541.429	V V	7316.68	Ti III	7895.57	Ti III	8466.87	Ti III
6547.75	Ti III	7320.63	Ti III	7899.90	Ti III	8504.05	Ti III
6575.78	Ti III	7335.41	Ti III	7900.^{C}	V XXII	8505.88	Ti III
6600.^{C}	Co XXVI	7347.59	Ti III	7900.^{C}	V XXII	8516.40	Ti III
6611.38	Ti III	7370.14	Ti III	7955.11	Ti III	8527.03	Ti III
6621.58	Ti III	7371.34	Ti III	7968.5^{C}	Mn IX	8532.26	Ti III
6628.796	V V	7376.27	Ti III	7975.94	Ti III	8544.89	Ti III
6629.37	Ti III	7379.96	Ti III	7981.09	Ti III	8563.50	Ti III
6635.164	V V	7397.27	Ti III	8024.1	Ni XV	8566.24	Ti III
6644.51	Ti III	7400.^{C}	Cr XXIII	8030.70	Ti III	8573.53	Ti III
6647.47	Ti III	7408.13	Ti III	8098.47	Ti III	8584.05	Ti III
6667.99	Ti III	7417.60	Ti III	8100.^{C}	V XXII	8605.75	Ti III
6674.19	Ti III	7419.24	Ti III	8117.53	Ti III	8611.06	Ti III
6700.^{C}	Mn XXIV	7432.20	Ti III	8153.8	Cr XII	8618.79	Ti III
6700.^{C}	Ti XXI	7439.94	Ti III	8161.84	Ti III	8625.35	Ti III
6701.7	Ni XV	7441.72	Ti III	8161.84	Ti III	8662.79	Ti III
6707.76	Ti III	7450.45	Ti III	8161.84	Ti III	8699.85	Ti III
6724.80	Ti III	7457.85	Ti III	8163.09	Ti III	8703.30	Ti III
6734.10	Ti III	7460.04	Ti III	8164.06	Ti III	8731.24	Ti III
6782.37	Ti III	7473.32	Ti III	8165.85	Ti III	8739.^{C}	Mn XIX
6785.90	Ti III	7475.35	Ti III	8166.96	Ti III	8745.99	Ti III
6796.12	Ti III	7483.07	Ti IV	8172.21	Ti III	8795.28	Ti III
6800.^{C}	Fe XXV	7484.58	Ti III	8173.37	Ti III	8801.25	Ti III
6805.^{C}	Ti XVI	7491.37	Ti IV	8178.00	Ti III	8801.25	Ti III
6807.96	Ti III	7491.92	Ti III	8179.13	Ti III	8887.71	Ti III
6862.26	Ti III	7494.77	Ti IV	8182.42	Ti III	8916.95	Ti III
6874.35	Ti III	7495.18	Ti III	8187.79	Ti III	8931.21	Ti III
6896.12	Ti III	7500.^{C}	Cr XXIII	8189.78	Ti III	8938.06	Ti III
6900.^{C}	Fe XXV	7500.^{C}	Cr XXIII	8190.57	Ti III	8938.06	Ti III
6913.85	Ti IV	7505.^{C}	Ti XVIII	8192.68	Ti III	9000.^{C}	Ti XXI
6932.44	Ti III	7506.87	Ti III	8194.75	Ti III	9017.10	Ti III
6968.54	Ti IV	7507.68	Ti III	8198.30	Ti III	9024.05	Ti III
6978.51	Ti IV	7508.65	Ti III	8199.17	Ti III	9081.40	Ti III
6988.74	Ti IV	7511.59	Ti III	8200.10	Ti III	9193.52	Ti III
7015.38	Ti III	7515.98	Ti III	8202.13	Ti III	9242.2^{P}	Co XIV
7017.31	Ti III	7523.85	Ti III	8212.60	Ti III	9271.12	Ti III
7031.40	Ti III	7531.15	Ti III	8213.35	Ti III	9303.06^{C}	Ti III
7058.6	Fe XV	7540.99	Ti III	8229.26	Ti III	9898.^{C}	Ti XVIII
7071.93	Ti III	7544.29	Ti III	8235.58	Ti III	9978.3^{C}	Mn X

Finding List – Continued

Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum	Wavelength (Å)	Spectrum
10746.8	Fe XIII	10797.9	Fe XIII				

^{C} Wavelength calculated from energy level data using the Ritz combination principle.
^{T} Wavelength tentatively identified.
^{P} Wavelength predicted along an isoelectronic sequence.
^{S} Wavelength smoothed along an isoelectronic sequence.
^{L} Wavelength identified from isoelectronic study. The levels generating this line are not known.

4. SAMPLE GROTRIAN DIAGRAM

4.1. Explanation of Grotrian Diagrams

Notations on the Diagrams generally have the same meanings as for the Tables (see Explanation of Tables).

Abscissa

Energy of the levels in cm^{-1}.

Short vertical lines

Energy levels are indicated as the vertical lines. The electronic configuration (with the parentage in parentheses) and the level energy in cm^{-1} are given to the right of the vertical line, and above is the J value. Energy levels with the same LS label for the upper term are grouped together. The term designation is given at the right of the diagram; the ordering is by increasing multiplicity and orbital angular momentum. For the lower level, the term is adjacent to the configuration.

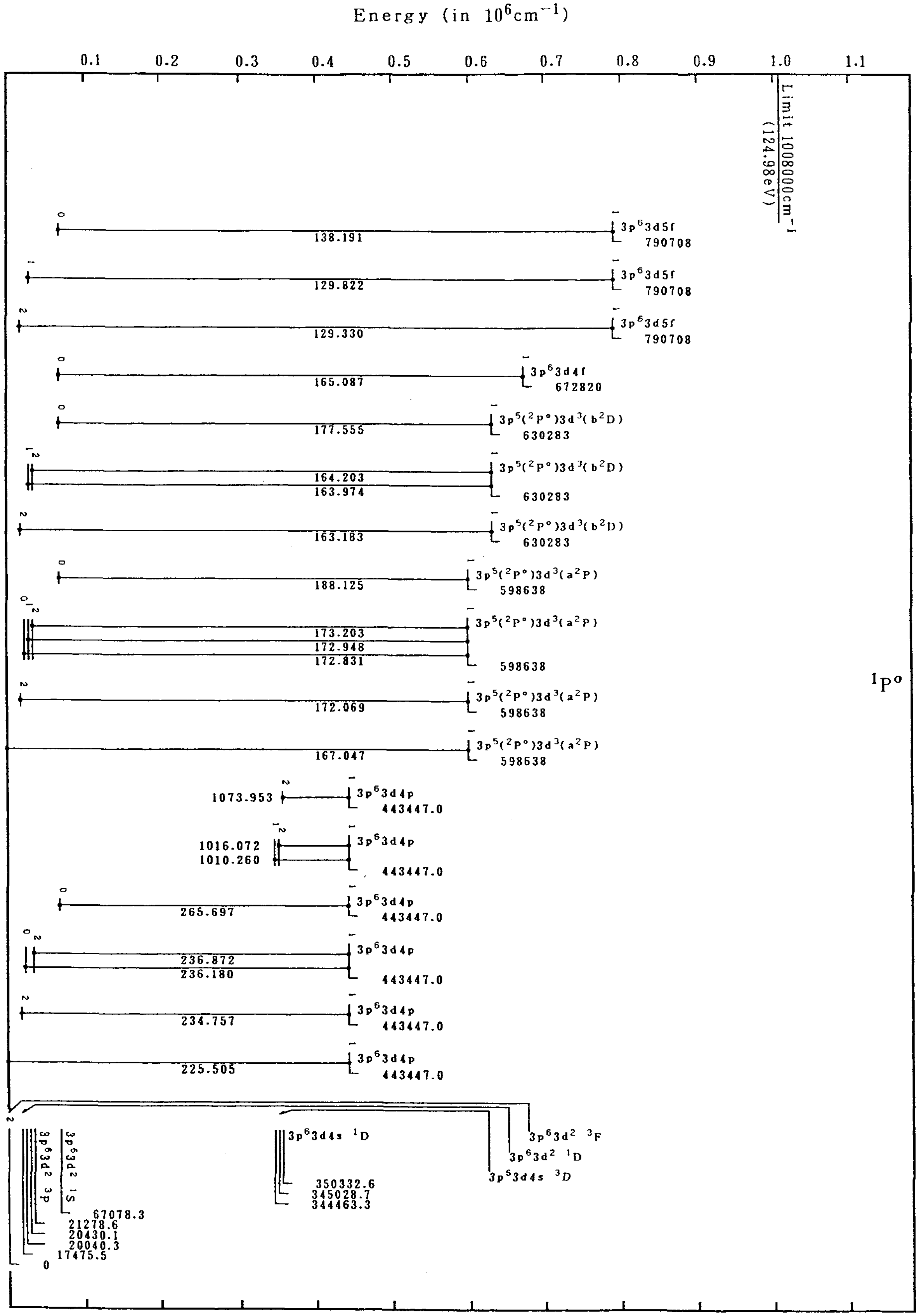
Horizontal lines

Transitions between levels. The number below each line gives the transition wavelength in Angstroms (10^{-8} cm). The numbers above are the J values of the upper and lower states. Heavier dashed lines indicate resonance transitions with absorption oscillator strengths $f \geq 0.01$.

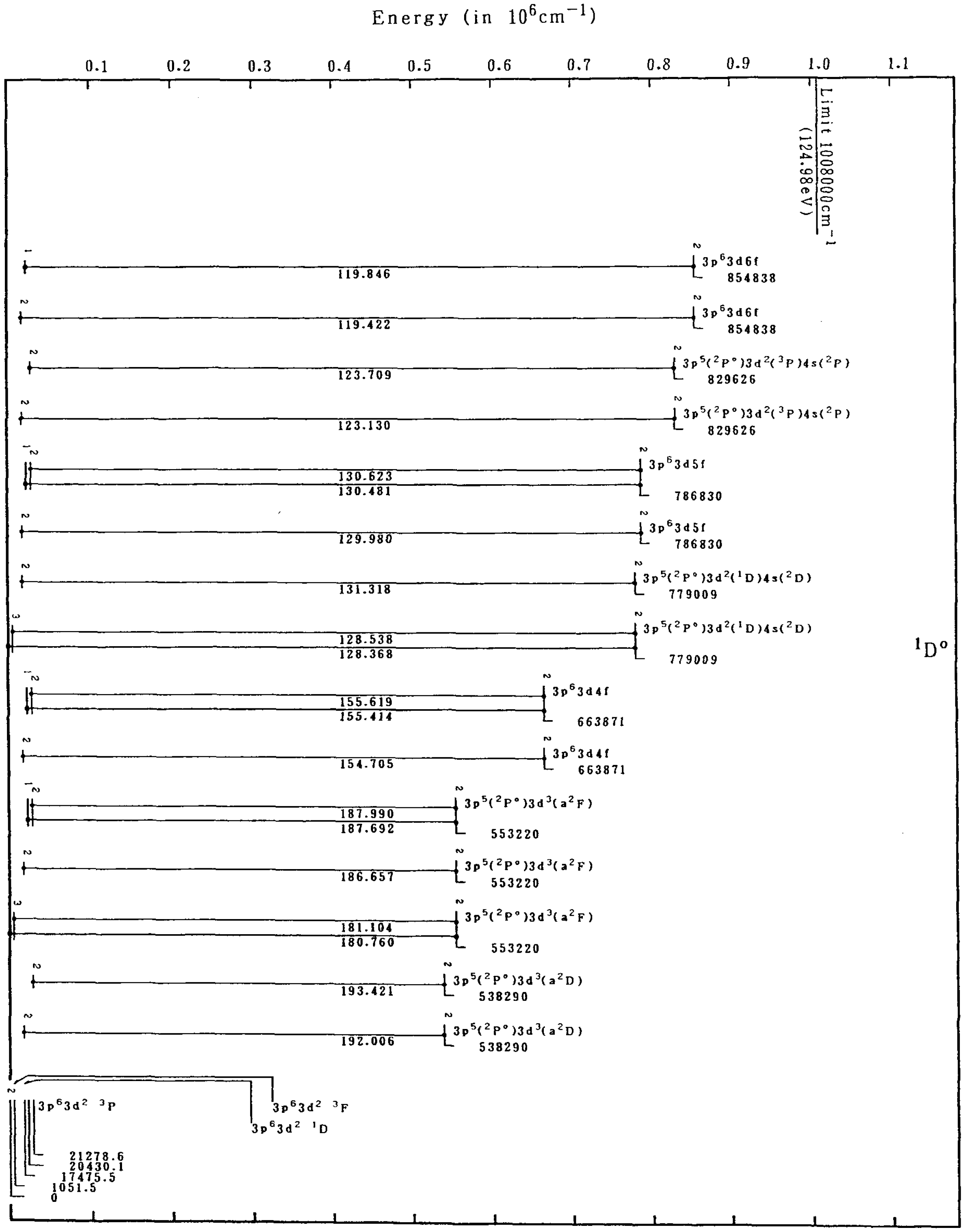
Limit

Principal ionization limit in cm^{-1} and eV.

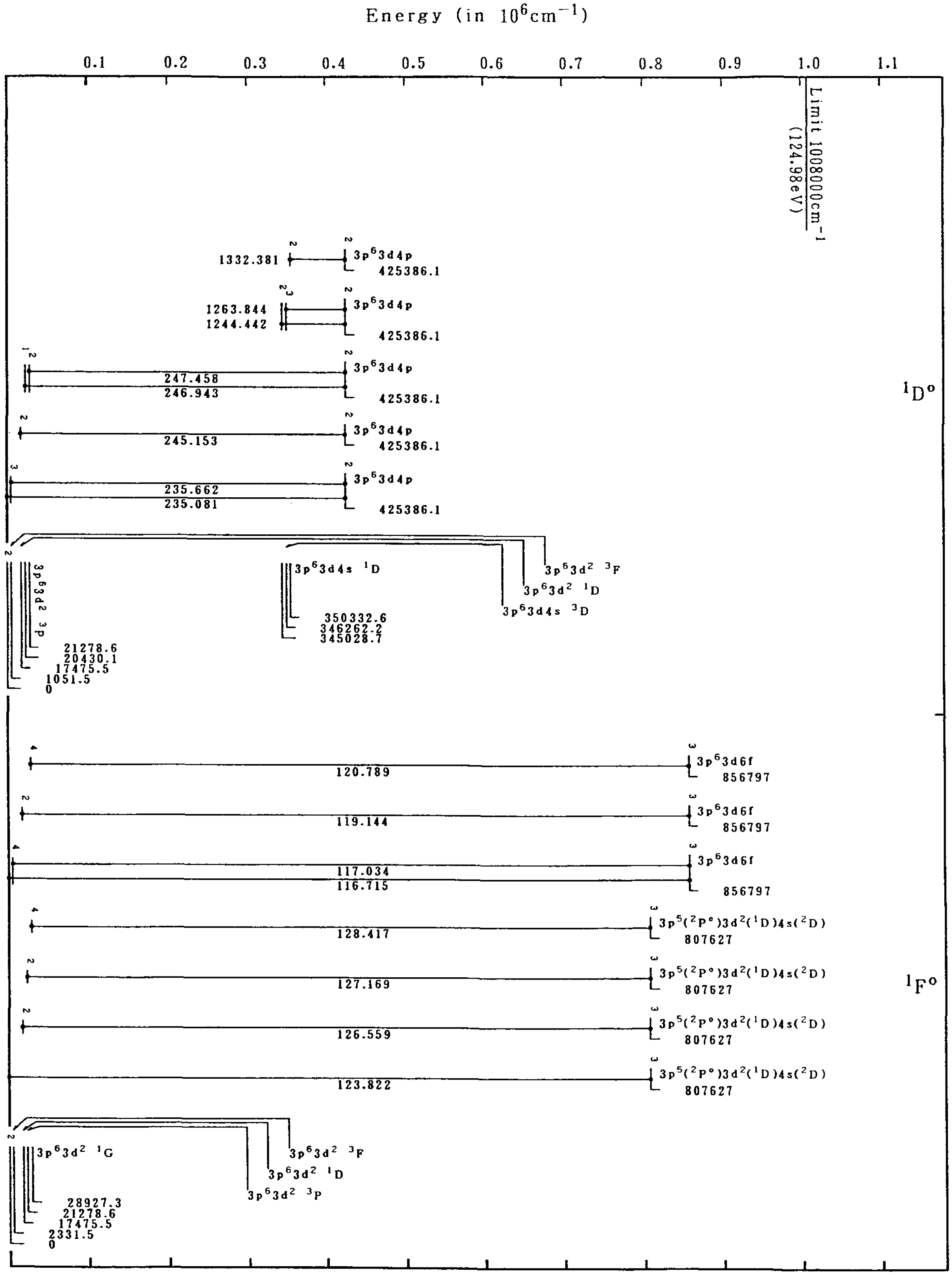
4.2. Grotrian Diagrams for Fe VII



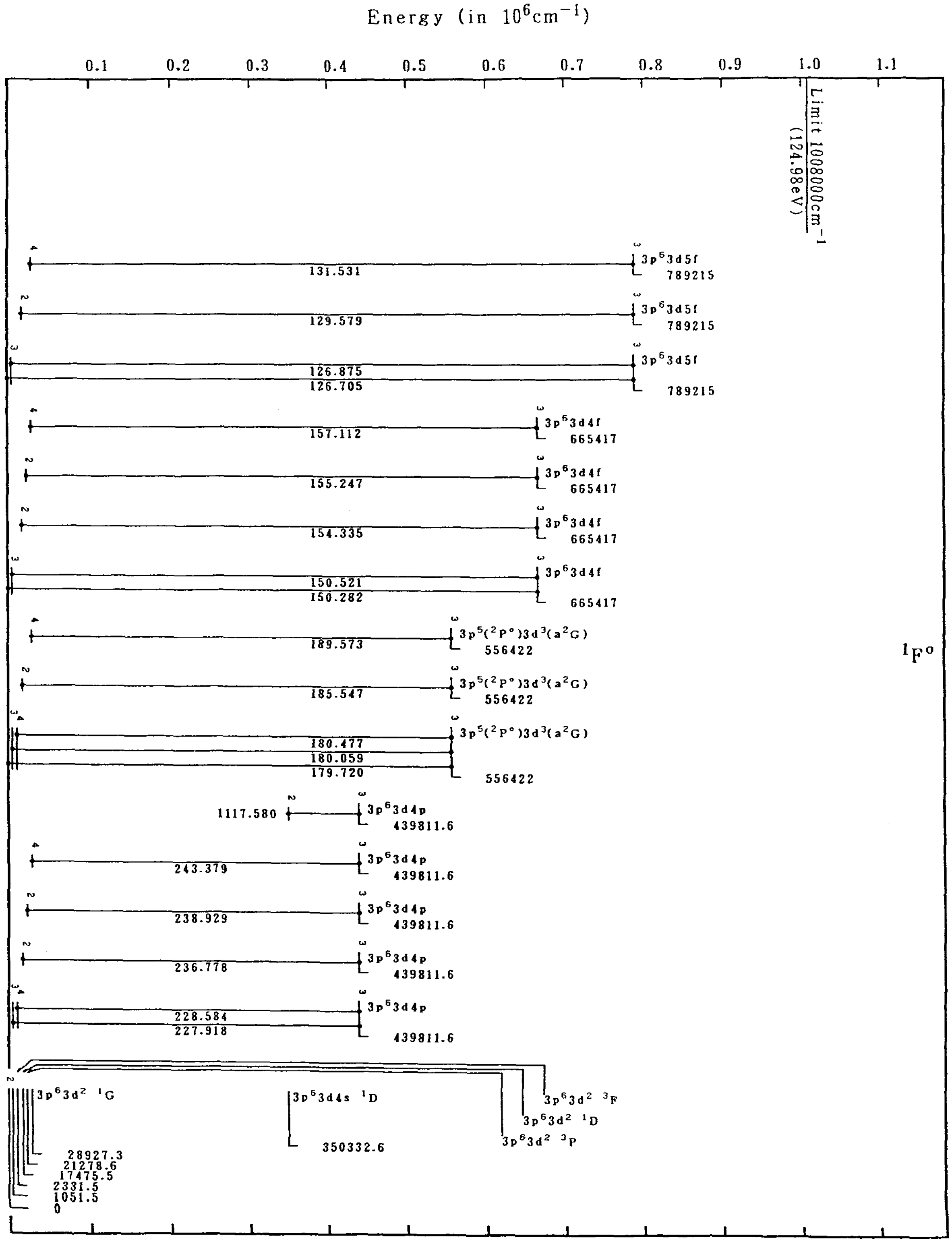
Grotrian Diagrams for Fe VII – Continued



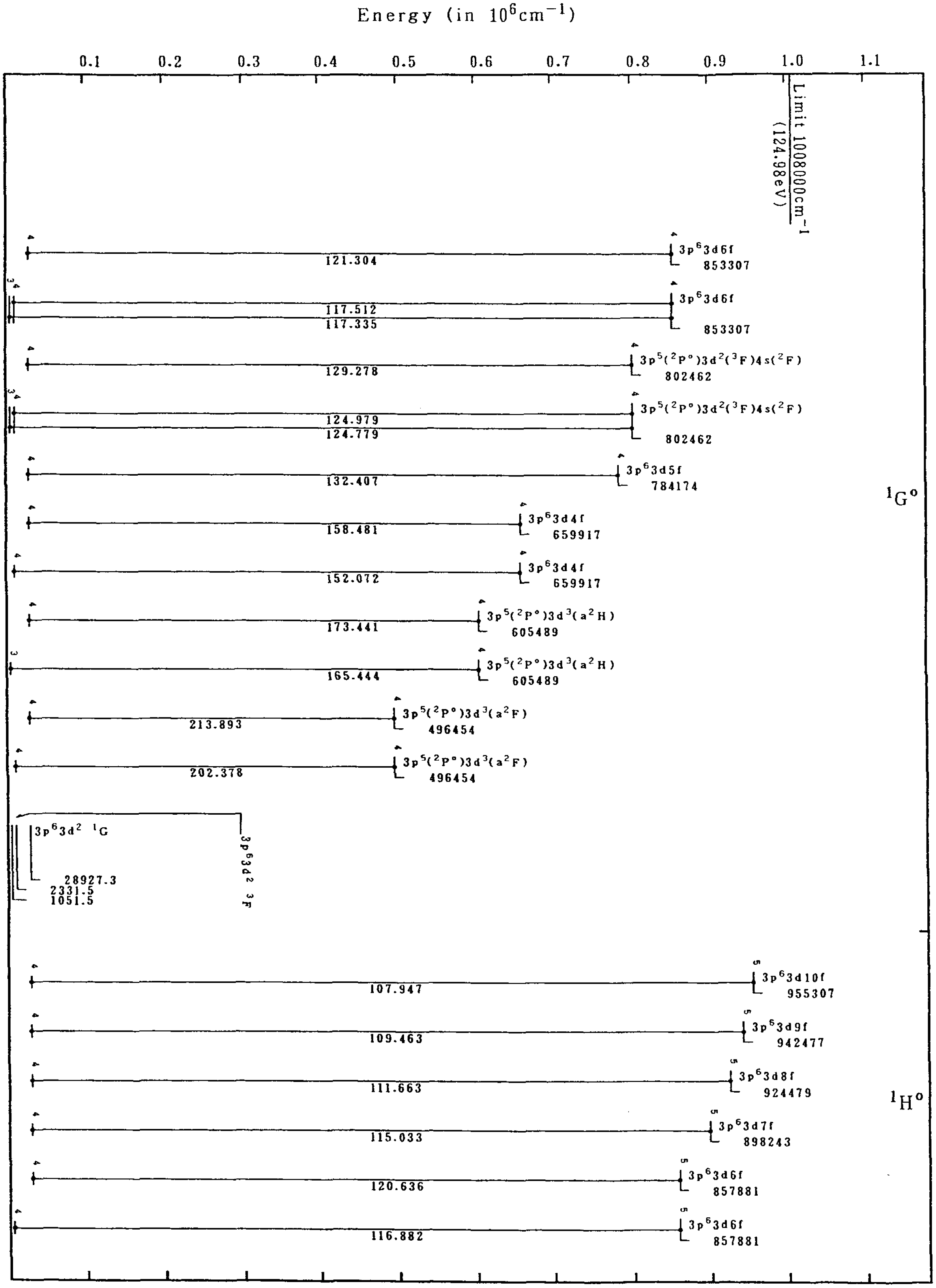
Grotrian Diagrams for Fe VII – Continued



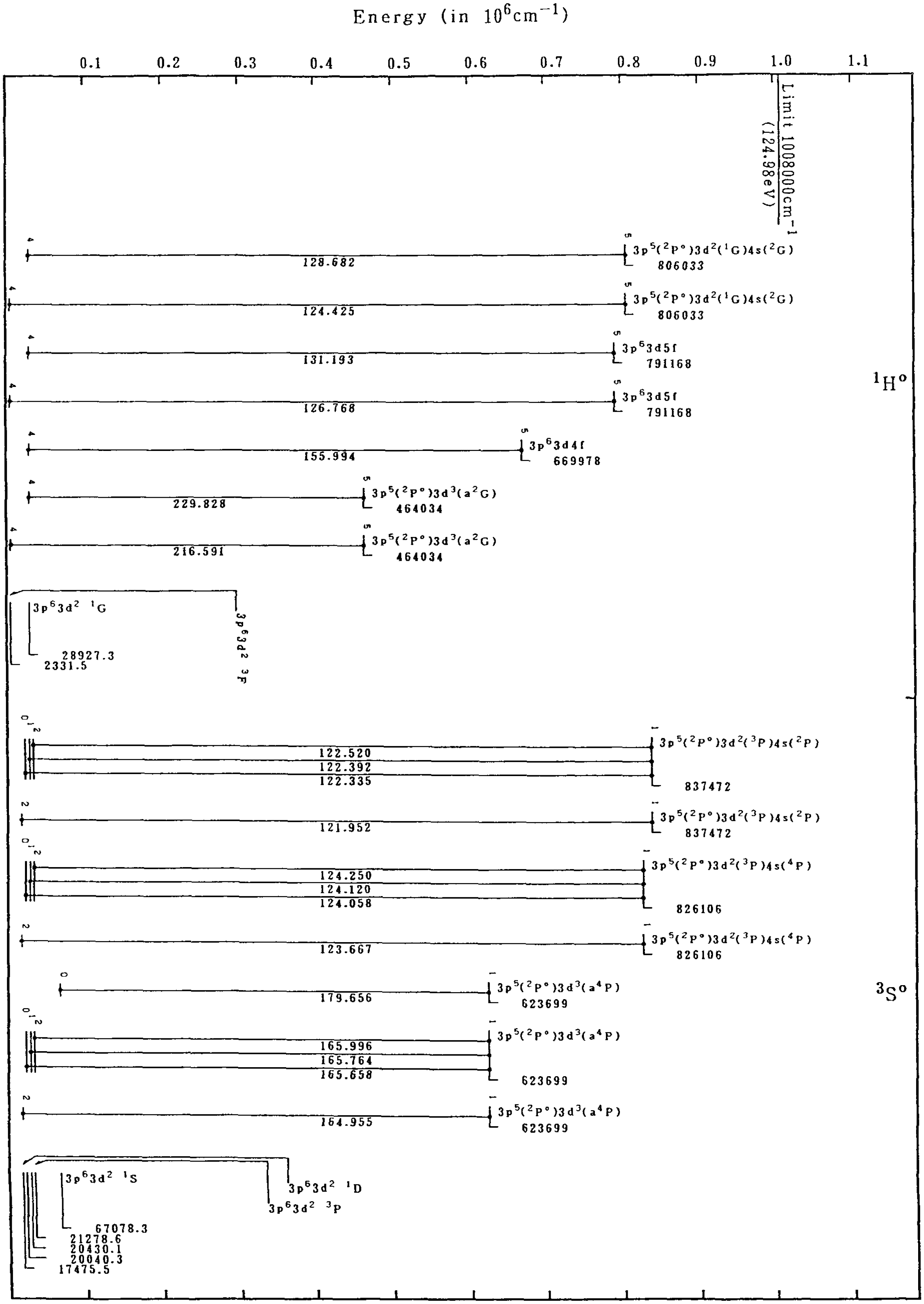
Grotrian Diagrams for Fe VII – Continued



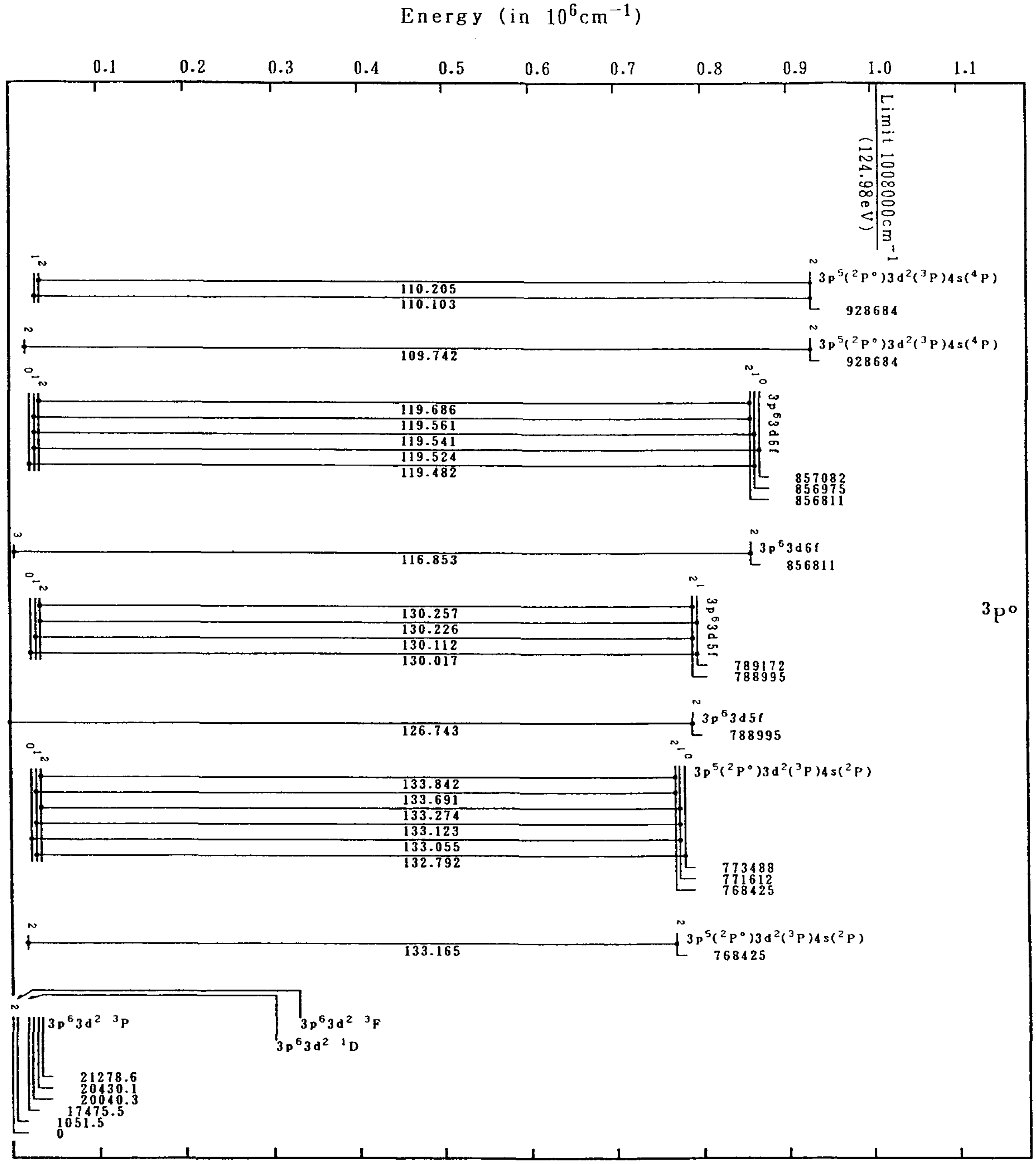
Grotrian Diagrams for Fe VII – Continued



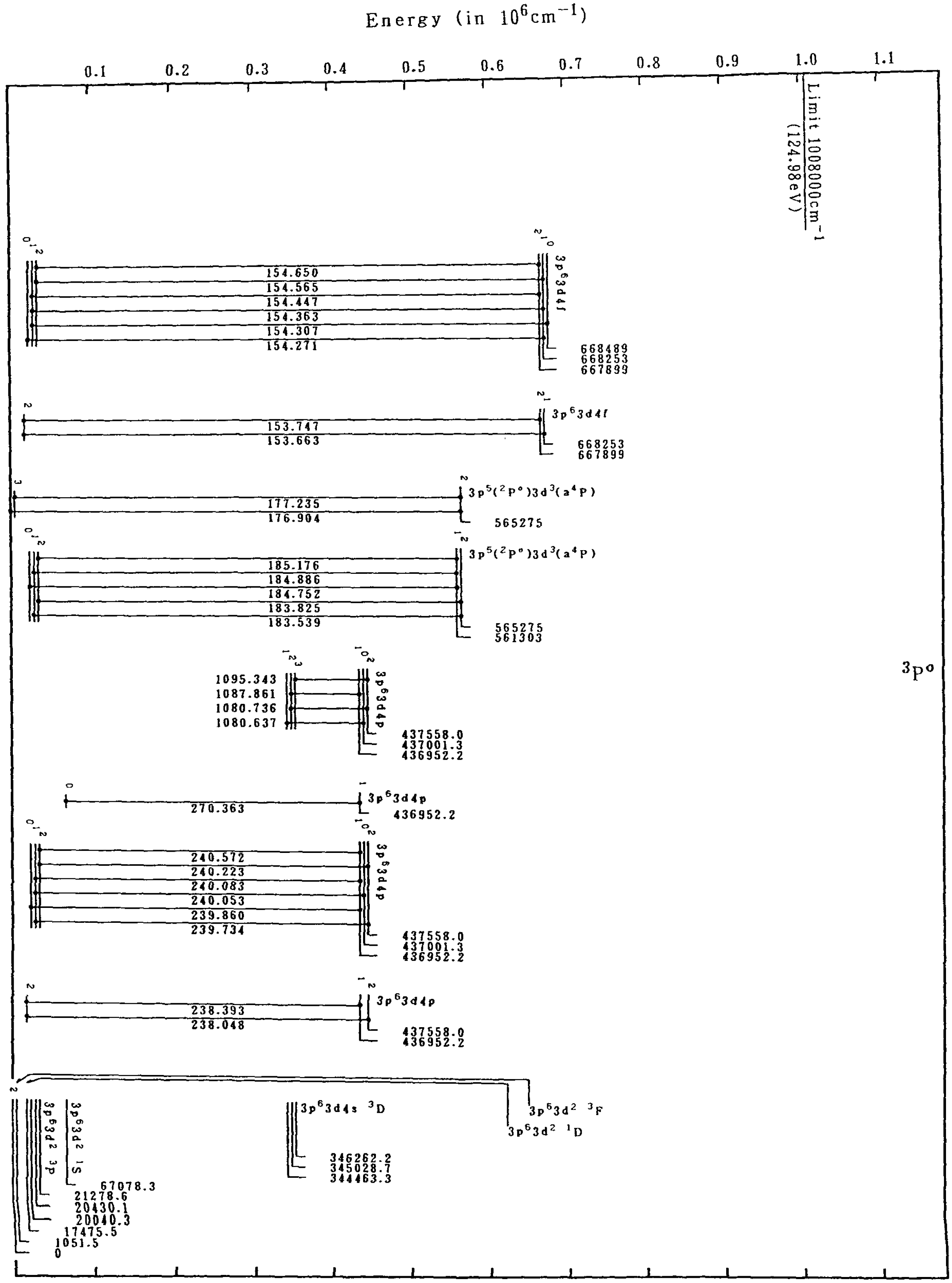
Grotrian Diagrams for Fe VII – Continued



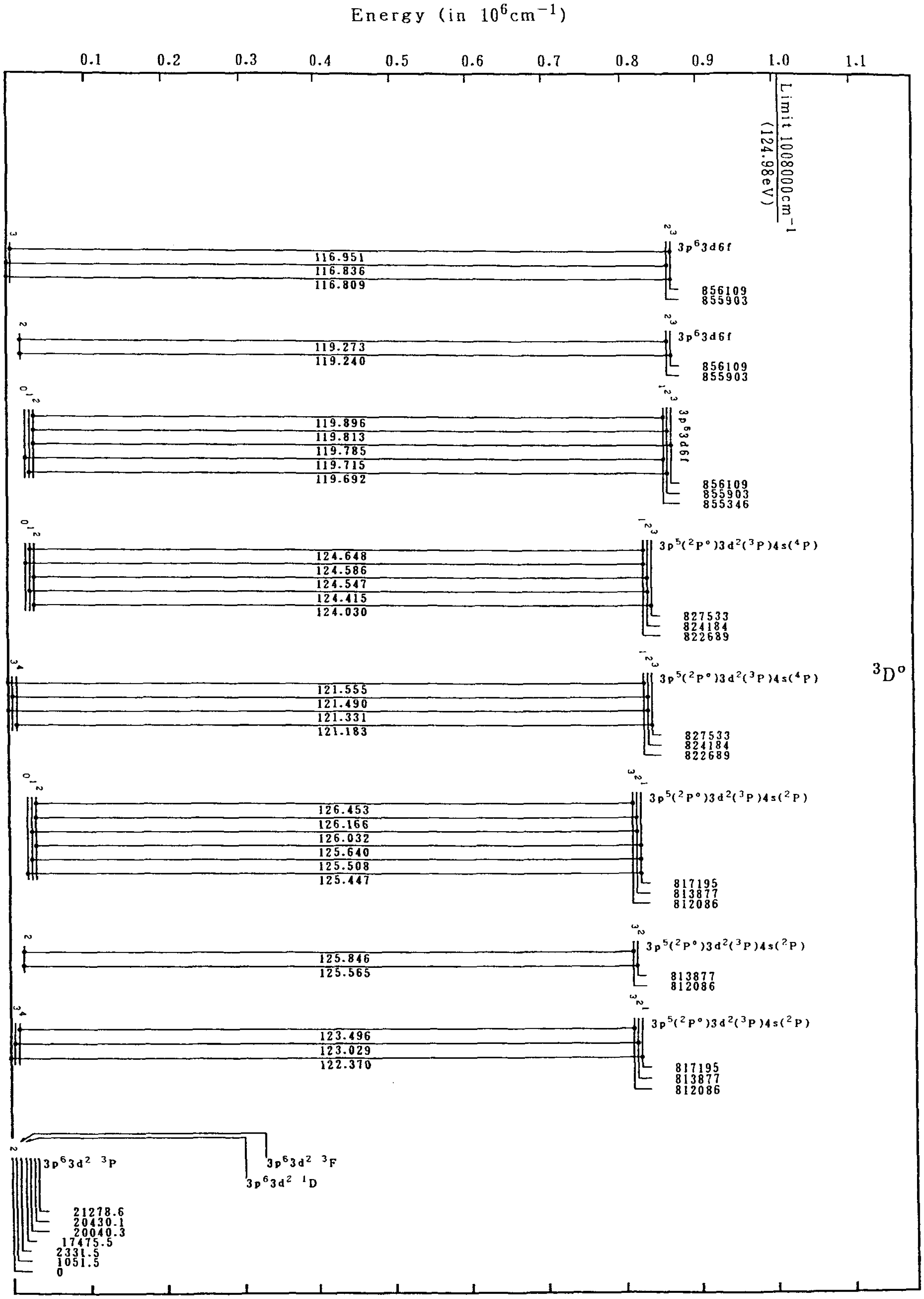
Grotrian Diagrams for Fe VII – Continued



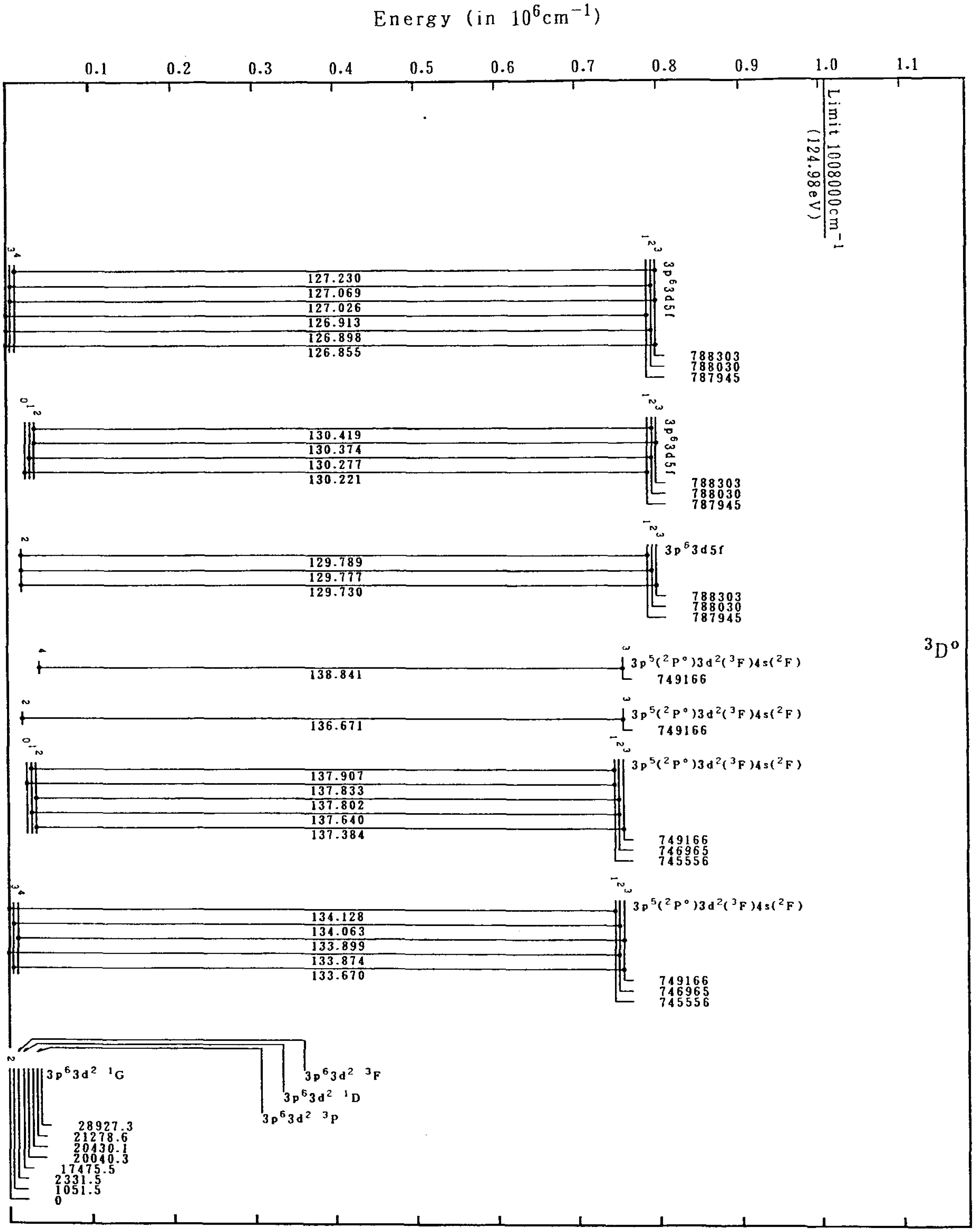
Grotrian Diagrams for Fe VII – Continued



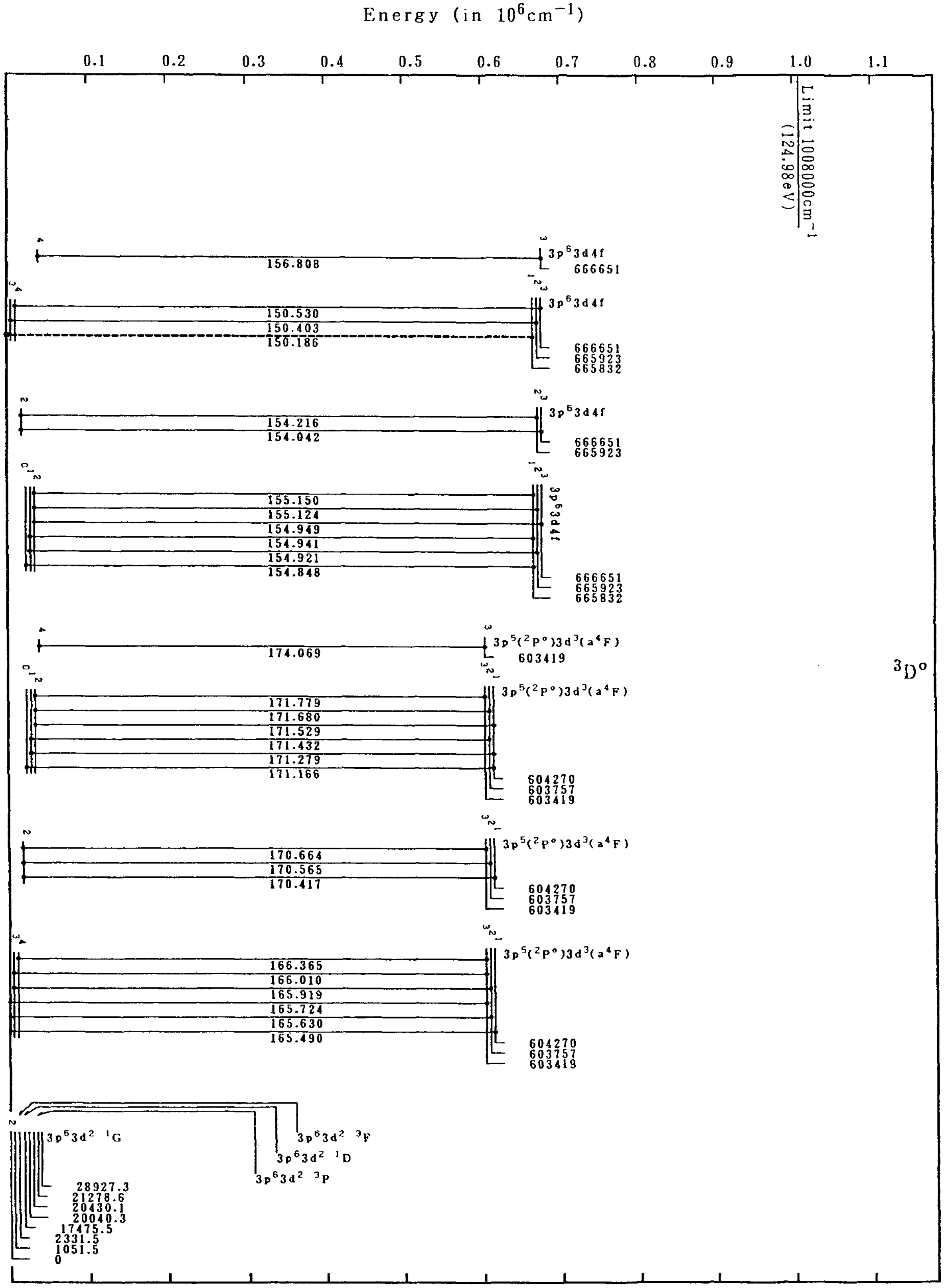
Grotrian Diagrams for Fe VII – Continued



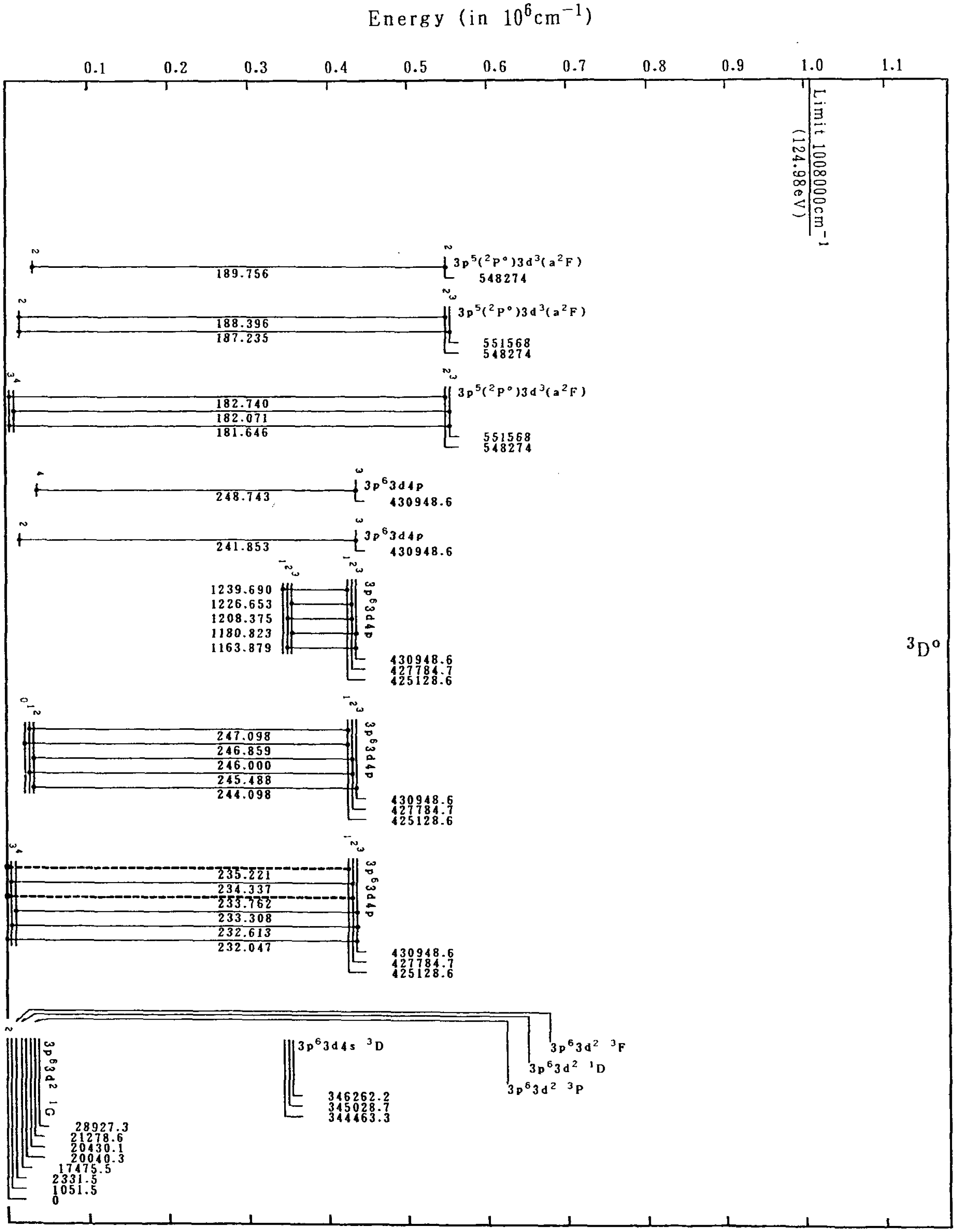
Grotrian Diagrams for Fe VII – Continued



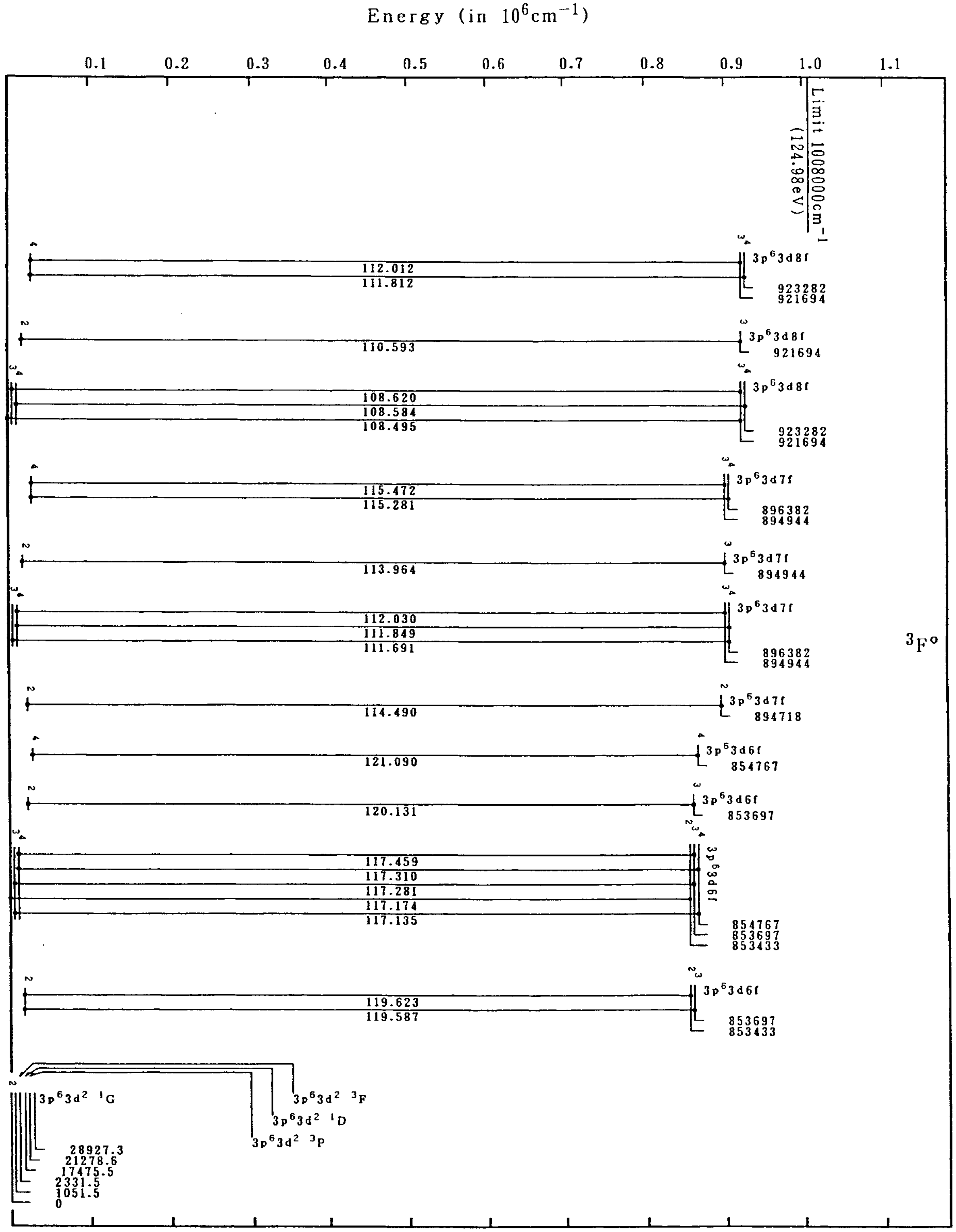
Grotrian Diagrams for Fe VII – Continued



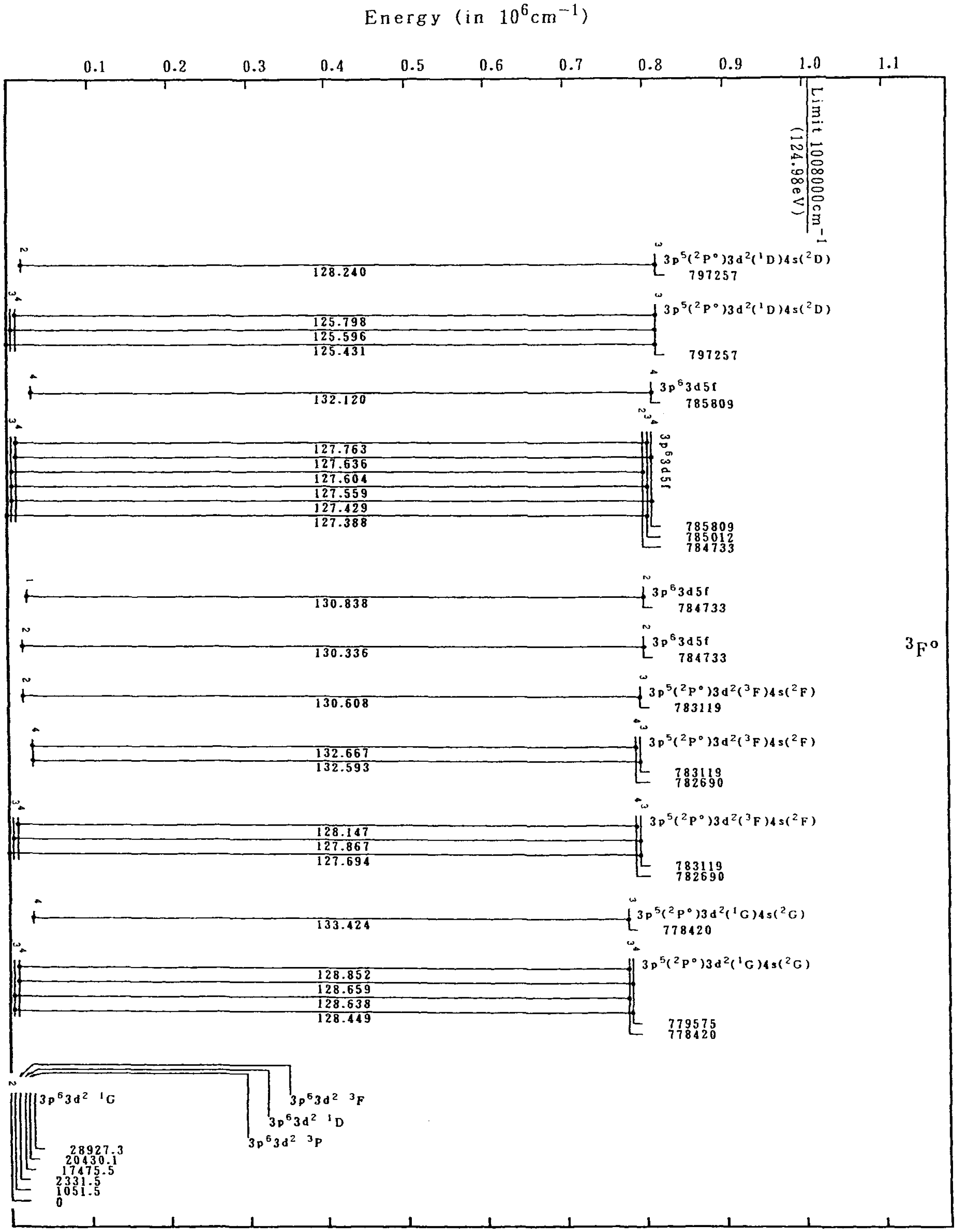
Grotrian Diagrams for Fe VII – Continued



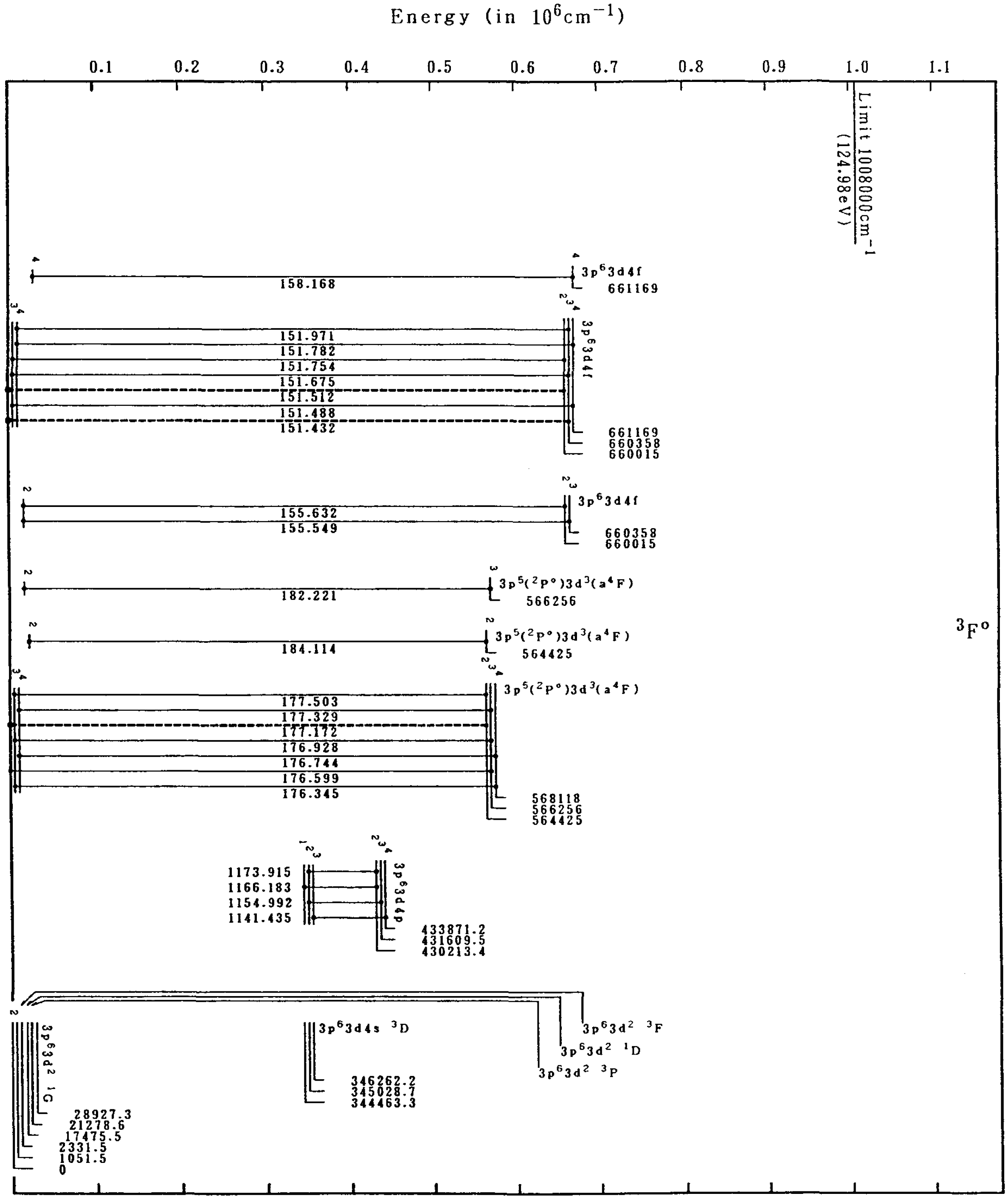
Grotrian Diagrams for Fe VII – Continued



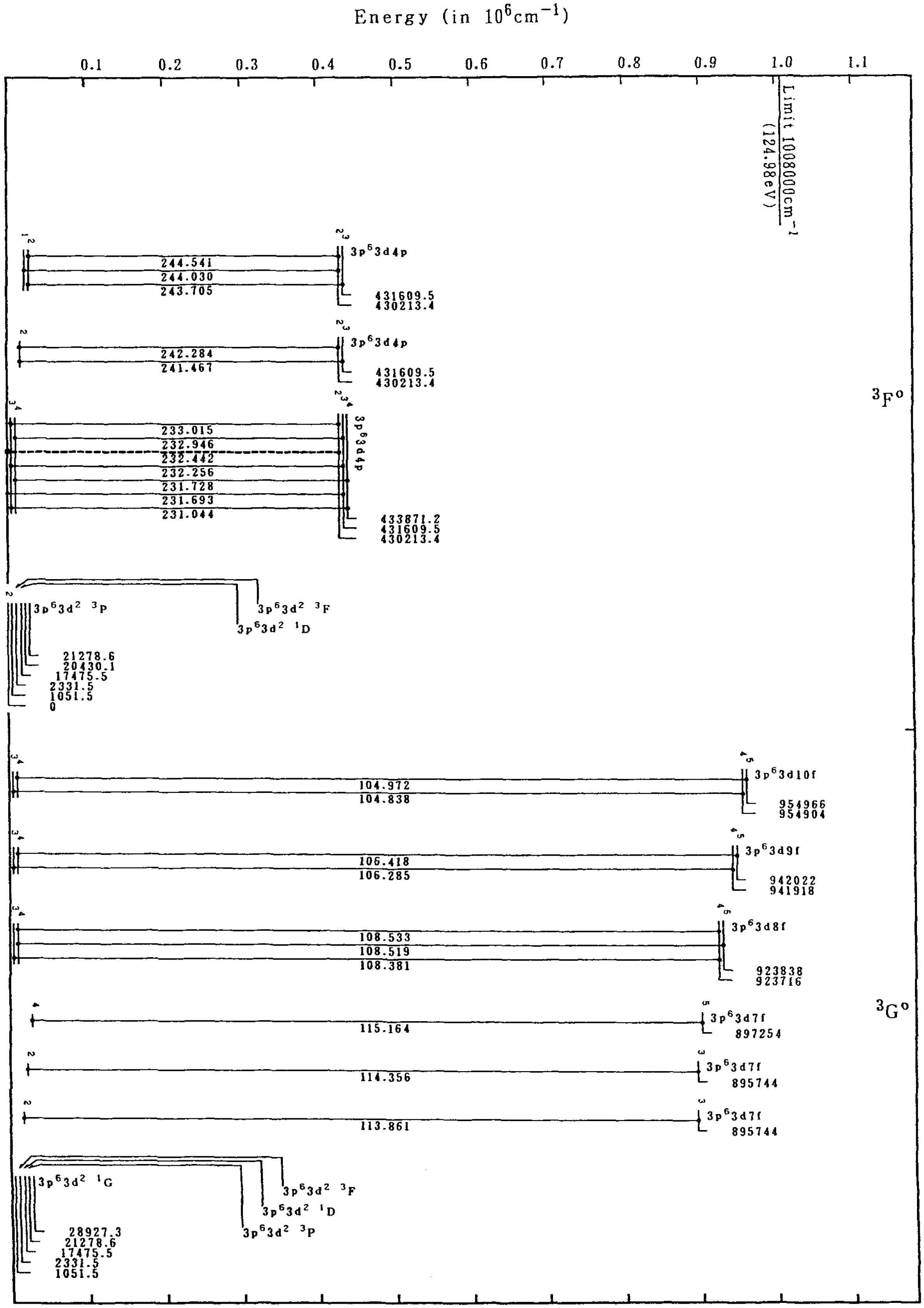
Grotrian Diagrams for Fe VII – Continued



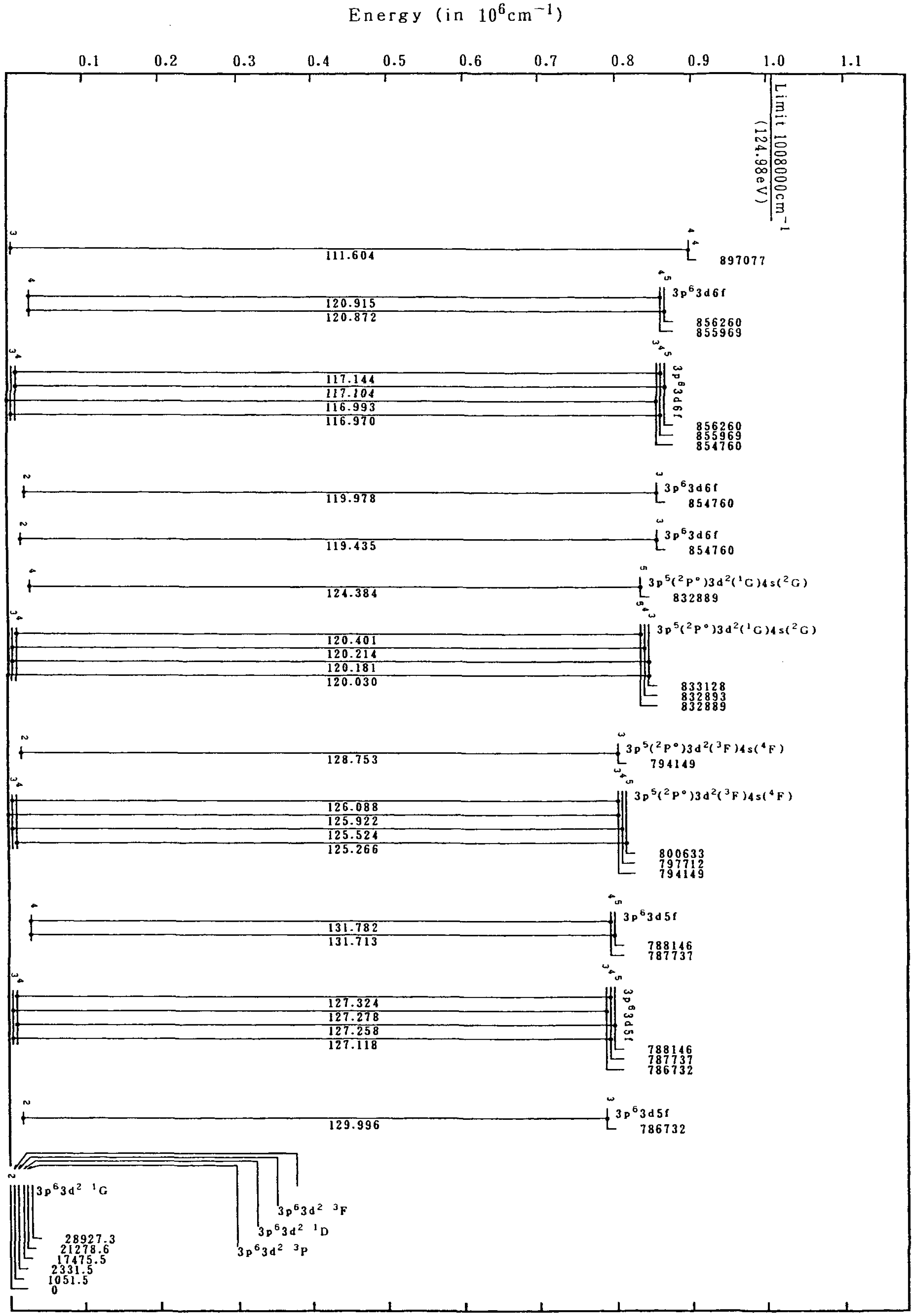
Grotrian Diagrams for Fe VII – Continued



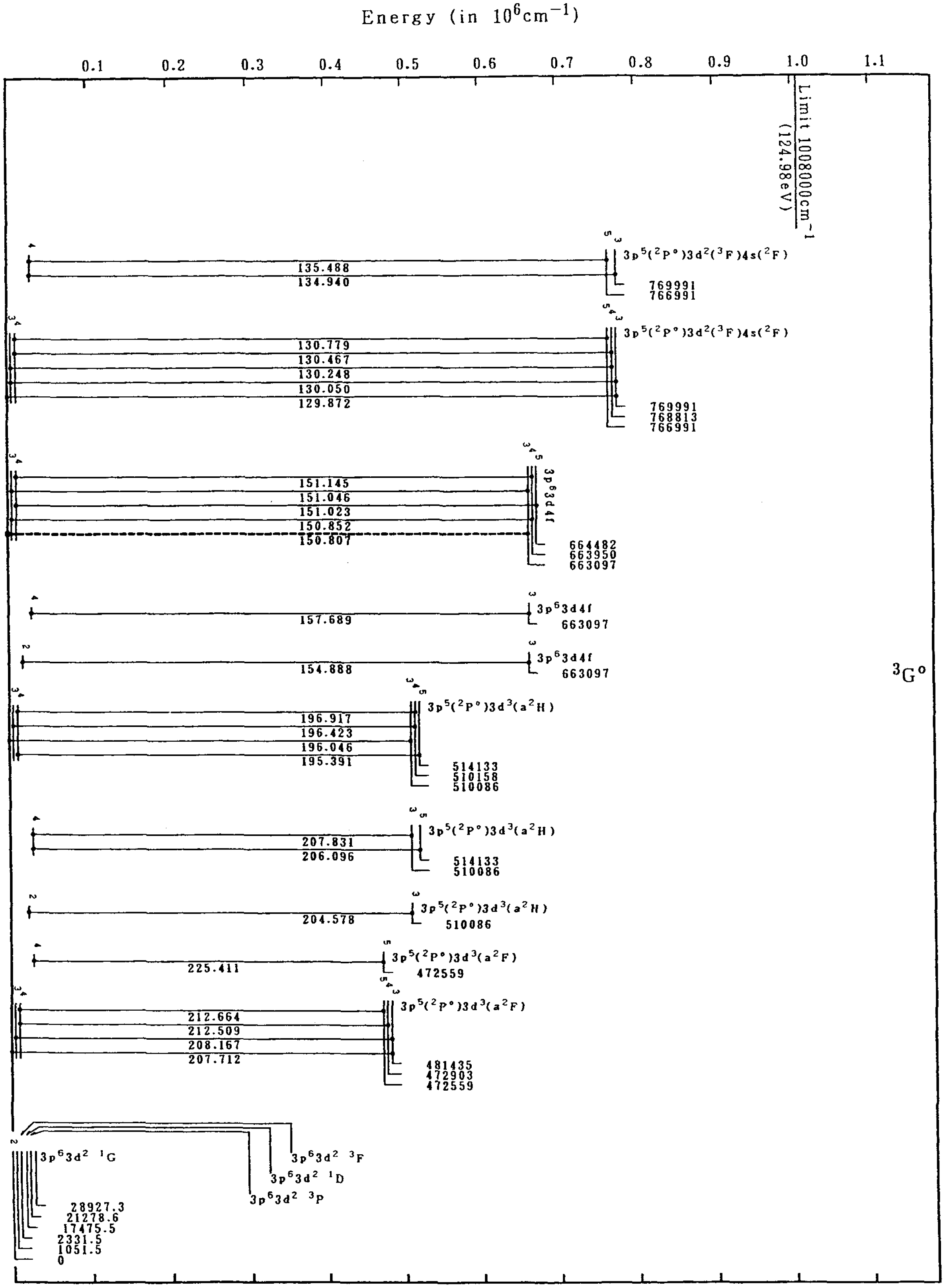
Grotrian Diagrams for Fe VII – Continued



Grotrian Diagrams for Fe VII – Continued



Grotrian Diagrams for Fe VII – Continued



Grotrian Diagrams for Fe VII – Continued