# Forbidden Lines in $ns^2np^k$ Ground Configurations and $nsnp$ Excited Configurations of Beryllium through Molybdenum Atoms and Ions

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Observed and predicted wavelengths of magnetic dipole lines arising within ground configurations of the type $ns^2np^k$ ($n=2$ and 3, $k=1$ to 5) are compiled. For $n=2$ the compilation includes the elements B through Kr, and for $k=5$ it extends to Mo. For $n=3$ Al through Mo are included. In addition the $2s2p$ excited configuration of the Be I isoelectronic sequence for Be through Kr and $3s3p$ of the Mg sequence for Mg through Mo are included. For each line we give a calculated value for the transition probability obtained mainly from the Dirac-Fock method or from the use of scaled radial integrals. The calculated wavelengths are obtained from known energy levels or from levels derived from scaled radial integrals. A small group of electric quadrupole lines seen in astronomical sources are included. The list contains 1660 predicted wavelengths in the range 100 Å to 25.9 mm and 406 observed wavelengths in the range 325 Å to 609 μm.

Key words: astronomy; magnetic-dipole lines; spectra; tokamak; transition probabilities; wavelengths.

## Contents



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## 1. Introduction

Forbidden lines have long been used in the analysis of astrophysical plasmas (solar, stellar, nebular, etc.). In the infrared they are among the strongest stellar lines, and many of those of the light atoms have been measured. Spectra of the solar corona and solar flares are rich in magnetic dipole lines (M1) in the visible and ultraviolet for the elements nitrogen through nickel. In recent years these lines have achieved new importance for diagnostics of low-density, magnetically-confined, high-temperature laboratory plasmas generated in tokamaks. This research has extended the range of elements of interest to heavier atoms that may be injected into the plasma to measure ion temperatures in the range of 0.5 to 20 keV by Doppler broadening and to observe plasma dynamics such as plasma rotation and transport of impurities.

On the basis of recent advances in the determination of energy level structures of highly ionized atoms of the iron period, one may predict the wavelengths of M1 lines with high accuracy for this range of elements. From a study of the behavior of the radial energy integrals fitted to these levels, and from numerous M1 lines identified for ions of copper to molybdenum, it became possible to extend the predictions to ions through molybdenum. We have compiled the observed and predicted wavelengths of magnetic dipole lines arising within ground configurations of the type $ns^2np^k$ ($n=2$ and 3, $k=1$ to 5). For $n=2$, we include the elements B through Kr, and for $k=5$ the tables extend to Mo. For $n=3$, Al through Mo are included. In addition, the $2s2p$ excited configuration of the Be I isoelectronic sequence for Be through Kr and $3s3p$ of the Mg I sequence for Mg through Mo are included.

It will probably be difficult to observe the $nsnp$ ($^3P_{0,1,2}-{}^1P_1$) transitions in the Be I and Mg I sequences because the very large electric-dipole transition probability of the $ns^2\ {}^1S_0-nsnp\ {}^1P_1$ resonant transition will tend to rapidly deplete the $nsnp\ {}^1P_1$ level. Similarly, but to a lesser extent, the $^3P_0-{}^3P_1$ transition can be expected to be weak because of the $ns^2\ {}^1S_0-nsnp\ {}^3P_1$ transition. However, we have included these magnetic-dipole transitions for the sake of completeness.

All measured lines that we consider correctly identified are included. Some are only tentatively classified by the authors, but appear to be reasonable on the basis of predictions along isoelectronic sequences. Some are omitted because they are far from satisfying this criterion.

We have also included a selected group of electric quadrupole lines (E2) that are frequently observed in $ns^2np^2$ and $ns^2np^4$ configurations; these are the $^1D_2-{}^1S_0$ transitions.

Calculations of line strengths and transition probabilities have been made for all of these lines by both relativistic and non-relativistic methods. We have given preference to the relativistic results. Calculations by both methods for the $n=3$ shell differ on the average by only 5% (see Sec. 6, Ref. 1).

## 2. Predicted Wavelengths

For Be through Ni, predicted values for the wavelengths of the M1 and E2 lines were obtained from the known energy levels by the Ritz principal of deriving wavelengths from energy differences. Their uncertainties are derived from the reported level uncertainties. The source of data for each of these atoms and ions is given in Sec. 7 below.

From Cu through Mo predictions of wavelengths of M1 lines within the $3s^23p^k$ configurations by Sugar and Kaufman[1] are quoted. These are preferred to *ab initio* calculations because they are semi-empirically derived

by fitting radial energy integrals to the known levels beginning with potassium, and have been found to give more accurate wavelength predictions. The uncertainty estimates are derived as prescribed in that paper. Contributions to the uncertainty by each integral in the calculation was estimated, and the combined effect was given as a monotonically increasing function of atomic number. These estimates appear to be high by a factor of two, as indicated by many subsequently identified lines.

We predicted the lines of the $3s3p$ configurations for inclusion here. The radial integrals $G^1(sp)$ and $\zeta_p$ were fit to known levels from potassium to molybdenum. These parameters were then interpolated for ions for which the levels are not known, and predictions were made by diagonalizing the energy matrices. Measured emission lines of copper in this sequence from Sugar and Kaufman[2] were combined with the M1 transition $3s3p\ ^3P_2-{}^3P_1$ from Denne *et al.*[3] to establish the levels of this ion. Denne *et al.* measured this same transition for Ge, Se, Zr, and Mo. The intersystem lines $3s^2\ ^1S_0-3s3p\ ^3P_1$ were observed by Finkenthal *et al.*[4] for Ge, Se, Zr, and Mo. Values for the $3s^2\ ^1S_0-3s3p\ ^1P_1$ lines were provided by Fawcett and Hayes[5] for Zn to Se and from Reader[6] for Sr to Mo.

Edlén has made a comparison of the known levels of the $n=2$ shell (Li to F sequences) with the relativistic Dirac-Fock *ab initio* calculations available in the literature, and has derived analytical expressions for the differences. By this means he has predicted level values through Kr. We used his results to obtain predicted wavelengths from Cu to Kr for the beryllium-to-oxygen isoelectronic sequences[7-10] and from Cu to Mo for the fluorine isoelectronic sequence.[7]

We include a total of 1660 predicted wavelengths.

## 3. Observed Wavelengths

With a few exceptions the M1 and E2 lines of carbon through argon have been observed only from astronomical sources, including gaseous nebulae, stars, and the solar corona. These sources have also provided considerable iron-period data. The most common laboratory source generating copious forbidden lines is the tokamak, which contains a magnetically-confined, high-temperature plasma with an ion density similar to that of the solar corona. By injecting any impurity element, magnetic dipole lines of that element may be seen in stages of ionization determined by the plasma temperature. All of the scandium and titanium data, most of the chromium and nickel data, and all from copper to molybdenum are from tokamak observations.

We have included a small group of E2 lines comprising the $^1D_2-{}^1S_0$ transition of the $ns^2np^2$ and $ns^2np^4$ configurations ($n=2$, 3) because of their prominence in nebular sources.

The sources of observed data that we have credited are not necessarily the original discoverers of the lines, but are those providing the best measurements. In some cases, such as for spectra of the solar corona, the authors have given the line identifications for wavelengths observed by others. References for the observed wavelengths are given in Sec. 8, each preceded by a symbol that is used to identify them in the tables. We include 406 observed wavelengths.

## 4. Predicted Transition Probabilities

In most cases multiconfiguration Dirac-Fock calculations of line strengths are available. These calculations do not generally converge for neutral and singly ionized atoms, but non-relativistic calculations have been made in every such case. Line strengths for the magnetic-dipole lines of Be I, B I, B II, C I, C II, N I, N II, O I, O II and F II were taken from Wiese *et al.*[11] Those for Si I and P I were taken from Wiese *et al.*[12] Line strengths for the magnetic-dipole lines of the isoelectronic sequences of B I, C I, N I and F I were taken, except as noted above, from Cheng *et al.*[13] Those for the Al I, Si I, and P I sequences were taken, except as noted above, from Huang.[14-16] Those for the Cl I sequence, with a few exceptions, are from Huang *et al.*[17] For Cl-like Ga, Ge, As, Y and Zr the line strengths were interpolated from values of neighboring ions. The relativistic calculations are not available for the Be, Mg, and S isoelectronic sequences. The transition probabilities for all magnetic-dipole lines of the Be-like, Mg-like, and S-like ions were calculated in the manner described in Sugar and Kaufman.[1] These are non-relativistic calculations in intermediate coupling. They agree within a few percent with relativistic calculations in the $n=3$ sequences for which both are available.

Line strengths for the electric-quadrupole lines of $2s^22p^k\ (^1D_2-{}^1S_0)$ [$k=2$] of C I and N II and [$k=4$] of O I and F II are from Wiese *et al.*[11] Those for the remainder of the carbon sequence, O III through Ni XXIII, and for the remainder of the oxygen sequence, Ne III through Ni XXI, are from Cheng *et al.*[13] The transition probabilities for these lines in the sulfur sequence, $3s^23p^4$, for S I through Ni XIII, are from Mendoza and Zeippen.[18] Those from Cu XIV through Mo XXVII are from Biemont and Hansen.[19] The one for Si I, $3s^23p^2$, is from Mendoza and Zeippen.[20] For the remainder of this sequence, P II through Mo XXIX, we used the line strengths given by Huang.[15]

Relations between transition probabilities $A(s^{-1})$ and line strengths $S$ are given explicitly as

$$A = \frac{2.697 \times 10^{13}}{\lambda^3 g} S(\mathrm{M1}),$$

$$A = \frac{1.680 \times 10^{18}}{\lambda^5 g} S(\mathrm{E2}),$$

where $\lambda$ is the transition wavelength in Å and $g$ is the $2J+1$ degeneracy of the upper level. $S$(M1) in Bohr magneton units ($\mu_B$) and $S$(E2) in atomic units ($ea_0^2$) are the magnetic-dipole and electric-quadrupole line strengths, respectively.

The magnetic-dipole transition rate in almost all cases is a few orders of magnitude greater than the electric-quadrupole transition rate. We have added the E2 rate to the M1 rate in those cases for which the former is greater than 1 % of the latter. This is true only for some of the N I ($2p^3$) and P I ($3p^3$) sequence transitions. An asterisk following the transition rate in the tables shows where this occurs.

## 5. Data Table Information

The tables contain the predicted and observed wavelengths and predicted transition probabilities for magnetic-dipole transitions within $ns^2np^k$ ($k=1-5$) and $nsnp$ configurations; $n=2$ for beryllium through sodium, $n=2$, 3 for magnesium through krypton, and $n=3$ for rubidium through molybdenum. The F-sequence is given through molybdenum. The electric quadrupole transition $^1D_2-{}^1S_0$ for $k=2$, 4 is included because it is frequently observed. The data are presented in two formats. In Tables 1–39 the lines are segregated according to element and within each element are listed in order of increasing wavelength. In Table 40 all lines are merged and sorted by wavelength. The columns from left to right in order of appearance contain the following information:

| Column No. | Description |
|---|---|
| 1 | Wavelengths (observed and predicted) in Å below 20 000 Å, in micrometers (μm) between 2 and 1000 μm, and in millimeters (mm) between 1 and 26 mm. Wavelengths given without units are in Å. Wavelengths in vacuum are given below 2000 Å, in air between 2000 Å and 5 μm, and in vacuum above 5 μm. Each wavelength is followed by its uncertainty in parentheses. Tentative identifications are preceded by "T". |
| 2 | Transition probabilities ($A$) are written as a factor times 10 to a power. The power of ten follows the decimal factor. For example, 2.20 +4 means $2.20 \times 10^4$. An asterisk following the transition probability indicates that the E2 rate for the transition is greater than 1 % of the M1 rate and has been added to that value. |
| 3 | Spectrum. |
| 4 | Electronic configuration. |
| 5 | Line classification. Lower level is given first. |
| 6 | Ionization energy in thousands of electron volts (keV).[21–23] |
| 7 | References for observed wavelengths. Definitions of symbols are given in Sec. 8, "References for Observed Wavelengths." |

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B II
Olme, A. (1970), Phys. Scr. **1**, 256.

C I
Johansson, L. (1966), Ark. Fys. **31**, 201; Kaufman, V., and Ward, J. F. (1966), J. Opt. Soc. Am. **56**, 1591.

C II
Cooksy, A. L., Blake, G. A., and Saykally, R. J. (1985), Astrophys. J. (submitted).

C III
Bockasten, K. (1955), Ark. Fys. **9,** 457.

N I
Eriksson, K. B. S. (1966), Ark. Fys. **33,** 357.

N II
Eriksson, K. B. S. (1983), Phys. Scr. **28,** 593; Bowen, I. S. (1955), Astrophys. J. **121,** 306; Cooksy, A. L., and Saykally, R. J. (1985), Astrophys. J. (submitted).

N III
Eriksson, K. B. S. (1958), Ark. Fys. **13,** 303.

N IV
Hallin, R. (1966), Ark. Fys. **32,** 201.

O I
Eriksson, K. B. S. (1965), Ark. Fys. **30,** 199.

O II
De Roberts, M. M., Osterbrock, D. E., and McKee, C. F. (1985), Astrophys. J. **293,** 459.

O III
Pettersson, S. -G. (1982), Phys. Scr. **26,** 296.

O IV
Bromander, J. (1969), Ark. Fys. **40,** 257.

O V
Moore, C. E. (1980), Natl. Stand. Ref. Data Ser., Natl. Bur. Stand. (U.S.) 3, Sec. 9.

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F II
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F III
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F IV
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F V
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F VI
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Ne IV
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Ne V
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Ne VI
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Ne VII
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Mg I, and Mg IV through Mg IX
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Al I, II and Al V through Al X
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Si I, II, III and Si VI through Si XI
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P I through P IV and P VII through P XII
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S I
Kaufman, V. (1982), Phys. Scr. **26,** 439.

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S III
Energy levels drived from: Bowen, I. S. (1955), Astrophys. J. **121,** 306; Bowen, I. S. (1960), Astrophys. J. **132,** 1; Baluteau, J. -P., Bussoletti, E., Anderegg, M., Moorwood, A. F. M., and Coron, N. (1976), Astrophys. J. **210,** L45; Herter, T., Briotta, D. A., Gull, G. E., Shure, M. A., and Houck, J. R. (1982), Astrophys. J. **259,** L109.

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S IX
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S X
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S XII
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Cl I
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Cl XI
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Cl XII
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Cl XIII
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Cl XIV
Edlén, B. (1983), Phys. Scr. **28,** 51.

Ar II
Yamada, C., Kanamori, H., and Hirota, E. (1985), J. Chem. Phys. **83,** 552.

Ar III
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Ar V
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Ar VII
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Ar X
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BDGRG Bava, E., DeMarchi, A., Godone, A., Rovera, G. D., and Giusfredi, G. (1983), Opt. Commun. **47,** 193.
BGBR Burrell, K. H., Groebner, R. J., Brooks, N. H., and Rottler, L. (1984), Phys. Rev. A **29,** 1343.
CBS Cooksy, A. L., Blake, G. A., and Saykally, R. J. (1985), Astrophys. J. (submitted).
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DHST Denne, B., Hinnov, E., Suckewer, S., and Timberlake, J. (1984), J. Opt. Soc. Am. B **1,** 296.
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E(78) Eriksson, K. B. S. (1978), Astrophys. J. **222,** 398.
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FBM Finkenthal, M., Bell, R. E., Moos, H. W., and TFR Group (1984), J. Appl. Phys. **56,** 2012.
FMH Forrest, W. J., McCarthy, J. F., and Houck, J. R. (1980), Astrophys. J. **240,** L37.
GJ Grasdalen, G. L., and Joyce, R. R. (1976), Nature **259,** 187.
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HBGSH Herter, T., Briotta, D. A., Gull, G. E., Shure, M. A., and Houck, J. R. (1982), Astrophys. J. **259,** L109.
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L Lacy, J. H. (Oct. 1985), private communication.
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MSFJK Moorwood, A. F. M., Salinari, P., Furniss, I., Jennings, R. E., and King, K. J. (1980), Astron. Astrophys. **90,** 304.
P Pryce, M. H. L. (1964), Astrophys. J. **140,** 1192.
PSS Peacock, N. J., Stamp, M. F., and Silver, J. D. (1984), Phys. Scr. **T8,** 10.
RKSPR Roberts, J. R., Kaufman, V., Sugar, J., Pittman, T. L., and Rowan, W. L. (1983), Phys. Rev. A **27,** 1721.
RPSKR Roberts, J. R., Pittman, T. L., Sugar, J., Kaufman, V., and Rowan, W. L. (1985), unpublished data from TEXT.
RSW Russell, R. W., Sofer, B. T., and Willner, S. P. (1977), Astrophys. J. **217,** L149.
S Smitt, R. (1977), Sol. Phys. **51,** 113.
SBST Sandlin, G. D., Brueckner, G. E., Scherrer, V. E., and Tousey, R. (1976), Astrophys. J. **205,** L47.
SBT Sandlin, G. D., Brueckner, G. E., and Tousey, R. (1977), Astrophys. J. **214,** 898.
SE(79) Saykally, R. J., and Evenson, K. M. (1979), J. Chem. Phys. **71,** 1564.
SE(80) Saykally, R. J., and Evenson, K. M. (1980), Astrophys. J. **238,** L107.
SCCFH Suckewer, S., Cecchi, J., Cohen, S., Fonck, R., and Hinnov, E. (1980), Phys. Lett. A **80,** 259.
SFH Suckewer, S., Fonck, R., and Hinnov, E. (1980), Phys. Rev. A **22,** 2278.
SH(78) Suckewer, S., and Hinnov, E. (1978), Phys. Rev. Lett. **41,** 756.
SH(82) Suckewer, S., and Hinnov, E., *Physics of Electronic and Atomic Collisions,* (North Holland Press, 1982).
SHG Shure, M. A., Houck, J. R., and Gull, G. E. (1984), Astrophys. J. **281,** L29.

SK Stanton, A. C., and Kolb, C. E. (1980), J. Chem. Phys. **72,** 6637.
ST Sandlin, G. D., and Tousey, R. (1979), Astrophys. J. **227,** L107.
Su Suckewer, S. (Oct. 1985), private communication.
Sw Swensson, J. W. (1967), Naturwiss. **15,** 440.
T Thackeray, A. D. (1974), Mon. Not. R. Astron. Soc. **167,** 87.
TMR Trauger, J. T., Munch, G., and Roesler, F. L. (1980), Astrophys. J. **236,** 1035.
W Widing, K. G. (1978), Astrophys. J. **222,** 735.
YKH Yamada, C., Kanamori, H., and Hirota, E. (1985), J. Chem. Phys. **83,** 552.

Table 1. Beryllium: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 4856.061(13) | 9.58 -7 | Be I | 2s 2p | $^3P_0$ - $^1P_1$ | 0.009 | |
| | 4856.212(10) | 9.19 -3 | Be I | 2s 2p | $^3P_1$ - $^1P_1$ | 0.009 | |
| | 4856.766(13) | 1.19 -6 | Be I | 2s 2p | $^3P_2$ - $^1P_1$ | 0.009 | |
| | 4.25(8) mm | 1.76 -10 | Be I | 2s 2p | $^3P_1$ - $^3P_2$ | 0.009 | |
| | 15.6(1.0) mm | 4.74 -12 | Be I | 2s 2p | $^3P_0$ - $^3P_1$ | 0.009 | |

Table 2. Boron: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 2772.35(4) | 8.52 -5 | B II | 2s 2p | $^3P_0$ - $^1P_1$ | 0.048 | |
| | 2772.78(4) | 2.01 -1 | B II | 2s 2p | $^3P_1$ - $^1P_1$ | 0.048 | |
| | 2774.01(4) | 1.07 -4 | B II | 2s 2p | $^3P_2$ - $^1P_1$ | 0.048 | |
| | 625.(17) μm | 5.52 -8 | B II | 2s 2p | $^3P_1$ - $^3P_2$ | 0.048 | |
| | 655.6(7) μm | 3.19 -8 | B I | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.008 | |
| | 1.79(14) mm | 3.14 -9 | B II | 2s 2p | $^3P_0$ - $^3P_1$ | 0.048 | |

Table 3. Carbon: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 1999.95(4) | 1.22 -3 | C III | 2s 2p | $^3P_0$ - $^1P_1$ | 0.048 | |
| | 2000.90(4) | 1.04 -3 | C III | 2s 2p | $^3P_1$ - $^1P_1$ | 0.048 | |
| | 2003.16(4) | 1.52 -3 | C III | 2s 2p | $^3P_2$ - $^1P_1$ | 0.048 | |
| 4621.57(10) | 4621.570(5) | 2.60 -3 | C I | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 0.011 | P |
| 8727.18(10) | Q 8727.141(22) | 5.01 -1 | C I | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 0.011 | Sw |
| | 9824.109(22) | 7.79 -5 | C I | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 0.011 | |
| 9850.28(10) | 9850.243(22) | 2.30 -4 | C I | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 0.011 | Sw |
| 157.74084(21) | 157.74084(21)μm | 2.29 -6 | C II | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.024 | CBS |
| | 177.4(9) μm | 2.10 -6 | C III | 2s 2p | $^3P_1$ - $^3P_2$ | 0.048 | |
| 370.4140(15) | 370.37(19) μm | 2.65 -7 | C I | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 0.011 | SE(80) |
| | 422.(4) μm | 3.00 -7 | C III | 2s 2p | $^3P_0$ - $^3P_1$ | 0.048 | |
| 609.1333(8) | 609.4(4) μm | 7.95 -8 | C I | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 0.011 | SE(80) |

Table 4. Nitrogen: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | 1575.183(4) | | 1.09 -2 | N IV | 2s 2p | $^3P_0$ - $^1P_1$ | 0.077 | |
| | 1576.750(4) | | 8.33 -3 | N IV | 2s 2p | $^3P_1$ - $^1P_1$ | 0.077 | |
| | 1580.338(4) | | 1.35 -2 | N IV | 2s 2p | $^3P_2$ - $^1P_1$ | 0.077 | |
| | 3062.838(13) | | 3.40 -2 | N II | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 0.030 | |
| 3466.4970(6) | 3466.497(1) | | 6.18 -3 | N I | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.015 | E(66) |
| 3466.5434(12) | 3466.543(1) | | 2.46 -3 | N I | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.015 | E(66) |
| 5197.94(10) | 5197.901(14) | | 1.62 -5* | N I | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.015 | B(55) |
| 5200.41(10) | 5200.257(14) | | 6.92 -6* | N I | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.015 | B(55) |
| 5754.57(4) | Q 5754.64(5) | | 1.08 +0 | N II | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 0.030 | B(55) |
| 6548.06(4) | 6548.03(5) | | 1.04 -3 | N II | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 0.030 | B(55) |
| 6583.39(7) | 6583.41(5) | | 3.02 -3 | N II | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 0.030 | B(55) |
| 10397.74(10) | 10397.74(5) | | 5.48 -2* | N I | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.015 | P |
| | 10407.17(5) | | 2.47 -2* | N I | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.015 | |
| | 10407.59(6) | | 4.71 -2* | N I | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.015 | |
| 57.330(3) | 57.343(3) | μm | 4.77 -5 | N III | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.047 | MSFJK |
| | 69.44(7) | μm | 3.63 -5 | N IV | 2s 2p | $^3P_1$ - $^3P_2$ | 0.077 | |
| 121.88887(12) | 121.88887(12) | μm | 7.47 -6 | N II | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 0.030 | CS |
| | 158.5(4) | μm | 6.00 -6 | N IV | 2s 2p | $^3P_0$ - $^3P_1$ | 0.077 | |
| | 205.5(4) | μm | 2.07 -6 | N II | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 0.030 | |
| | 1.148(9) | mm | 1.07 -8 | N I | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2D_{3/2}$ | 0.015 | |
| | 25.9(8) | mm | 5.17 -13 | N I | $2s^2$ $2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.015 | |

Table 5. Oxygen: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 1301.148(12) | 6.10 -2 | O V | 2s 2p | $^3P_0$ - $^1P_1$ | 0.114 | |
| | 1303.456(12) | 4.57 -2 | O V | 2s 2p | $^3P_1$ - $^1P_1$ | 0.114 | |
| | 1308.688(12) | 7.49 -2 | O V | 2s 2p | $^3P_2$ - $^1P_1$ | 0.114 | |
| | 2320.9510(16) | 3.27 -1 | O III | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 0.055 | |
| | 2470.21(2) | 2.38 -2 | O II | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.035 | |
| | 2470.33(2) | 5.95 -2 | O II | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.035 | |
| 2972.288(1) | 2972.2864(13) | 6.68 -2 | O I | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 0.014 | E(65) |
| 3726.04(2) | 3726.03(2) | 1.69 -4* | O II | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.035 | B(55) |
| 3728.80(2) | 3728.82(3) | 5.01 -5* | O II | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.035 | B(55) |
| 4363.19(2) | Q 4363.209(8) | 2.65 +0 | O III | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 0.055 | B(55) |
| 4958.93(2) | 4958.910(7) | 6.37 -3 | O III | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 0.055 | B(55) |
| 5006.86(2) | 5006.843(8) | 4.67 -2 | O III | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 0.055 | B(55) |
| 5577.34(10) | Q 5577.338(4) | 1.34 +0 | O I | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 0.014 | P |
| 6300.304(2) | 6300.304(6) | 5.11 -3 | O I | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 0.014 | E(65) |
| 6363.776(2) | 6363.776(6) | 1.65 -3 | O I | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 0.014 | E(65) |
| 7319.92(10) | 7319.92(20) | 1.15 -1* | O II | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.035 | B(55) |
| 7330.19(10) | 7329.63(20) | 1.01 -1* | O II | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.035 | B(55) |
| | 7330.70(20) | 6.14 -2* | O II | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.035 | |
| 25.87(2) | 25.913(13) μm | 5.17 -4 | O IV | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.077 | FMH |
| | 32.61(8) μm | 3.55 -4 | O V | 2s 2p | $^3P_1$ - $^3P_2$ | 0.114 | |
| 51.8145(5) | 51.815(1) μm | 9.69 -5 | O III | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 0.055 | MSFJK |
| 63.18371(3) | 63.185(6) μm | 8.91 -5 | O I | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 0.014 | E-pr |
| | 73.5(4) μm | 5.81 -5 | O V | 2s 2p | $^3P_0$ - $^3P_1$ | 0.114 | |
| 88.356(2) | 88.3564(22) μm | 2.61 -5 | O III | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 0.055 | MSFJK |
| 145.52548(8) | 145.53(13) μm | 1.75 -5 | O I | $2s^2$ $2p^4$ | $^3P_1$ - $^3P_0$ | 0.014 | DHLS |
| | 497.3(1.7) μm | 1.25 -7 | O II | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2D_{3/2}$ | 0.035 | |
| | 5.00(6) mm | 4.39 -12 | O II | $2s^2$ $2p^3$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.035 | |

Table 6. Fluorine: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | 1108.13(7) | | 2.56 -1 | F VI | 2s 2p | $^3P_0$ - $^1P_1$ | 0.157 | |
| | 1111.33(7) | | 1.90 -1 | F VI | 2s 2p | $^3P_1$ - $^1P_1$ | 0.157 | |
| | 1118.49(7) | | 3.11 -1 | F VI | 2s 2p | $^3P_2$ - $^1P_1$ | 0.157 | |
| | 1875.73(7) | | 1.51 +0 | F IV | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 0.087 | |
| | 1939.435(11) | | 3.52 -1 | F III | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.063 | |
| | 1939.465(11) | | 1.44 -1 | F III | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.063 | |
| | 2242.61(4) | | 4.93 -1 | F II | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 0.035 | |
| | 2929.70(4) | | 3.63 -4* | F III | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.063 | |
| | 2932.78(4) | | 1.63 -4* | F III | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.063 | |
| | Q 3532.17(25) | | 3.52 +0 | F IV | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 0.087 | |
| 3997.37(10) | 3997.37(9) | | 3.17 -2 | F IV | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 0.087 | B(60) |
| 4060.22(10) | 4060.21(9) | | 1.39 -1 | F IV | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 0.087 | B(60) |
| | Q 4157.75(12) | | 2.10 +0 | F II | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 0.035 | |
| | 4789.45(12) | | 3.83 -2 | F II | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 0.035 | |
| | 4868.99(17) | | 1.21 -2 | F II | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 0.035 | |
| | 5721.20(19) | | 3.05 -1* | F III | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.063 | |
| | 5732.95(19) | | 2.08 -1* | F III | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.063 | |
| | 5733.21(19) | | 2.74 -1* | F III | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.063 | |
| | 13.432(9) | μm | 3.71 -3 | F V | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.114 | |
| | 17.36(21) | μm | 2.39 -3 | F VI | 2s 2p | $^3P_1$ - $^3P_2$ | 0.157 | |
| 24.7475(15) | 24.740(12) | μm | 1.19 -3 | F I | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.017 | SK |
| | 25.83(4) | μm | 7.82 -4 | F IV | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 0.087 | |
| | 29.33(4) | μm | 8.91 -4 | F II | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 0.035 | |
| | 38.5(1.0) | μm | 3.87 -4 | F VI | 2s 2p | $^3P_0$ - $^3P_1$ | 0.157 | |
| | 44.07(21) | μm | 2.10 -4 | F IV | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 0.087 | |
| | 67.2(3) | μm | 1.78 -4 | F II | $2s^2$ $2p^4$ | $^3P_1$ - $^3P_0$ | 0.035 | |
| | 279.(6) | μm | 7.45 -7 | F III | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2D_{3/2}$ | 0.063 | |
| | 12.(7) | mm | 5.20 -12 | F III | $2s^2$ $2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.063 | |

Table 7. Neon: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 964.20(10) | 8.85 -1 | Ne VII | 2s 2p | $^3P_0$ - $^1P_1$ | 0.207 | |
| | 968.45(19) | 6.54 -1 | Ne VII | 2s 2p | $^3P_1$ - $^1P_1$ | 0.207 | |
| | 977.86(20) | 1.06 +0 | Ne VII | 2s 2p | $^3P_2$ - $^1P_1$ | 0.207 | |
| 1574.82(5) | 1574.60(13) | 5.50 +0 | Ne V | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 0.126 | ST |
| 1601.5 | 1600.0(5) | 1.41 +0 | Ne IV | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.097 | SBT |
| 1601.7 | 1600.1(5) | 5.90 -1 | Ne IV | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.097 | SBT |
| | 1814.63(5) | 2.76 +0 | Ne III | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 0.064 | |
| | 2418.2(1.2) | 2.65 -3* | Ne IV | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.097 | |
| | 2420.9(1.2) | 6.03 -4* | Ne IV | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.097 | |
| | Q 2972.8(5) | 4.39 +0 | Ne V | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 0.126 | |
| 3342.5(3) | Q 3342.42(17) | 4.28 +0 | Ne III | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 0.064 | B(60) |
| 3345.84(2) | 3345.83(16) | 1.24 -1 | Ne V | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 0.126 | B(55) |
| 3425.87(2) | 3425.87(17) | 4.36 -1 | Ne V | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 0.126 | B(55) |
| 3868.76(2) | 3868.752(15) | 1.39 -1 | Ne III | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 0.064 | B(55) |
| 3967.47(2) | 3967.46(4) | 5.95 -2 | Ne III | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 0.064 | B(55) |
| 4714.25(4) | 4714.22(6) | 6.19 -1* | Ne IV | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.097 | B(55) |
| 4724.15(4) | 4724.17(6) | 6.41 -1* | Ne IV | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.097 | B(55) |
| 4725.62(4) | 4725.60(6) | 5.92 -1* | Ne IV | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.097 | B(55) |
| | 7.642(6) μm | 2.01 -2 | Ne VI | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.158 | |
| | 10.06(7) μm | 1.25 -2 | Ne VII | 2s 2p | $^3P_1$ - $^3P_2$ | 0.207 | |
| 12.81355(2) | 12.81355(2) μm | 8.55 -3 | Ne II | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.041 | YKH |
| | 14.32(3) μm | 4.59 -3 | Ne V | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 0.126 | |
| | 15.555(5) μm | 5.97 -3 | Ne III | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 0.064 | |
| | 22.0(3) μm | 1.99 -3 | Ne VII | 2s 2p | $^3P_0$ - $^3P_1$ | 0.207 | |
| 24.28(2) | 24.28(2) μm | 1.27 -3 | Ne V | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 0.126 | FMH |
| 36.02(1) | 36.02(4) μm | 1.15 -3 | Ne III | $2s^2$ $2p^4$ | $^3P_1$ - $^3P_0$ | 0.064 | SHG |
| | 223.7(1.4) μm | 1.44 -6 | Ne IV | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2D_{3/2}$ | 0.097 | |
| | 1.56(7) mm | 2.36 -9 | Ne IV | $2s^2$ $2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.097 | |

Table 8. Sodium: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | 852.31(5) | | 2.62 +0 | Na VIII | 2s 2p | $^3P_0$ - $^1P_1$ | 0.264 | |
| | 857.66(5) | | 1.92 +0 | Na VIII | 2s 2p | $^3P_1$ - $^1P_1$ | 0.264 | |
| | 869.64(5) | | 3.08 +0 | Na VIII | 2s 2p | $^3P_2$ - $^1P_1$ | 0.264 | |
| | 1356.6(4) | | 1.69 +1 | Na VI | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 0.172 | |
| | 1365.1(6) | | 4.74 +0 | Na V | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.138 | |
| | 1365.8(6) | | 1.96 +0 | Na V | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.138 | |
| | 1529.29(5) | | 9.48 +0 | Na IV | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 0.099 | |
| | 2066.9(1.4) | | 1.78 -2* | Na V | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.138 | |
| | 2068.4(1.4) | | 1.73 -3* | Na V | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.138 | |
| | Q 2568.9(1.9) | | 5.27 +0 | Na VI | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 0.172 | |
| | Q 2803.74(18) | | 5.43 +0 | Na IV | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 0.099 | |
| | 2872.7(1.9) | | 4.06 -1 | Na VI | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 0.172 | |
| | 2971.9(1.8) | | 1.27 +0 | Na VI | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 0.172 | |
| 3241.68(10) | 3241.63(15) | | 5.75 -1 | Na IV | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 0.099 | B(60) |
| 3362.20(10) | 3362.24(16) | | 2.03 -1 | Na IV | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 0.099 | B(60) |
| | 4010.9(2.3) | | 1.40 +0* | Na V | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.138 | |
| | 4016.7(2.3) | | 1.91 +0* | Na V | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.138 | |
| | 4022.7(2.3) | | 1.43 +0* | Na V | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.138 | |
| | 4.675(22) | μm | 8.80 -2 | Na VII | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.209 | |
| | 6.23(3) | μm | 5.27 -2 | Na VIII | 2s 2p | $^3P_1$ - $^3P_2$ | 0.264 | |
| | 7.319(5) | μm | 4.59 -2 | Na III | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.072 | |
| | 8.61(9) | μm | 2.11 -2 | Na VI | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 0.172 | |
| | 9.039(12) | μm | 3.04 -2 | Na IV | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 0.099 | |
| | 13.66(13) | μm | 8.27 -3 | Na VIII | 2s 2p | $^3P_0$ - $^3P_1$ | 0.264 | |
| | 14.3(3) | μm | 6.14 -3 | Na VI | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 0.172 | |
| | 21.29(6) | μm | 5.58 -3 | Na IV | $2s^2$ $2p^4$ | $^3P_1$ - $^3P_0$ | 0.099 | |
| | 270.(100) | μm | 4.55 -7 | Na V | $2s^2$ $2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.138 | |
| | 278.(110) | μm | 7.50 -7 | Na V | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2D_{3/2}$ | 0.138 | |

Table 9. Magnesium: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 762.29(20) | 6.92 +0 | Mg IX | 2s 2p | $^3P_0$ - $^1P_1$ | 0.328 | |
| | 768.90(20) | 5.05 +0 | Mg IX | 2s 2p | $^3P_1$ - $^1P_1$ | 0.328 | |
| | 783.72(21) | 7.95 +0 | Mg IX | 2s 2p | $^3P_2$ - $^1P_1$ | 0.328 | |
| 1189.82(1) | 1189.82(16) | 4.58 +1 | Mg VII | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 0.225 | SBT |
| 1190.07(1) | 1190.074(20) | 1.37 +1 | Mg VI | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.187 | SBT |
| 1191.62(1) | 1191.611(20) | 5.62 +0 | Mg VI | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.187 | SBT |
| 1324.44(1) | 1324.58(8) | 2.79 +1 | Mg V | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 0.141 | SBT |
| 1805.94(1) | 1805.94(7) | 2.75 -2* | Mg VI | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.187 | SBT |
| | 1806.49(17) | 4.58 -3* | Mg VI | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.187 | |
| | Q 2261.5(6) | 6.16 +0 | Mg VII | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 0.225 | |
| | Q 2417.5(3) | 6.59 +0 | Mg V | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 0.141 | |
| | 2509.2(7) | 1.17 +0 | Mg VII | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 0.225 | |
| | 2629.1(8) | 3.36 +0 | Mg VII | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 0.225 | |
| | 2782.7(3) | 1.86 +0 | Mg V | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 0.141 | |
| | 2928.0(4) | 5.85 -1 | Mg V | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 0.141 | |
| | 3486.7(6) | 3.33 +0* | Mg VI | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.187 | |
| | 3488.7(3) | 5.06 +0* | Mg VI | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.187 | |
| | 3502.0(3) | 3.48 +0* | Mg VI | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.187 | |
| | 7573.179(8) | 1.95 -4 | Mg I | 3s 3p | $^3P_0$ - $^1P_1$ | 0.008 | |
| | 7584.704(8) | 1.46 -4 | Mg I | 3s 3p | $^3P_1$ - $^1P_1$ | 0.008 | |
| | 7608.206(8) | 2.40 -4 | Mg I | 3s 3p | $^3P_2$ - $^1P_1$ | 0.008 | |
| 3.0275(20) | 3.0275(20) μm | 3.24 -1 | Mg VIII | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.266 | MNM |
| | 4.06(4) μm | 1.91 -1 | Mg IX | 2s 2p | $^3P_1$ - $^3P_2$ | 0.328 | |
| | 4.487(4) μm | 1.99 -1 | Mg IV | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.109 | |
| | 5.50(3) μm | 8.09 -2 | Mg VII | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 0.225 | |
| 5.60(2) | 5.608(9) μm | 1.27 -1 | Mg V | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 0.141 | RSW |
| | 8.87(17) μm | 2.94 -2 | Mg IX | 2s 2p | $^3P_0$ - $^3P_1$ | 0.328 | |
| | 9.03(9) μm | 2.44 -2 | Mg VII | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 0.225 | |
| | 13.54(5) μm | 2.17 -2 | Mg V | $2s^2$ $2p^4$ | $^3P_1$ - $^3P_0$ | 0.141 | |
| | 92.3(1.2) μm | 1.13 -5 | Mg VI | $2s^2$ $2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.187 | |
| 245.6157(7) | 245.62(9) μm | 9.00 -7 | Mg I | 3s 3p | $^3P_1$ - $^3P_2$ | 0.008 | ILME |
| 498.592792(3) | 498.5(4) μm | 1.00 -7 | Mg I | 3s 3p | $^3P_0$ - $^3P_1$ | 0.008 | BDGRG |
| | 595.(190) μm | 7.63 -8 | Mg VI | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2D_{3/2}$ | 0.187 | |

Table 10. Aluminum: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 688.03(17) | 1.67 +1 | Al X | 2s 2p | $^3P_0$ - $^1P_1$ | 0.399 | |
| | 695.93(18) | 1.21 +1 | Al X | 2s 2p | $^3P_1$ - $^1P_1$ | 0.399 | |
| | 713.98(18) | 1.87 +1 | Al X | 2s 2p | $^3P_2$ - $^1P_1$ | 0.399 | |
| | 1054.08(3) | 3.51 +1 | Al VII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.241 | |
| | 1057.05(3) | 1.44 +1 | Al VII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.241 | |
| | 1058.0(7) | 1.12 +2 | Al VIII | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 0.285 | |
| | 1169.85(14) | 7.29 +1 | Al VI | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 0.154 | |
| | 1603.36(8) | 1.22 -2* | Al VII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.241 | |
| 1604.80(4) | 1604.80(5) | 4.26 -1* | Al VII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.241 | ST |
| | Q 2018.(3) | 7.09 +0 | Al VIII | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 0.285 | |
| | Q 2124.9(6) | 7.79 +0 | Al VI | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 0.154 | |
| | 2222.(3) | 3.06 +0 | Al VIII | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 0.285 | |
| | 2365.(3) | 8.13 +0 | Al VIII | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 0.285 | |
| | 2428.4(6) | 5.15 +0 | Al VI | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 0.154 | |
| | 2601.0(7) | 1.48 +0 | Al VI | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 0.154 | |
| | 3070.7(3) | 7.22 +0 | Al VII | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.241 | |
| | 3076.0(4) | 1.27 +1* | Al VII | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.241 | |
| | 3096.0(3) | 8.12 +0* | Al VII | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.241 | |
| | 4451.311(14) | 3.07 -3 | Al II | 3s 3p | $^3P_0$ - $^1P_1$ | 0.019 | |
| | 4463.409(14) | 2.31 -3 | Al II | 3s 3p | $^3P_1$ - $^1P_1$ | 0.019 | |
| | 4488.233(14) | 3.74 -3 | Al II | 3s 3p | $^3P_2$ - $^1P_1$ | 0.019 | |
| 2.040(7) | 2.044(4) μm | 1.05 +0 | Al IX | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.330 | GJ |
| | 2.753(20) μm | 6.16 -1 | Al X | 2s 2p | $^3P_1$ - $^3P_2$ | 0.399 | |
| 2.879(14) | 2.9045(17)μm | 7.34 -1 | Al V | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.154 | GJ |
| 3.661(14) | 3.6593(19)μm | 4.58 -1 | Al VI | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 0.154 | GJ |
| 3.72(2) | 3.689(3) μm | 2.68 -1 | Al VIII | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 0.285 | GJ |
| | 5.85(10) μm | 8.96 -2 | Al VIII | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 0.285 | |
| | 6.06(12) μm | 9.19 -2 | Al X | 2s 2p | $^3P_0$ - $^3P_1$ | 0.399 | |
| | 9.116(6) μm | 7.10 -2 | Al VI | $2s^2$ $2p^4$ | $^3P_1$ - $^3P_0$ | 0.154 | |
| | 37.6(6) μm | 1.67 -4 | Al VII | $2s^2$ $2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.241 | |
| | 80.72(5) μm | 2.54 -5 | Al II | 3s 3p | $^3P_1$ - $^3P_2$ | 0.019 | |
| | 89.237(8) μm | 1.25 -5 | Al I | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.006 | |
| | 164.26(20) μm | 4.10 -6 | Al II | 3s 3p | $^3P_0$ - $^3P_1$ | 0.019 | |
| | 179.(11) μm | 1.86 -6 | Al VII | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.241 | |

Table 11. Silicon: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 625.48(6) | 3.75 +1 | Si XI | 2s 2p | $^3P_0$ - $^1P_1$ | 0.476 | |
| | 634.78(6) | 2.68 +1 | Si XI | 2s 2p | $^3P_1$ - $^1P_1$ | 0.476 | |
| | 656.34(6) | 4.05 +1 | Si XI | 2s 2p | $^3P_2$ - $^1P_1$ | 0.476 | |
| | 944.38(4) | 8.14 +1 | Si VIII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.304 | |
| | 949.24(4) | 3.37 +1 | Si VIII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.304 | |
| | 950.08(23) | 2.51 +2 | Si IX | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 0.351 | |
| | 1049.2(3) | 1.73 +2 | Si VII | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 0.247 | |
| 1440.50(1) | 1440.497(10) | 3.42 -2* | Si VIII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.304 | SBT |
| 1445.75(1) | 1445.753(10) | 1.70 +0 | Si VIII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.304 | SBT |
| | Q 1822.4(8) | 8.01 +0 | Si IX | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 0.351 | |
| | Q 1895.0(9) | 9.01 +0 | Si VII | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 0.247 | |
| 1984.88(2) | 1984.88(3) | 7.40 +0 | Si IX | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 0.351 | SBT |
| 2146.64(4) | 2146.64(5) | 1.28 +1 | Si VII | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 0.247 | SBT |
| 2149.26(5) | 2149.31(3) | 1.83 +1 | Si IX | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 0.351 | SBT |
| | 2350.02(18) | 3.37 +0 | Si VII | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 0.247 | |
| | 2722.4(4) | 2.83 +1 | Si VIII | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.304 | |
| | 2741.2(4) | 1.69 +1* | Si VIII | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.304 | |
| | 2763.1(4) | 1.79 +1* | Si VIII | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.304 | |
| | 3314.727(16) | 1.85 -2 | Si III | 3s 3p | $^3P_0$ - $^1P_1$ | 0.033 | |
| | 3328.921(16) | 1.37 -2 | Si III | 3s 3p | $^3P_1$ - $^1P_1$ | 0.033 | |
| | 3358.189(16) | 2.22 -2 | Si III | 3s 3p | $^3P_2$ - $^1P_1$ | 0.033 | |
| | 6526.781(3) | 3.55 -2 | Si I | $3s^2$ $3p^2$ | $^3P_1$ - $^1S_0$ | 0.008 | |
| 10991.42(10) | Q 10991.413(9) | 7.96 -1 | Si I | $3s^2$ $3p^2$ | $^1D_2$ - $^1S_0$ | 0.008 | P |
| 14305.(4) | 14301.(4) | 3.07 +0 | Si X | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.401 | MNM |
| | 16068.297(18) | 9.75 -4 | Si I | $3s^2$ $3p^2$ | $^3P_1$ - $^1D_2$ | 0.008 | |
| | 16454.531(19) | 2.71 -3 | Si I | $3s^2$ $3p^2$ | $^3P_2$ - $^1D_2$ | 0.008 | |
| | 19320.(50) | 1.80 +0 | Si XI | 2s 2p | $^3P_1$ - $^3P_2$ | 0.476 | |
| 19590.(70) | 19641.(11) | 2.37 +0 | Si VI | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.205 | GJ |
| 2.474(7) | 2.4807(18)μm | 1.47 +0 | Si VII | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 0.247 | GJ |
| | 2.5839(5) μm | 7.79 -1 | Si IX | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 0.351 | |
| 3.92(2) | 3.928(11) μm | 2.95 -1 | Si IX | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 0.351 | GJ |
| | 4.27(3) μm | 2.59 -1 | Si XI | 2s 2p | $^3P_0$ - $^3P_1$ | 0.476 | |
| | 6.515(18) μm | 1.94 -1 | Si VII | $2s^2$ $2p^4$ | $^3P_1$ - $^3P_0$ | 0.247 | |
| | 18.45(24) μm | 1.40 -3 | Si VIII | $2s^2$ $2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.304 | |
| | 34.8141(18)μm | 2.13 -4 | Si II | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.016 | |
| | 38.207(21) μm | 2.41 -4 | Si III | 3s 3p | $^3P_1$ - $^3P_2$ | 0.033 | |
| | 39.62(11) μm | 1.70 -4 | Si VIII | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.304 | |
| | 68.473(3) μm | 4.20 -5 | Si I | $3s^2$ $3p^2$ | $^3P_1$ - $^3P_2$ | 0.008 | |
| | 77.77(9) μm | 3.86 -5 | Si III | 3s 3p | $^3P_0$ - $^3P_1$ | 0.033 | |
| 129.68173(4) | 129.676(16) μm | 8.25 -6 | Si I | $3s^2$ $3p^2$ | $^3P_0$ - $^3P_1$ | 0.008 | IEBL |

Table 12. Phosphorus: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 571.87(7) | 9.46 +1 | P XII | 2s 2p | $^3P_0$ - $^1P_1$ | 0.561 | |
| | 582.57(5) | 6.76 +1 | P XII | 2s 2p | $^3P_1$ - $^1P_1$ | 0.561 | |
| | 607.95(8) | 1.01 +2 | P XII | 2s 2p | $^3P_2$ - $^1P_1$ | 0.561 | |
| | 853.61(15) | 1.74 +2 | P IX | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.372 | |
| | 860.08(21) | 5.24 +2 | P X | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 0.424 | |
| | 861.26(15) | 7.34 +1 | P IX | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.372 | |
| | 952.1(3) | 3.82 +2 | P VIII | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 0.310 | |
| | 1307.51(5) | 9.90 -2* | P IX | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.372 | |
| 1317.65(3) | 1318.06(5) | 5.46 +0 | P IX | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.372 | ST |
| | Q 1659.2(8) | 8.99 +0 | P X | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 0.424 | |
| | Q 1708.5(1.0) | 1.03 +0 | P VIII | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 0.310 | |
| | 1785.8(9) | 1.68 +1 | P X | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 0.424 | |
| | 1913.7(9) | 2.90 +1 | P VIII | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 0.310 | |
| | 1974.5(1.1) | 3.86 +1 | P X | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 0.424 | |
| | 2150.0(1.6) | 7.03 +0 | P VIII | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 0.310 | |
| | 2421.7(1.2) | 6.11 +1 | P IX | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.372 | |
| | 2458.2(1.2) | 3.54 +1* | P IX | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.372 | |
| | 2484.3(1.2) | 3.72 +1* | P IX | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.372 | |
| | 2682.154(10) | 7.33 -2 | P IV | 3s 3p | $^3P_0$ - $^1P_1$ | 0.051 | |
| | 2698.696(10) | 5.40 -2 | P IV | 3s 3p | $^3P_1$ - $^1P_1$ | 0.051 | |
| | 2733.280(11) | 8.66 -2 | P IV | 3s 3p | $^3P_2$ - $^1P_1$ | 0.051 | |
| | 4669.25(6) | 1.62 -1 | P II | $3s^2$ $3p^2$ | $^3P_1$ - $^1S_0$ | 0.019 | |
| | 5332.416(11) | 1.08 -1 | P I | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.010 | |
| | 5339.621(11) | 4.26 -2 | P I | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.010 | |
| | Q 7875.99(17) | 2.24 +0 | P II | $3s^2$ $3p^2$ | $^1D_2$ - $^1S_0$ | 0.019 | |
| | 8787.54(3) | 1.96 -4* | P I | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.010 | |
| | 8799.61(3) | 2.97 -4* | P I | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.010 | |
| | 10308.(3) | 8.20 +0 | P XI | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.479 | |
| | 11468.2(4) | 3.62 -3 | P II | $3s^2$ $3p^2$ | $^3P_1$ - $^1D_2$ | 0.019 | |
| | 11882.8(4) | 5.13 -2 | P II | $3s^2$ $3p^2$ | $^3P_2$ - $^1D_2$ | 0.019 | |
| | 13533.61(10) | 7.45 -2* | P I | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.010 | |
| | 13562.27(10) | 1.13 -1* | P I | $3s^2$ $3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.010 | |
| | 13580.12(10) | 1.01 -1* | P I | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.010 | |
| | 13745.(6) | 6.92 +0 | P VII | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.264 | |
| | 13951.(40) | 4.75 +0 | P XII | 2s 2p | $^3P_1$ - $^3P_2$ | 0.561 | |
| | 17350.(80) | 4.28 +0 | P VIII | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 0.310 | |
| | 18680.(100) | 2.05 +0 | P X | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 0.424 | |
| | 2.708(21) μm | 8.99 -1 | P X | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 0.424 | |
| | 3.112(22) μm | 6.80 -1 | P XII | 2s 2p | $^3P_0$ - $^3P_1$ | 0.561 | |
| | 4.85(8) μm | 4.70 -1 | P VIII | $2s^2$ $2p^4$ | $^3P_1$ - $^3P_0$ | 0.310 | |
| | 9.62(26) μm | 9.74 -3 | P IX | $2s^2$ $2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.372 | |

Table 12. Phosphorus: wavelengths and transition probabilities - Continued

| Wavelength Observed | Calculated | | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | 16.34(11) | μm | 2.39 -3 | P IX | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.372 | |
| | 17.885(5) | μm | 1.57 -3 | P III | $3s^2\ 3p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.030 | |
| | 21.336(6) | μm | 1.38 -3 | P IV | 3s 3p | $^3P_1$ - $^3P_2$ | 0.051 | |
| | 32.87(3) | μm | 3.80 -4 | P II | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 0.019 | |
| | 43.77(3) | μm | 2.18 -4 | P IV | 3s 3p | $^3P_0$ - $^3P_1$ | 0.051 | |
| | 60.64(7) | μm | 8.05 -5 | P II | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 0.019 | |
| | 395.3(9) | μm | 1.45 -7 | P I | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.010 | |
| | 640.6(2.3) | μm | 4.10 -8 | P I | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.010 | |

Table 12. Phosphorus: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 571.87(7) | 9.46 +1 | P XII | 2s 2p | $^3P_0$ - $^1P_1$ | 0.561 | |
| | 582.57(5) | 6.76 +1 | P XII | 2s 2p | $^3P_1$ - $^1P_1$ | 0.561 | |
| | 607.95(8) | 1.01 +2 | P XII | 2s 2p | $^3P_2$ - $^1P_1$ | 0.561 | |
| | 853.61(15) | 1.74 +2 | P IX | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.372 | |
| | 860.08(21) | 5.24 +2 | P X | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 0.424 | |
| | 861.26(15) | 7.34 +1 | P IX | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.372 | |
| | 952.1(3) | 3.82 +2 | P VIII | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 0.310 | |
| | 1307.51(5) | 9.90 -2* | P IX | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.372 | |
| 1317.65(3) | 1318.06(5) | 5.46 +0 | P IX | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.372 | ST |
| | Q 1659.2(8) | 8.99 +0 | P X | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 0.424 | |
| | Q 1708.5(1.0) | 1.03 +0 | P VIII | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 0.310 | |
| | 1785.8(9) | 1.68 +1 | P X | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 0.424 | |
| | 1913.7(9) | 2.90 +1 | P VIII | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 0.310 | |
| | 1974.5(1.1) | 3.86 +1 | P X | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 0.424 | |
| | 2150.0(1.6) | 7.03 +0 | P VIII | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 0.310 | |
| | 2421.7(1.2) | 6.11 +1 | P IX | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.372 | |
| | 2458.2(1.2) | 3.54 +1* | P IX | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.372 | |
| | 2484.3(1.2) | 3.72 +1* | P IX | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.372 | |
| | 2682.154(10) | 7.33 -2 | P IV | 3s 3p | $^3P_0$ - $^1P_1$ | 0.051 | |
| | 2698.696(10) | 5.40 -2 | P IV | 3s 3p | $^3P_1$ - $^1P_1$ | 0.051 | |
| | 2733.280(11) | 8.66 -2 | P IV | 3s 3p | $^3P_2$ - $^1P_1$ | 0.051 | |
| | 4669.25(6) | 1.62 -1 | P II | $3s^2$ $3p^2$ | $^3P_1$ - $^1S_0$ | 0.019 | |
| | 5332.416(11) | 1.08 -1 | P I | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.010 | |
| | 5339.621(11) | 4.26 -2 | P I | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.010 | |
| | Q 7875.99(17) | 2.24 +0 | P II | $3s^2$ $3p^2$ | $^1D_2$ - $^1S_0$ | 0.019 | |
| | 8787.54(3) | 1.96 -4* | P I | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.010 | |
| | 8799.61(3) | 2.97 -4* | P I | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.010 | |
| | 10308.(3) | 8.20 +0 | P XI | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.479 | |
| | 11468.2(4) | 3.62 -3 | P II | $3s^2$ $3p^2$ | $^3P_1$ - $^1D_2$ | 0.019 | |
| | 11882.8(4) | 5.13 -2 | P II | $3s^2$ $3p^2$ | $^3P_2$ - $^1D_2$ | 0.019 | |
| | 13533.61(10) | 7.45 -2* | P I | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.010 | |
| | 13562.27(10) | 1.13 -1* | P I | $3s^2$ $3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.010 | |
| | 13580.12(10) | 1.01 -1* | P I | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.010 | |
| | 13745.(6) | 6.92 +0 | P VII | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.264 | |
| | 13951.(40) | 4.75 +0 | P XII | 2s 2p | $^3P_1$ - $^3P_2$ | 0.561 | |
| | 17350.(80) | 4.28 +0 | P VIII | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 0.310 | |
| | 18680.(100) | 2.05 +0 | P X | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 0.424 | |
| | 2.708(21) μm | 8.99 -1 | P X | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 0.424 | |
| | 3.112(22) μm | 6.80 -1 | P XII | 2s 2p | $^3P_0$ - $^3P_1$ | 0.561 | |
| | 4.85(8) μm | 4.70 -1 | P VIII | $2s^2$ $2p^4$ | $^3P_1$ - $^3P_0$ | 0.310 | |
| | 9.62(26) μm | 9.74 -3 | P IX | $2s^2$ $2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.372 | |

Table 12. Phosphorus: wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | 16.34(11) | μm | 2.39 -3 | P IX | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.372 | |
| | 17.885(5) | μm | 1.57 -3 | P III | $3s^2\ 3p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.030 | |
| | 21.336(6) | μm | 1.38 -3 | P IV | 3s 3p | $^3P_1$ - $^3P_2$ | 0.051 | |
| | 32.87(3) | μm | 3.80 -4 | P II | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 0.019 | |
| | 43.77(3) | μm | 2.18 -4 | P IV | 3s 3p | $^3P_0$ - $^3P_1$ | 0.051 | |
| | 60.64(7) | μm | 8.05 -5 | P II | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 0.019 | |
| | 395.3(9) | μm | 1.45 -7 | P I | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.010 | |
| | 640.6(2.3) | μm | 4.10 -8 | P I | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.010 | |

Table 13. Sulfur: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 525.21(6) | 1.58 +2 | S XIII | 2s 2p | $^3P_0 - {}^1P_1$ | 0.652 | |
| | 537.29(6) | 1.10 +2 | S XIII | 2s 2p | $^3P_1 - {}^1P_1$ | 0.652 | |
| | 566.96(7) | 1.57 +2 | S XIII | 2s 2p | $^3P_2 - {}^1P_1$ | 0.652 | |
| | 776.37(3) | 3.48 +2 | S X | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.447 | |
| | 782.96(17) | 1.04 +3 | S XI | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 0.505 | |
| | 787.56(3) | 1.50 +2 | S X | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.447 | |
| | 871.73(16) | 7.91 +2 | S IX | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 0.379 | |
| 1196.24(1) | 1196.245(14) | 2.87 -1* | S X | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.447 | SBT |
| 1212.96(1) | 1212.970(15) | 1.64 +1 | S X | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.447 | SBT |
| | Q 1520.2(7) | 1.00 +1 | S XI | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 0.505 | |
| | Q 1552.7(4) | 1.17 +1 | S IX | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 0.379 | |
| 1614.51(3) | 1614.5(7) | 3.62 +1 | S XI | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 0.505 | SBT |
| 1715.44(1) | 1715.41(12) | 6.18 +1 | S IX | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 0.379 | SBT |
| 1826.21(2) | 1826.2(9) | 7.69 +1 | S XI | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 0.505 | SBT |
| | 1987.7(6) | 1.36 +1 | S IX | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 0.379 | |
| | 2156.28(24) | 1.25 +2 | S X | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.447 | |
| | 2211.26(25) | 6.92 +1 | S X | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.447 | |
| | 2244.84(26) | 7.20 +1 | S X | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.447 | |
| | 2265.5(8) | 2.30 -1 | S V | 3s 3p | $^3P_0 - {}^1P_1$ | 0.073 | |
| | 2284.63(18) | 1.68 -1 | S V | 3s 3p | $^3P_1 - {}^1P_1$ | 0.073 | |
| | 2325.1(8) | 2.65 -1 | S V | 3s 3p | $^3P_2 - {}^1P_1$ | 0.073 | |
| 3721.69(10) | 3721.68(10) | 6.83 -1 | S III | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.035 | B(60) |
| 4068.60(2) | 4068.60(3) | 2.20 -1 | S II | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.023 | B(55) |
| 4076.35(2) | 4076.35(3) | 7.44 -2 | S II | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.023 | B(55) |
| 4589.2606(5) | 4589.2606(14) | 3.5 -1 | S I | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.010 | E(78) |
| 6312.06(4) | Q 6312.1(4) | 3.22 +0 | S III | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.035 | B(55) |
| 6716.47(2) | 6716.467(23) | 2.65 -4* | S II | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.023 | TMR |
| 6730.85(2) | 6730.847(23) | 5.37 -4* | S II | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.023 | TMR |
| 7611.0(4) | 7611.2(6) | 2.04 +1 | S XII | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 0.565 | J |
| 7725.0461(7) | Q 7725.046(4) | 1.53 +0 | S I | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.010 | E(78) |
| | 9068.9(7) | 1.62 -2 | S III | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.035 | |
| | 9531.0(7) | 9.40 -2 | S III | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.035 | |
| T 9911.(1) | 9911.8(1.0) | 1.84 +1 | S VIII | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.329 | J |
| | 10264.(30) | 1.20 +1 | S XIII | 2s 2p | $^3P_1 - {}^3P_2$ | 0.652 | |
| | 10286.66(22) | 1.32 -1* | S II | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.023 | |
| | 10320.42(22) | 2.22 -1* | S II | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.023 | |
| | 10336.33(22) | 1.95 -1* | S II | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.023 | |
| 10821.177(5) | 10821.176(6) | 2.75 -2 | S I | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.010 | E(78) |
| | 11305.854(9) | 8.0 -3 | S I | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.010 | |
| | 12520.(20) | 1.14 +1 | S IX | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 0.379 | |
| | 13924.(50) | 4.94 +0 | S XI | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 0.505 | |

Table 13. Sulfur: wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 19200.(70) | 2.51 +0 | S XI | $2s^2\ 2p^2$ | $^3P_0$ - $^3P_1$ | 0.505 | |
| | 2.336(15) μm | 1.58 +0 | S XIII | 2s 2p | $^3P_0$ - $^3P_1$ | 0.652 | |
| | 3.75(3) μm | 1.01 +0 | S IX | $2s^2\ 2p^4$ | $^3P_1$ - $^3P_0$ | 0.379 | |
| | 5.467(21) μm | 5.22 -2 | S X | $2s^2\ 2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.447 | |
| | 8.676(11) μm | 1.58 -2 | S X | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.447 | |
| 10.5105(1) | 10.5141(22)μm | 7.73 -3 | S IV | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.047 | L |
| | 13.12(26) μm | 5.49 -3 | S V | 3s 3p | $^3P_1$ - $^3P_2$ | 0.073 | |
| 18.7129(4) | 18.7129(5) μm | 2.06 -3 | S III | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 0.035 | BBAMC |
| | 25.2490(3) μm | 1.40 -3 | S I | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 0.010 | |
| | 27.1(1.1) μm | 9.16 -4 | S V | 3s 3p | $^3P_0$ - $^3P_1$ | 0.073 | |
| 33.47(2) | 33.47(2) μm | 4.78 -4 | S III | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 0.035 | HBGSH |
| | 56.311(5) μm | 3.02 -4 | S I | $3s^2\ 3p^4$ | $^3P_1$ - $^3P_0$ | 0.010 | |
| | 214.1(1.3) μm | 9.13 -7 | S II | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.023 | |
| | 314.5(7) μm | 3.46 -7 | S II | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.023 | |

Table 14. Chlorine: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 483.99(17) | 3.02 +2 | Cl XIV | 2s 2p | $^3P_0$ - $^1P_1$ | 0.750 | |
| | 497.59(17) | 2.08 +2 | Cl XIV | 2s 2p | $^3P_1$ - $^1P_1$ | 0.750 | |
| | 531.69(20) | 2.85 +2 | Cl XIV | 2s 2p | $^3P_2$ - $^1P_1$ | 0.750 | |
| | 708.6(5) | 6.54 +2 | Cl XI | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.529 | |
| | 716.1(5) | 1.95 +3 | Cl XII | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 0.592 | |
| | 724.4(5) | 2.94 +2 | Cl XI | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.529 | |
| | 804.0(3) | 1.55 +3 | Cl X | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 0.456 | |
| | 1100.3(1.2) | 8.08 -1* | Cl XI | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.529 | |
| | 1125.5(1.3) | 4.51 +1 | Cl XI | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.529 | |
| | Q 1400.8(2.8) | 1.11 +1 | Cl XII | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 0.592 | |
| | Q 1420.6(1.4) | 1.32 +1 | Cl X | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 0.456 | |
| | 1464.9(2.2) | 7.49 +1 | Cl XII | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 0.592 | |
| | 1542.7(1.2) | 1.25 +2 | Cl X | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 0.456 | |
| | 1698.0(2.9) | 1.46 +2 | Cl XII | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 0.592 | |
| | 1852.4(1.8) | 2.54 +1 | Cl X | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 0.456 | |
| | 1913.1(8) | 2.49 +2 | Cl XI | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.529 | |
| | 1967.(4) | 6.14 -1 | Cl VI | 3s 3p | $^3P_0$ - $^1P_1$ | 0.097 | |
| | 1989.(4) | 4.46 -1 | Cl VI | 3s 3p | $^3P_1$ - $^1P_1$ | 0.097 | |
| | 1990.8(8) | 1.31 +2 | Cl XI | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.529 | |
| | 2031.6(9) | 1.35 +3 | Cl XI | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.529 | |
| | 2035.(4) | 6.93 -1 | Cl VI | 3s 3p | $^3P_2$ - $^1P_1$ | 0.097 | |
| | 3118.55(8) | 2.19 +0 | Cl IV | $3s^2$ $3p^2$ | $^3P_1$ - $^1S_0$ | 0.053 | |
| 3342.9(3) | 3342.80(20) | 6.91 -1 | Cl III | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.040 | B(60) |
| 3353.33(10) | 3353.17(22) | 1.22 -1 | Cl III | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.040 | B(60) |
| | 3677.855(8) | 1.37 +0 | Cl II | $3s^2$ $3p^4$ | $^3P_1$ - $^1S_0$ | 0.024 | |
| 5323.29(10) | Q 5323.3(3) | 4.14 +0 | Cl IV | $3s^2$ $3p^2$ | $^1D_2$ - $^1S_0$ | 0.053 | B(55) |
| 5517.66(10) | 5517.71(6) | 8.07 -4* | Cl III | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.040 | B(55) |
| 5537.6(3) | 5537.88(6) | 3.44 -3* | Cl III | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.040 | B(55) |
| | 5746.(20) | 4.73 +1 | Cl XIII | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.657 | |
| | Q 6161.835(21) | 2.06 +0 | Cl II | $3s^2$ $3p^4$ | $^1D_2$ - $^1S_0$ | 0.024 | |
| | 7334.(11) | 4.55 +1 | Cl IX | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.400 | |
| 7530.54(10) | 7529.9(4) | 5.57 -2 | Cl IV | $3s^2$ $3p^2$ | $^3P_1$ - $^1D_2$ | 0.053 | B(55) |
| | 7756.(40) | 2.80 +1 | Cl XIV | 2s 2p | $^3P_1$ - $^3P_2$ | 0.750 | |
| 8045.63(10) | 8046.1(5) | 2.08 -1 | Cl IV | $3s^2$ $3p^2$ | $^3P_2$ - $^1D_2$ | 0.053 | B(55) |
| | 8433.65(12) | 3.39 -1* | Cl III | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.040 | |
| | 8480.85(12) | 3.87 -1* | Cl III | $3s^2$ $3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.040 | |
| | 8500.00(13) | 3.60 -1* | Cl III | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.040 | |
| | 8578.697(29) | 1.07 -1 | Cl II | $3s^2$ $3p^4$ | $^3P_2$ - $^1D_2$ | 0.024 | |
| | 9123.60(5) | 2.98 -2 | Cl II | $3s^2$ $3p^4$ | $^3P_1$ - $^1D_2$ | 0.024 | |
| | 9223.(18) | 2.83 +1 | Cl X | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 0.456 | |
| | 10672.(24) | 1.09 +1 | Cl XII | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 0.592 | |

Table 14. Chlorine: wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 13774.(40) | 6.78 +0 | Cl XII | $2s^2\ 2p^2$ | $^3P_0$ - $^3P_1$ | 0.592 | |
| | 17700.(220) | 3.52 +0 | Cl XIV | 2s 2p | $^3P_0$ - $^3P_1$ | 0.750 | |
| | 3.051(20) μm | 1.87 +0 | Cl X | $2s^2\ 2p^4$ | $^3P_1$ - $^3P_0$ | 0.456 | |
| | 3.263(23) μm | 2.40 -1 | Cl XI | $2s^2\ 2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.529 | |
| | 4.91(5) μm | 8.53 -2 | Cl XI | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.529 | |
| | 6.704(9) μm | 2.98 -2 | Cl V | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.068 | |
| | 8.58(5) μm | 2.10 -2 | Cl VI | 3s 3p | $^3P_1$ - $^3P_2$ | 0.097 | |
| 11.333347(15) | 11.333347(15)μm | 1.24 -2 | Cl I | $3s^2\ 3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.013 | DJM |
| | 11.741(7) μm | 8.32 -3 | Cl IV | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 0.053 | |
| | 14.3678(8) μm | 7.50 -3 | Cl II | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 0.024 | |
| | 18.08(23) μm | 3.16 -3 | Cl VI | 3s 3p | $^3P_0$ - $^3P_1$ | 0.097 | |
| | 20.354(21) μm | 2.13 -3 | Cl IV | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 0.053 | |
| | 33.281(8) μm | 1.50 -3 | Cl II | $3s^2\ 3p^4$ | $^3P_1$ - $^3P_0$ | 0.024 | |
| | 108.07(21) μm | 7.08 -6 | Cl III | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.040 | |
| | 151.6(4) μm | 3.08 -6 | Cl III | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.040 | |

Table 15. Argon: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 447.33(14) | 5.55 +2 | Ar XV | 2s 2p | $^3P_0$ - $^1P_1$ | 0.855 | |
| | 462.19(15) | 3.75 +2 | Ar XV | 2s 2p | $^3P_1$ - $^1P_1$ | 0.855 | |
| | 501.15(18) | 4.93 +2 | Ar XV | 2s 2p | $^3P_2$ - $^1P_1$ | 0.855 | |
| | 648.93(27) | 1.17 +3 | Ar XII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.618 | |
| | 656.73(28) | 3.51 +3 | Ar XIII | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 0.686 | |
| | 669.97(29) | 5.49 +2 | Ar XII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.618 | |
| | 746.0(4) | 2.91 +3 | Ar XI | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 0.539 | |
| | 1018.6(7) | 2.17 +0* | Ar XII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.618 | |
| | 1054.9(8) | 1.11 +2 | Ar XII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.618 | |
| | Q 1296.8(1.2) | 1.23 +1 | Ar XIII | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 0.686 | |
| | Q 1304.9(1.2) | 1.49 +1 | Ar XI | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 0.539 | |
| T 1331.52(1) | 1330.5(1.1) | 1.50 +2 | Ar XIII | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 0.686 | SBT |
| 1392.12(1) | 1392.1(1.0) | 2.41 +2 | Ar XI | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 0.539 | SBT |
| T 1582.56(1) | 1584.3(1.6) | 2.66 +2 | Ar XIII | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 0.686 | SBT |
| | 1686.3(1.8) | 4.76 +2 | Ar XII | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.618 | |
| | 1737.3(1.5) | 1.46 +0 | Ar VII | 3s 3p | $^3P_0$ - $^1P_1$ | 0.124 | |
| | 1741.9(2.1) | 4.21 +1 | Ar XI | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 0.539 | |
| | 1762.0(1.6) | 1.05 +0 | Ar VII | 3s 3p | $^3P_1$ - $^1P_1$ | 0.124 | |
| | 1787.9(2.0) | 2.40 +2 | Ar XII | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.618 | |
| | 1815.8(1.7) | 1.60 +0 | Ar VII | 3s 3p | $^3P_2$ - $^1P_1$ | 0.124 | |
| | 1836.2(2.2) | 2.41 +2 | Ar XII | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.618 | |
| | 2691.04(19) | 5.89 +0 | Ar V | $3s^2$ $3p^2$ | $^3P_1$ - $^1S_0$ | 0.075 | |
| | 2853.654(24) | 1.88 +0 | Ar IV | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.060 | |
| | 2868.15(5) | 7.60 -1 | Ar IV | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.060 | |
| 3109.08(30) | 3109.17(5) | 4.09 +0 | Ar III | $3s^2$ $3p^4$ | $^3P_1$ - $^1S_0$ | 0.041 | B(60) |
| 4412.4(2) | 4416.(4) | 1.04 +2 | Ar XIV | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.756 | D |
| 4625.54(10) | Q 4625.34(14) | 5.18 +0 | Ar V | $3s^2$ $3p^2$ | $^1D_2$ - $^1S_0$ | 0.075 | B(55) |
| 4711.33(2) | 4711.339(11) | 2.07 -3* | Ar IV | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.060 | B(55) |
| 4740.20(2) | 4740.199(11) | 1.72 -2* | Ar IV | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.060 | B(55) |
| 5191.82(10) | Q 5191.79(14) | 2.59 +0 | Ar III | $3s^2$ $3p^4$ | $^1D_2$ - $^1S_0$ | 0.041 | B(55) |
| 5533.4(4) | 5533.39(21) | 1.06 +2 | Ar X | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.479 | J |
| T 5926. | 5944.(25) | 6.20 +1 | Ar XV | 2s 2p | $^3P_1$ - $^3P_2$ | 0.855 | P |
| 6435.10(10) | 6435.1(1.0) | 1.61 -1 | Ar V | $3s^2$ $3p^2$ | $^3P_1$ - $^1D_2$ | 0.075 | B(55) |
| T 6917. | 6931.(24) | 6.63 +1 | Ar XI | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 0.539 | P |
| 7005.67(10) | 7005.7(1.2) | 4.70 -1 | Ar V | $3s^2$ $3p^2$ | $^3P_2$ - $^1D_2$ | 0.075 | B(55) |
| 7135.80(4) | 7135.78(10) | 3.24 -1 | Ar III | $3s^2$ $3p^4$ | $^3P_2$ - $^1D_2$ | 0.041 | B(55) |
| 7170.62(10) | 7170.47(16) | 8.40 -1* | Ar IV | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.060 | B(55) |
| 7237.26(30) | 7237.54(16) | 7.08 -1* | Ar IV | $3s^2$ $3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.060 | B(55) |
| 7262.76(30) | 7262.7(3) | 6.96 -1* | Ar IV | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.060 | B(55) |
| 7751.06(10) | 7751.12(11) | 8.44 -2 | Ar III | $3s^2$ $3p^4$ | $^3P_1$ - $^1D_2$ | 0.041 | B(55) |
| | 8303.(40) | 2.29 +1 | Ar XIII | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 0.686 | |

Table 15. Argon: wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 10159.(40) | 1.68 +1 | Ar XIII | $2s^2\ 2p^2$ | $^3P_0$ - $^3P_1$ | 0.686 | |
| | 13904.(140) | 7.34 +0 | Ar XV | 2s 2p | $^3P_0$ - $^3P_1$ | 0.855 | |
| | 2.066(24) μm | 9.24 -1 | Ar XII | $2s^2\ 2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.618 | |
| | 2.60(5) μm | 3.00 +0 | Ar XI | $2s^2\ 2p^4$ | $^3P_1$ - $^3P_0$ | 0.539 | |
| | 2.97(6) μm | 3.77 -1 | Ar XII | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.618 | |
| | 4.527(5) μm | 9.69 -2 | Ar VI | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.091 | |
| | 5.95(5) μm | 6.41 -2 | Ar VII | 3s 3p | $^3P_1$ - $^3P_2$ | 0.124 | |
| 6.985274(3) | 6.985274(3)μm | 5.28 -2 | Ar II | $3s^2\ 3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.028 | YKH |
| | 7.904(22) μm | 2.72 -2 | Ar V | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 0.075 | |
| 8.9910(1) | 8.9910(1) μm | 3.06 -2 | Ar III | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 0.041 | L |
| | 12.42(22) μm | 9.36 -3 | Ar VII | 3s 3p | $^3P_0$ - $^3P_1$ | 0.124 | |
| | 13.07(7) μm | 8.03 -3 | Ar V | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 0.075 | |
| | 21.842(6) μm | 5.31 -3 | Ar III | $3s^2\ 3p^4$ | $^3P_1$ - $^3P_0$ | 0.041 | |
| | 56.47(21) μm | 4.94 -5 | Ar IV | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.060 | |
| | 77.41(4) μm | 2.30 -5 | Ar IV | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.060 | |

Table 16. Potassium: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 414.5(4) | 9.84 +2 | K XVI | 2s 2p | $^3P_0 - {}^1P_1$ | 0.97 | |
| | 430.5(4) | 6.54 +2 | K XVI | 2s 2p | $^3P_1 - {}^1P_1$ | 0.97 | |
| | 474.6(5) | 8.19 +2 | K XVI | 2s 2p | $^3P_2 - {}^1P_1$ | 0.97 | |
| | 594.6(4) | 1.98 +3 | K XIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.71 | |
| | 603.58(20) | 6.10 +3 | K XIV | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 0.79 | |
| | 622.1(4) | 9.91 +2 | K XIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.71 | |
| | 694.13(25) | 5.27 +3 | K XII | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 0.63 | |
| | 945.1(9) | 5.58 +0* | K XIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.71 | |
| | 993.6(1.0) | 2.54 +2 | K XIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.71 | |
| | Q 1199.5(9) | 1.71 +1 | K XII | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 0.63 | |
| | Q 1204.8(9) | 1.36 +1 | K XIV | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 0.79 | |
| | 1209.5(7) | 2.91 +2 | K XIV | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 0.79 | |
| | 1255.4(6) | 4.49 +2 | K XII | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 0.63 | |
| | 1477.4(9) | 4.71 +2 | K XIV | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 0.79 | |
| | 1480.8(5) | 8.84 +2 | K XIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.71 | |
| | 1554.(5) | 3.23 +0 | K VIII | 3s 3p | $^3P_0 - {}^1P_1$ | 0.15 | |
| | 1581.(5) | 2.30 +0 | K VIII | 3s 3p | $^3P_1 - {}^1P_1$ | 0.15 | |
| | 1603.3(5) | 4.23 +2 | K XIII | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.71 | |
| | 1643.(5) | 3.43 +0 | K VIII | 3s 3p | $^3P_2 - {}^1P_1$ | 0.15 | |
| | 1647.4(1.2) | 6.84 +1 | K XII | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 0.63 | |
| | 1664.0(6) | 4.07 +2 | K XIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.71 | |
| | 2367.52(8) | 1.40 +1 | K VI | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.10 | |
| | 2494.24(12) | 4.56 +0 | K V | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.08 | |
| | 2514.45(13) | 1.90 +0 | K V | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.08 | |
| | 2711.07(10) | 1.05 +1 | K IV | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.06 | |
| | 3448.(4) | 2.19 +2 | K XV | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 0.86 | |
| | Q 4100.40(24) | 5.92 +0 | K VI | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.10 | |
| 4122.63(10) | 4122.6(3) | 4.96 -3* | K V | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.08 | B(55) |
| 4163.30(10) | 4163.3(3) | 8.06 -2* | K V | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.08 | B(55) |
| T 4256.4 | 4249.(4) | 2.34 +2 | K XI | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.56 | P |
| 4510.93(10) | Q 4510.92(29) | 3.18 +0 | K IV | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.06 | B(60) |
| | 4635.(15) | 1.31 +2 | K XVI | 2s 2p | $^3P_1 - {}^3P_2$ | 0.97 | |
| | 5274.(4) | 1.50 +2 | K XII | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 0.63 | |
| | 5602.4(4) | 4.13 -1 | K VI | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.10 | |
| 6101.83(10) | 6101.8(4) | 8.38 -1 | K IV | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.06 | B(55) |
| | 6221.9(1.1) | 1.97 +0* | K V | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.08 | |
| | 6228.6(5) | 1.03 +0 | K VI | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.10 | |
| | 6315.1(1.1) | 1.34 +0* | K V | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.08 | |
| | 6349.2(1.1) | 1.37 +0* | K V | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.08 | |
| | 6669.(11) | 4.37 +1 | K XIV | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 0.79 | |
| | 6795.0(7) | 2.03 -1 | K IV | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.06 | |

Table 16. Potassium: wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 7554.(11) | 4.06 +1 | K XIV | $2s^2\ 2p^2$ | $^3P_0$ - $^3P_1$ | 0.79 | |
| | 11110.(90) | 1.45 +1 | K XVI | 2s 2p | $^3P_0$ - $^3P_1$ | 0.97 | |
| | 13450.(40) | 3.25 +0 | K XIII | $2s^2\ 2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.71 | |
| | 19380.(80) | 1.32 +0 | K XIII | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.71 | |
| | 2.351(12) μm | 4.01 +0 | K XII | $2s^2\ 2p^4$ | $^3P_1$ - $^3P_0$ | 0.63 | |
| | 3.1899(10)μm | 2.77 -1 | K VII | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.12 | |
| | 4.213(13) μm | 1.79 -1 | K VIII | 3s 3p | $^3P_1$ - $^3P_2$ | 0.15 | |
| | 4.6153(21)μm | 1.83 -1 | K III | $3s^2\ 3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.05 | |
| | 5.575(4) μm | 7.74 -2 | K VI | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 0.10 | |
| | 5.983(4) μm | 1.04 -1 | K IV | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 0.06 | |
| | 8.823(8) μm | 2.61 -2 | K VI | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 0.10 | |
| | 8.99(6) μm | 2.52 -2 | K VIII | 3s 3p | $^3P_0$ - $^3P_1$ | 0.15 | |
| | 15.39(3) μm | 1.51 -2 | K IV | $3s^2\ 3p^4$ | $^3P_1$ - $^3P_0$ | 0.06 | |
| | 31.1(3) μm | 2.94 -4 | K V | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.08 | |
| | 42.2(5) μm | 1.41 -4 | K V | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.08 | |

Table 17. Calcium: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 384.13(8) | 1.72 +3 | Ca XVII | 2s 2p | $^3P_0 - {}^1P_1$ | 1.16 | |
| | 401.35(9) | 1.12 +3 | Ca XVII | 2s 2p | $^3P_1 - {}^1P_1$ | 1.16 | |
| | 451.12(11) | 1.33 +3 | Ca XVII | 2s 2p | $^3P_2 - {}^1P_1$ | 1.16 | |
| | 545.38(13) | 3.23 +3 | Ca XIV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.82 | |
| | 555.21(15) | 1.03 +4 | Ca XV | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 0.89 | |
| | 580.05(14) | 1.73 +3 | Ca XIV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.82 | |
| | 648.71(21) | 9.17 +3 | Ca XIII | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 0.73 | |
| | 880.9(3) | 1.35 +1* | Ca XIV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.82 | |
| | 944.6(4) | 5.35 +2 | Ca XIV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.82 | |
| | 1098.4(1) | 5.51 +2 | Ca XV | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 0.89 | |
| | Q 1106.1(8) | 1.96 +1 | Ca XIII | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 0.73 | |
| | Q 1122.7(6) | 1.50 +1 | Ca XV | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 0.89 | |
| T 1133.68 | 1133.7(5) | 8.06 +2 | Ca XIII | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 0.73 | CFD |
| | 1290.5(4) | 1.62 +3 | Ca XIV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.82 | |
| T 1375.95(3) | 1375.95(5) | 8.10 +2 | Ca XV | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 0.89 | SBT |
| | 1402.4(2.0) | 6.68 +0 | Ca IX | 3s 3p | $^3P_0 - {}^1P_1$ | 0.19 | |
| | 1431.8(4) | 7.25 +2 | Ca XIV | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.82 | |
| | 1432.5(2.1) | 4.70 +0 | Ca IX | 3s 3p | $^3P_1 - {}^1P_1$ | 0.19 | |
| | 1502.2(2.3) | 6.80 +0 | Ca IX | 3s 3p | $^3P_2 - {}^1P_1$ | 0.19 | |
| | 1503.1(5) | 6.66 +2 | Ca XIV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.82 | |
| | 1568.7(1.0) | 1.05 +2 | Ca XIII | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 0.73 | |
| | 2110.97(13) | 3.04 +1 | Ca VII | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.13 | |
| | 2214.5(1.0) | 1.00 +1 | Ca VI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.11 | |
| | 2242.1(1.0) | 4.28 +0 | Ca VI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.11 | |
| | 2412.9(1) | 2.40 +1 | Ca V | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.08 | |
| | 2737.(4) | 4.37 +2 | Ca XVI | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 0.97 | |
| 3327.5(4) | 3327.8(6) | 4.87 +2 | Ca XII | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.66 | J |
| | 3637.(4) | 2.70 +2 | Ca XVII | 2s 2p | $^3P_1 - {}^3P_2$ | 1.16 | |
| | 3669.1(2.7) | 1.17 -2* | Ca VI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.11 | |
| 3688.2(2.5) | Q 3686.6(4) | 6.81 +0 | Ca VII | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.13 | |
| | 3725.4(2.8) | 2.42 -1* | Ca VI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.11 | |
| | Q 3997.88(23) | 3.73 +0 | Ca V | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.08 | |
| 4087.1(4) | 4087.2(5) | 3.19 +2 | Ca XIII | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 0.73 | J |
| 4939.48(20) | 4939.6(7) | 9.74 -1 | Ca VII | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.13 | T |
| 5309.18(10) | 5309.11(28) | 1.95 +0 | Ca V | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.08 | B(55) |
| 5446.0 | 5443.9(8) | 7.90 +1 | Ca XV | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 0.89 | P |
| 5460.7 | 5460.7(8) | 4.31 +0* | Ca VI | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.11 | T |
| 5586.3 | 5586.3(9) | 2.58 +0* | Ca VI | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.11 | T |
| 5618.58(20) | 5618.8(9) | 2.15 +0 | Ca VII | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.13 | T |
| | 5631.7(9) | 2.70 +0* | Ca VI | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.11 | |
| 5693.6(4) | 5693.5(6) | 9.40 +1 | Ca XV | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 0.89 | J |

Table 17. Calcium wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| 6086.92(10) | 6086.4(5) | 4.35 -1 | Ca V | $3s^2\ 3p^4$ | $^3P_1$ - $^1D_2$ | 0.08 | B(55) |
| | 8950.(22) | 2.77 +1 | Ca XVII | 2s 2p | $^3P_0$ - $^3P_1$ | 1.16 | |
| | 9122.(18) | 1.01 +1 | Ca XIV | $2s^2\ 2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.82 | |
| | 13070.(40) | 4.19 +0 | Ca XIV | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.82 | |
| | 2.258(15) μm | 4.46 +0 | Ca XIII | $2s^2\ 2p^4$ | $^3P_1$ - $^3P_0$ | 0.73 | |
| 2.32(2) | 2.3205(11)μm | 7.20 -1 | Ca VIII | $3s^2\ 3p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.15 | GJ |
| | 3.088(13) μm | 4.54 -1 | Ca IX | 3s 3p | $^3P_1$ - $^3P_2$ | 0.19 | |
| 3.18(3) | 3.2061(10)μm | 5.46 -1 | Ca IV | $3s^2\ 3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.07 | GJ |
| | 4.086(5) μm | 1.96 -1 | Ca VII | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 0.13 | |
| | 4.1574(17)μm | 3.09 -1 | Ca V | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 0.08 | |
| | 6.154(8) μm | 7.67 -2 | Ca VII | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 0.13 | |
| | 6.67(6) μm | 6.16 -2 | Ca IX | 3s 3p | $^3P_0$ - $^3P_1$ | 0.19 | |
| | 11.482(19) μm | 3.62 -2 | Ca V | $3s^2\ 3p^4$ | $^3P_1$ - $^3P_0$ | 0.08 | |
| | 17.99(9) μm | 1.50 -3 | Ca VI | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.11 | |
| | 24.30(17) μm | 7.34 -4 | Ca VI | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.11 | |

Table 18. Scandium: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 356.84(7) | 2.90 +3 | Sc XVIII | 2s 2p | $^3P_0 - {}^1P_1$ | 1.21 | |
| | 375.12(7) | 1.85 +3 | Sc XVIII | 2s 2p | $^3P_1 - {}^1P_1$ | 1.21 | |
| | 430.66(9) | 2.06 +3 | Sc XVIII | 2s 2p | $^3P_2 - {}^1P_1$ | 1.21 | |
| | 498.88(6) | 5.09 +3 | Sc XV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.93 | |
| 511.2(5) | 510.83(13) | 1.68 +4 | Sc XVI | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 1.01 | H |
| | 541.01(7) | 2.96 +3 | Sc XV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.93 | |
| 606.5(5) | 606.77(15) | 1.55 +4 | Sc XIV | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 0.83 | H |
| | 819.94(17) | 3.20 +1* | Sc XV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.93 | |
| 899.8(5) | 899.28(20) | 1.07 +3 | Sc XV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.93 | H |
| | 996.0(5) | 1.02 +3 | Sc XVI | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 1.01 | |
| | Q 1018.4(6) | 2.28 +1 | Sc XIV | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 0.83 | |
| | 1022.6(4) | 1.41 +3 | Sc XIV | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 0.83 | |
| | Q 1048.7(8) | 1.65 +1 | Sc XVI | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 1.01 | |
| | 1120.45(27) | 2.90 +3 | Sc XV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.93 | |
| | 1274.0(3) | 1.21 +3 | Sc XV | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.93 | |
| | 1276.0(7) | 1.31 +1 | Sc X | 3s 3p | $^3P_0 - {}^1P_1$ | 0.23 | |
| | 1276.6(8) | 1.36 +3 | Sc XVI | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 1.01 | |
| | 1309.6(7) | 9.11 +0 | Sc X | 3s 3p | $^3P_1 - {}^1P_1$ | 0.23 | |
| | 1358.0(4) | 1.05 +3 | Sc XV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.93 | |
| | 1387.8(8) | 1.28 +1 | Sc X | 3s 3p | $^3P_2 - {}^1P_1$ | 0.23 | |
| | 1501.2(9) | 1.56 +2 | Sc XIV | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 0.83 | |
| | 1901.41(26) | 6.12 +1 | Sc VIII | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.16 | |
| | 1988.0(8) | 2.05 +1 | Sc VII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.14 | |
| | 2024.2(8) | 8.93 +0 | Sc VII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.14 | |
| | 2178.99(7) | 5.09 +1 | Sc VI | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.11 | |
| 2190.5(2) | 2190.52(19) | 8.53 +2 | Sc XVII | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 1.09 | SCCFH |
| 2637.2(2) | 2637.18(21) | 9.78 +2 | Sc XIII | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.76 | SCCFH |
| 2907.9(3) | 2907.82(24) | 5.29 +2 | Sc XVIII | 2s 2p | $^3P_1 - {}^3P_2$ | 1.21 | SH(82) |
| 3206.1(3) | 3206.36(21) | 6.55 +2 | Sc XIV | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 0.83 | SCCFH |
| | 3305.9(2.2) | 2.78 -2* | Sc VII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.14 | |
| | Q 3350.5(8) | 7.70 +0 | Sc VIII | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.16 | |
| | 3381.7(2.3) | 7.32 -1 | Sc VII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.14 | |
| | Q 3592.01(18) | 4.31 +0 | Sc VI | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.11 | |
| 4354.3(4) | 4354.4(4) | 2.08 +2 | Sc XVI | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 1.01 | SCCFH |
| | 4393.4(1.4) | 2.15 +0 | Sc VIII | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.16 | |
| 4530.3(4) | 4530.4(5) | 1.34 +2 | Sc XVI | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 1.01 | SCCFH |
| | 4673.12(22) | 4.19 +0 | Sc VI | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.11 | |
| | 4820.6(7) | 8.96 +0* | Sc VII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.14 | |
| | 4983.4(7) | 4.91 +0* | Sc VII | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.14 | |
| | 5042.8(7) | 5.15 +0* | Sc VII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.14 | |
| | 5121.7(1.9) | 4.25 +0 | Sc VIII | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.16 | |

Table 18. Scandium: wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 5539.6(4) | 8.49 -1 | Sc VI | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.11 | |
| | 6404.(9) | 2.82 +1 | Sc XV | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.93 | |
| | 7319.(11) | 5.01 +1 | Sc XVIII | 2s 2p | $^3P_0 - {}^3P_1$ | 1.21 | |
| | 9291.(18) | 1.13 +1 | Sc XV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.93 | |
| | 17353.(12) | 1.72 +0 | Sc IX | $3s^2$ 3p | $^2P_{1/2} - {}^2P_{3/2}$ | 0.18 | |
| | 2.3112(4) μm | 1.46 +0 | Sc V | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.09 | |
| | 2.321(4) μm | 1.09 +0 | Sc X | 3s 3p | $^3P_1 - {}^3P_2$ | 0.23 | |
| | 2.396(12) μm | 3.66 +0 | Sc XIV | $2s^2\ 2p^4$ | $^3P_1 - {}^3P_0$ | 0.83 | |
| | 2.9877(9) μm | 8.29 -1 | Sc VI | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.11 | |
| | 3.090(7) μm | 4.51 -1 | Sc VIII | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.16 | |
| | 4.400(10) μm | 2.09 -1 | Sc VIII | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.16 | |
| | 4.984(18) μm | 1.40 -1 | Sc X | 3s 3p | $^3P_0 - {}^3P_1$ | 0.23 | |
| | 9.001(11) μm | 7.49 -2 | Sc VI | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.11 | |
| | 10.94(3) μm | 6.61 -3 | Sc VII | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.14 | |
| | 14.76(6) μm | 2.99 -3 | Sc VII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.14 | |

Table 19. Titanium: wavelengths and transition probabilities

| | Wavelength Observed | Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | | 331.68(3) | 4.79 +3 | Ti XIX | 2s 2p | $^3P_0 - {}^1P_1$ | 1.35 | |
| | | 350.78(4) | 2.99 +3 | Ti XIX | 2s 2p | $^3P_1 - {}^1P_1$ | 1.35 | |
| | | 412.47(5) | 3.11 +3 | Ti XIX | 2s 2p | $^3P_2 - {}^1P_1$ | 1.35 | |
| | 456.1(3) | 456.10(5) | 7.72 +3 | Ti XVI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.04 | H |
| | 470.4(3) | 470.54(11) | 2.68 +4 | Ti XVII | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 1.13 | H |
| | 505.9(3) | 505.82(6) | 4.94 +3 | Ti XVI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.04 | H |
| | | 567.41(16) | 2.55 +4 | Ti XV | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 0.94 | |
| | | 764.99(15) | 7.16 +1* | Ti XVI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 1.04 | |
| | 861.8(1) | 861.85(19) | 2.00 +3 | Ti XVI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 1.04 | H |
| T | 899.7(3) | 900.9(4) | 1.84 +3 | Ti XVII | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 1.13 | H |
| | 919.73(8) | 919.71(9) | 2.42 +3 | Ti XV | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 0.94 | PSS |
| | | Q 936.3(4) | 2.72 +1 | Ti XV | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 0.94 | |
| | 968.9(3) | 968.80(20) | 5.16 +3 | Ti XVI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 1.04 | H |
| | | Q 985.0(7) | 1.77 +1 | Ti XVII | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 1.13 | |
| | 1129.2(4) | 1129.6(3) | 1.99 +3 | Ti XVI | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 1.04 | FBM |
| | | 1165.69(19) | 2.46 +1 | Ti XI | 3s 3p | $^3P_0 - {}^1P_1$ | 0.27 | |
| | | 1177.4(7) | 2.25 +3 | Ti XVII | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 1.13 | |
| | | 1201.63(20) | 1.68 +1 | Ti XI | 3s 3p | $^3P_1 - {}^1P_1$ | 0.27 | |
| | 1224.1(4) | 1224.4(3) | 1.60 +3 | Ti XVI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 1.04 | FBM |
| | | 1289.09(24) | 2.27 +1 | Ti XI | 3s 3p | $^3P_2 - {}^1P_1$ | 0.27 | |
| | 1440.2(8) | 1440.05(22) | 2.23 +2 | Ti XV | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 0.94 | FBM |
| | | 1724.7(4) | 1.17 +2 | Ti IX | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.19 | |
| | 1778.1(1) | 1778.09(10) | 1.59 +3 | Ti XVIII | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 1.22 | SFH |
| | | 1797.5(6) | 3.90 +1 | Ti VIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.17 | |
| | | 1845.4(7) | 1.75 +1 | Ti VIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.17 | |
| | | 1989.38(18) | 1.01 +2 | Ti VII | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.14 | |
| | 2117.1(2) | 2117.12(18) | 1.89 +3 | Ti XIV | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.86 | SFH |
| | 2344.6(2) | 2344.5(2.3) | 1.01 +3 | Ti XIX | 2s 2p | $^3P_1 - {}^3P_2$ | 1.35 | PSS |
| | 2544.8(1) | 2544.54(19) | 1.30 +3 | Ti XV | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 0.94 | SFH |
| | | 3006.1(1.8) | 6.62 -2* | Ti VIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.17 | |
| | | Q 3071.8(1.3) | 8.58 +0 | Ti IX | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.19 | |
| | | 3105.6(1.9) | 2.00 +0 | Ti VIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.17 | |
| | | Q 3259.5(6) | 4.92 +0 | Ti VII | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.14 | |
| | 3370.8(2) | 3370.80(23) | 4.44 +2 | Ti XVII | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 1.13 | SFH |
| | 3834.4(2) | 3834.4(4) | 2.15 +2 | Ti XVII | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 1.13 | SFH |
| | | 3930.3(2.2) | 4.52 -1 | Ti IX | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.19 | |
| | | 4143.1(7) | 8.46 +0 | Ti VII | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.14 | |
| | | 4264.4(5) | 1.77 +1* | Ti VIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.17 | |
| | | 4467.6(6) | 9.10 +0* | Ti VIII | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.17 | |
| | | 4544.4(6) | 9.44 +0* | Ti VIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.17 | |
| | 4635.6(3) | 4639.(5) | 7.19 +1 | Ti XVI | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.04 | H |

Table 10. Titanium wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 4700.(3) | 8.05 +0 | Ti IX | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.19 | |
| | 5101.7(1.2) | 1.54 +0 | Ti VII | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.14 | |
| | 6092.(16) | 8.71 +1 | Ti XIX | 2s 2p | $^3P_0 - {}^3P_1$ | 1.35 | |
| | 6806.(10) | 2.80 +1 | Ti XVI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 1.04 | |
| | 13254.(7) | 3.86 +0 | Ti X | $3s^2$ 3p | $^2P_{1/2} - {}^2P_{3/2}$ | 0.22 | |
| | 17150.(30) | 3.56 +0 | Ti VI | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.12 | |
| | 17710.(40) | 2.43 +0 | Ti XI | 3s 3p | $^3P_1 - {}^3P_2$ | 0.27 | |
| | 2.2050(10)μm | 2.06 +0 | Ti VII | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.14 | |
| | 2.401(8) μm | 9.55 -1 | Ti IX | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.19 | |
| | 3.205(10) μm | 5.39 -1 | Ti IX | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.19 | |
| | 3.270(22) μm | 1.41 +0 | Ti XV | $2s^2\ 2p^4$ | $^3P_1 - {}^3P_0$ | 0.94 | |
| | 3.896(21) μm | 3.00 -1 | Ti XI | 3s 3p | $^3P_0 - {}^3P_1$ | 0.27 | |
| | 6.923(14) μm | 2.57 -2 | Ti VIII | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.17 | |
| | 7.386(15) μm | 1.34 -1 | Ti VII | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.14 | |
| | 9.382(25) μm | 1.24 -2 | Ti VIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.17 | |

Table 20. Vanadium: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 308.26(21) | 7.77 +3 | V XX | 2s 2p | $^3P_0$ - $^1P_1$ | 1.49 | |
| | 327.98(24) | 4.75 +3 | V XX | 2s 2p | $^3P_1$ - $^1P_1$ | 1.49 | |
| | 396.0(4) | 4.57 +3 | V XX | 2s 2p | $^3P_2$ - $^1P_1$ | 1.49 | |
| | 415.80(5) | 1.13 +4 | V XVII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 1.17 | |
| T 434.2(2) | 432.82(19) | 4.19 +4 | V XVIII | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 1.26 | FBM |
| | 472.99(6) | 8.10 +3 | V XVII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 1.17 | |
| 529.9(2) | 529.75(15) | 4.09 +4 | V XVI | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 1.06 | FBM |
| | 712.96(14) | 1.53 +2 | V XVII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 1.17 | |
| | 813.3(4) | 3.33 +3 | V XVIII | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 1.26 | |
| | 826.2(3) | 4.05 +3 | V XVI | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 1.06 | |
| | 826.92(19) | 3.57 +3 | V XVII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 1.17 | |
| | 836.33(20) | 9.04 +3 | V XVII | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 1.17 | |
| Q | 857.1(5) | 3.33 +1 | V XVI | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 1.06 | |
| Q | 925.2(1.0) | 1.93 +1 | V XVIII | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 1.26 | |
| | 997.61(28) | 3.23 +3 | V XVII | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 1.17 | |
| | 1072.2(1.6) | 4.22 +1 | V XII | 3s 3p | $^3P_0$ - $^1P_1$ | 0.31 | |
| 1078.2(1.4) | 1078.5(6) | 3.67 +3 | V XVIII | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 1.26 | FBM |
| | 1105.1(3) | 2.35 +3 | V XVII | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 1.17 | |
| | 1108.9(1.7) | 2.85 +1 | V XII | 3s 3p | $^3P_1$ - $^1P_1$ | 0.31 | |
| | 1204.5(2.1) | 3.72 +1 | V XII | 3s 3p | $^3P_2$ - $^1P_1$ | 0.31 | |
| | 1386.9(1.0) | 3.07 +2 | V XVI | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 1.06 | |
| 1457.6(9) | 1458.(4) | 2.89 +3 | V XIX | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.36 | FBM |
| | 1573.04(18) | 2.11 +2 | V X | $3s^2$ $3p^2$ | $^3P_1$ - $^1S_0$ | 0.23 | |
| | 1633.3(5) | 7.05 +1 | V IX | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.21 | |
| | 1694.1(6) | 3.28 +1 | V IX | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.21 | |
| 1719.4(1.7) | 1721.4(1.5) | 3.52 +3 | V XV | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.98 | FBM |
| | 1830.39(24) | 1.89 +2 | V VIII | $3s^2$ $3p^4$ | $^3P_1$ - $^1S_0$ | 0.17 | |
| | 1908.(5) | 1.86 +3 | V XX | 2s 2p | $^3P_1$ - $^3P_2$ | 1.49 | |
| 2042.7(8) | 2042.8(8) | 2.47 +3 | V XVI | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 1.06 | FBM |
| | 2633.6(1.4) | 9.19 +2 | V XVIII | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 1.26 | |
| | 2752.6(1.6) | 1.57 -1* | V IX | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.21 | |
| Q | 2836.7(6) | 9.45 +0 | V X | $3s^2$ $3p^2$ | $^1D_2$ - $^1S_0$ | 0.23 | |
| | 2880.3(1.7) | 4.98 +0 | V IX | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.21 | |
| Q | 2978.1(6) | 5.61 +0 | V VIII | $3s^2$ $3p^4$ | $^1D_2$ - $^1S_0$ | 0.17 | |
| | 3307.(3) | 3.24 +2 | V XVIII | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 1.26 | |
| | 3438.(3) | 1.71 +2 | V XVII | $2s^2$ $2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.17 | |
| | 3528.9(9) | 9.10 +0 | V X | $3s^2$ $3p^2$ | $^3P_1$ - $^1D_2$ | 0.23 | |
| | 3692.8(7) | 1.62 +1 | V VIII | $3s^2$ $3p^4$ | $^3P_2$ - $^1D_2$ | 0.17 | |
| | 3770.2(1.0) | 3.34 +1 | V IX | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.21 | |
| | 4014.1(1.1) | 1.64 +1* | V IX | $3s^2$ $3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.21 | |
| | 4110.7(1.2) | 1.66 +1* | V IX | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.21 | |

Table 20. Vanadium: wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 4330.0(1.3) | 1.47 +1 | V X | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.23 | |
| | 4746.1(1.6) | 2.60 +0 | V VIII | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.17 | |
| | 5127.(40) | 1.46 +2 | V XX | 2s 2p | $^3P_0 - {}^3P_1$ | 1.49 | |
| | 5172.(8) | 6.21 +1 | V XVII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 1.17 | |
| | 10311.(5) | 8.19 +0 | V XI | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.26 | |
| | 13038.(3) | 8.11 +0 | V VII | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.15 | |
| | 13963.(280) | 4.82 +0 | V XII | 3s 3p | $^3P_1 - {}^3P_2$ | 0.31 | |
| | 16640.(14) | 4.76 +0 | V VIII | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.17 | |
| | 19080.(30) | 1.88 +0 | V X | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.23 | |
| | 2.392(3) μm | 1.29 +0 | V X | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.23 | |
| | 3.24(15) μm | 5.67 -1 | V XII | 3s 3p | $^3P_0 - {}^3P_1$ | 0.31 | |
| | 4.552(15) μm | 8.87 -2 | V IX | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.21 | |
| | 6.207(27) μm | 4.23 -2 | V IX | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.21 | |
| | 6.362(29) μm | 2.08 -1 | V VIII | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.17 | |
| | 9.78(26) μm | 5.10 -2 | V XVI | $2s^2\ 2p^4$ | $^3P_1 - {}^3P_0$ | 1.06 | |

Table 21. Chromium: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 286.51(17) | 1.24 +4 | Cr XXI | 2s 2p | $^3P_0$ - $^1P_1$ | 1.63 | |
| | 306.80(5) | 7.42 +3 | Cr XXI | 2s 2p | $^3P_1$ - $^1P_1$ | 1.63 | |
| 378.0(3) | 378.1(3) | 1.61 +4 | Cr XVIII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 1.30 | DH |
| | 381.6(3) | 6.56 +3 | Cr XXI | 2s 2p | $^3P_2$ - $^1P_1$ | 1.63 | |
| 398.4(3) | 398.42(16) | 6.38 +4 | Cr XIX | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 1.40 | HSCS |
| 442.1(3) | 442.3(4) | 1.31 +4 | Cr XVIII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 1.30 | DH |
| 493.8(3) | 493.79(24) | 6.42 +4 | Cr XVII | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 1.19 | HSCS |
| 663.1(3) | 663.1(9) | 3.22 +2 | Cr XVIII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 1.30 | DH |
| 722.1(3) | 722.56(16) | 1.56 +4 | Cr XVIII | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 1.30 | DH |
| 731.1(3) | 731.07(8) | 5.62 +3 | Cr XIX | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 1.40 | HSCS |
| 740.75(3) | 740.75(3) | 6.67 +3 | Cr XVII | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 1.19 | PSS |
| | Q 781.9(6) | 4.19 +1 | Cr XVII | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 1.19 | |
| 793.3(3) | 793.3(1.3) | 6.12 +3 | Cr XVIII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 1.30 | HSCS |
| | Q 875.6(8) | 2.03 +1 | Cr XIX | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 1.40 | |
| | 879.96(23) | 5.14 +3 | Cr XVIII | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 1.30 | |
| 979.0(3) | 979.06(14) | 5.93 +3 | Cr XIX | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 1.40 | HSCS |
| | 988.5(1.0) | 7.59 +1 | Cr XIII | 3s 3p | $^3P_0$ - $^1P_1$ | 0.35 | |
| | 999.6(3) | 3.33 +3 | Cr XVIII | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 1.30 | |
| | 1028.49(10) | 5.03 +1 | Cr XIII | 3s 3p | $^3P_1$ - $^1P_1$ | 0.35 | |
| | 1135.8(1.3) | 6.25 +1 | Cr XIII | 3s 3p | $^3P_2$ - $^1P_1$ | 0.35 | |
| 1205.9(3) | 1205.9(3) | 5.11 +3 | Cr XX | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.50 | HSCS |
| 1340.7(4) | 1340.09(20) | 4.09 +2 | Cr XVII | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 1.19 | FBM |
| 1410.60(2) | 1410.62(4) | 6.39 +3 | Cr XVI | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 1.10 | PSS |
| 1440.01(2) | 1440.8(2.1) | 3.68 +2 | Cr XI | $3s^2$ $3p^2$ | $^3P_1$ - $^1S_0$ | 0.27 | SBT |
| 1489.04(3) | 1489.05(16) | 1.21 +2 | Cr X | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.24 | SBT |
| 1564.30(2) | 1564.09(17) | 5.89 +1 | Cr X | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.24 | SBT |
| 1566.4(1) | 1565.(5) | 3.38 +3 | Cr XXI | 2s 2p | $^3P_1$ - $^3P_2$ | 1.63 | Su |
| 1656.3(3) | 1656.29(27) | 4.58 +3 | Cr XVII | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 1.19 | HSCS |
| | 1693.9(6) | 3.40 +2 | Cr IX | $3s^2$ $3p^4$ | $^3P_1$ - $^1S_0$ | 0.21 | |
| 2090.9(3) | 2090.9(4) | 1.81 +3 | Cr XIX | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 1.40 | HSCS |
| | 2534.1(5) | 3.67 -1* | Cr X | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.24 | |
| 2606.4(3) | 2606.4(3) | 3.80 +2 | Cr XVIII | $2s^2$ $2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.30 | DH |
| | Q 2634.(7) | 1.03 +1 | Cr XI | $3s^2$ $3p^2$ | $^1D_2$ - $^1S_0$ | 0.27 | |
| | 2694.4(5) | 1.14 +1 | Cr X | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.24 | |
| | Q 2733.6(1.5) | 6.41 +0 | Cr IX | $3s^2$ $3p^4$ | $^1D_2$ - $^1S_0$ | 0.21 | |
| 2885.4(3) | 2885.4(1.2) | 4.69 +2 | Cr XIX | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 1.40 | HSCS |
| 3178. | 3177.9(7) | 1.77 +1 | Cr XI | $3s^2$ $3p^2$ | $^3P_1$ - $^1D_2$ | 0.27 | M |
| | 3301.1(5) | 2.99 +1 | Cr IX | $3s^2$ $3p^4$ | $^3P_2$ - $^1D_2$ | 0.21 | |
| | 3326.4(8) | 6.22 +1 | Cr X | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.24 | |
| | 3608.2(9) | 2.86 +1* | Cr X | $3s^2$ $3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.24 | |
| | 3725.8(1.0) | 2.82 +1* | Cr X | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.24 | |

Table 21. Chromium: wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| 3996.8(4) | 3996.6(1.1) | 2.60 +1 | Cr XI | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.27 | J |
| 4038.6(3) | 4039.(7) | 1.27 +2 | Cr XVIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 1.30 | DH |
| | 4330.(40) | 2.38 +2 | Cr XXI | 2s 2p | $^3P_0 - {}^3P_1$ | 1.63 | |
| | 4450.5(1.4) | 4.19 +0 | Cr IX | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.21 | |
| 8153.8(4) | 8153.7(7) | 1.66 +1 | Cr XII | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.30 | J |
| | 10106.4(2.0) | 1.74 +1 | Cr VIII | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.18 | |
| | 10878.(120) | 1.03 +1 | Cr XIII | 3s 3p | $^3P_1 - {}^3P_2$ | 0.35 | |
| | 12783.(8) | 1.04 +1 | Cr IX | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.21 | |
| | 15514.(17) | 3.46 +0 | Cr XI | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.27 | |
| | 18059.(16) | 2.98 +0 | Cr XI | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.27 | |
| | 2.54(6) μm | 1.13 +0 | Cr XIII | 3s 3p | $^3P_0 - {}^3P_1$ | 0.35 | |
| | 3.103(7) μm | 2.74 -1 | Cr X | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.24 | |
| | 4.260(13) μm | 1.28 -1 | Cr X | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.24 | |
| | 4.3(4) μm | 1.93 -1 | Cr XVII | $2s^2\ 2p^4$ | $^3P_0 - {}^3P_1$ | 1.19 | |
| | 5.787(24) μm | 2.73 -1 | Cr IX | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.21 | |

Table 22. Manganese: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 266.37(28) | 1.94 +4 | Mn XXII | 2s 2p | $^3P_0$ - $^1P_1$ | 1.79 | |
| | 286.70(25) | 1.14 +4 | Mn XXII | 2s 2p | $^3P_1$ - $^1P_1$ | 1.79 | |
| | 342.78(26) | 2.19 +4 | Mn XIX | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 1.44 | |
| | 365.6(5) | 9.65 +4 | Mn XX | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 1.54 | |
| | 368.4(5) | 9.16 +3 | Mn XXII | 2s 2p | $^3P_2$ - $^1P_1$ | 1.79 | |
| | 413.0(4) | 2.08 +4 | Mn XIX | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 1.44 | |
| | 457.8(8) | 9.94 +4 | Mn XVIII | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 1.32 | |
| | 615.6(8) | 6.50 +2 | Mn XIX | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 1.44 | |
| | 625.2(1.1) | 2.66 +4 | Mn XIX | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 1.44 | |
| | 655.0(1.2) | 9.56 +3 | Mn XX | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 1.54 | |
| | 664.0(1.4) | 1.08 +4 | Mn XVIII | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 1.32 | |
| Q | 707.2(2.1) | 5.53 +1 | Mn XVIII | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 1.32 | |
| | 758.9(1.3) | 1.02 +4 | Mn XIX | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 1.44 | |
| | 773.5(1.7) | 8.13 +3 | Mn XIX | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 1.44 | |
| Q | 827.7(2.5) | 2.16 +1 | Mn XX | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 1.54 | |
| | 880.2(2.2) | 9.51 +3 | Mn XX | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 1.54 | |
| | 906.3(2.3) | 4.54 +3 | Mn XIX | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 1.44 | |
| | 914.8(8) | 1.26 +2 | Mn XIV | 3s 3p | $^3P_0$ - $^1P_1$ | 0.40 | |
| | 956.7(9) | 8.21 +1 | Mn XIV | 3s 3p | $^3P_1$ - $^1P_1$ | 0.40 | |
| | 1006.4(3.0) | 8.79 +3 | Mn XXI | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.64 | |
| | 1073.8(1.2) | 9.75 +1 | Mn XIV | 3s 3p | $^3P_2$ - $^1P_1$ | 0.40 | |
| | 1170.(7) | 1.12 +4 | Mn XVII | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 1.24 | |
| | 1293.(4) | 5.94 +3 | Mn XXII | 2s 2p | $^3P_1$ - $^3P_2$ | 1.79 | |
| | 1298.(6) | 5.30 +2 | Mn XVIII | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 1.32 | |
| 1322.23(4) | 1322.(6) | 6.20 +2 | Mn XII | $3s^2$ $3p^2$ | $^3P_1$ - $^1S_0$ | 0.31 | ST |
| | 1359.(4) | 8.17 +3 | Mn XVIII | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 1.32 | |
| 1359.57(2) | 1359.58(9) | 2.00 +2 | Mn XI | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.29 | SBT |
| 1450.49(5) | 1450.43(10) | 1.02 +2 | Mn XI | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.29 | SBT |
| | 1574.2(7) | 5.90 +2 | Mn X | $3s^2$ $3p^4$ | $^3P_1$ - $^1S_0$ | 0.25 | |
| | 1678.(6) | 3.46 +3 | Mn XX | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 1.54 | |
| | 2015.(11) | 7.98 +2 | Mn XIX | $2s^2$ $2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.44 | |
| | 2341.09(27) | 8.33 -1* | Mn XI | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.29 | |
| Q | 2456.(19) | 1.12 +1 | Mn XII | $3s^2$ $3p^2$ | $^1D_2$ - $^1S_0$ | 0.31 | |
| Q | 2516.5(2.7) | 7.24 +0 | Mn X | $3s^2$ $3p^4$ | $^1D_2$ - $^1S_0$ | 0.25 | |
| | 2538.3(3) | 2.42 +1 | Mn XI | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.29 | |
| | 2559.(19) | 6.43 +2 | Mn XX | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 1.54 | |
| | 2860.(12) | 3.35 +1 | Mn XII | $3s^2$ $3p^2$ | $^3P_1$ - $^1D_2$ | 0.31 | |
| | 2925.9(6) | 1.13 +2 | Mn XI | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.29 | |
| | 2956.0(2.6) | 5.33 +1 | Mn X | $3s^2$ $3p^4$ | $^3P_2$ - $^1D_2$ | 0.25 | |
| | 3240.6(7) | 4.73 +1* | Mn XI | $3s^2$ $3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.29 | |
| | 3259.(30) | 2.35 +2 | Mn XIX | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 1.44 | |

Table 22. Manganese: wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | | $A$ ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. $\lambda$) |
|---|---|---|---|---|---|---|---|---|
| | 3381.9(8) | | 4.89 +1* | Mn XI | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.29 | |
| 3685.5(4) | 3682.(19) | | 4.48 +1 | Mn XII | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.31 | J |
| | 3756.(36) | | 3.73 +2 | Mn XXII | 2s 2p | $^3P_0 - {}^3P_1$ | 1.79 | |
| | 4200.(5) | | 6.42 +0 | Mn X | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.25 | |
| 6536.3(4) | 6536.3(4) | | 3.22 +1 | Mn XIII | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.34 | J |
| | 7968.5(1.3) | | 3.55 +1 | Mn IX | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.22 | |
| | 8770.(110) | | 1.97 +1 | Mn XIV | 3s 3p | $^3P_1 - {}^3P_2$ | 0.40 | |
| | 9978.(4) | | 2.18 +1 | Mn X | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.25 | |
| | 12817.(230) | | 6.03 +0 | Mn XII | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.31 | |
| | 13885.(190) | | 6.52 +0 | Mn XII | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.31 | |
| | 14200.(600) | | 5.15 +0 | Mn XVIII | $2s^2\ 2p^4$ | $^3P_0 - {}^3P_1$ | 1.32 | |
| | 2.09(6) | $\mu$m | 2.03 +0 | Mn XIV | 3s 3p | $^3P_0 - {}^3P_1$ | 0.40 | |
| | 2.170(3) | $\mu$m | 7.80 -1 | Mn XI | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.29 | |
| | 3.013(6) | $\mu$m | 3.54 -1 | Mn XI | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.29 | |
| | 5.624(18) | $\mu$m | 2.90 -1 | Mn X | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.25 | |

Table 23. Iron: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 247.12(14) | 3.01 +4 | Fe XXIII | 2s 2p | $^3P_0$ - $^1P_1$ | 1.96 | |
| | 267.59(12) | 1.72 +4 | Fe XXIII | 2s 2p | $^3P_1$ - $^1P_1$ | 1.96 | |
| 309.26(3) | 309.6(3) | 2.91 +4 | Fe XX | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 1.58 | SBST |
| | 335.5(3) | 1.43 +5 | Fe XXI | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 1.69 | |
| | 355.80(22) | 1.26 +4 | Fe XXIII | 2s 2p | $^3P_2$ - $^1P_1$ | 1.96 | |
| | 384.8(4) | 3.27 +4 | Fe XX | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 1.58 | |
| 424.26(5) | 424.27(7) | 1.50 +5 | Fe XIX | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 1.47 | W |
| 541.35(5) | 541.42(12) | 4.49 +4 | Fe XX | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 1.58 | W |
| 567.76(5) | 568.9(1.0) | 1.27 +3 | Fe XX | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 1.58 | W |
| 585.8(3) | 585.79(17) | 1.59 +4 | Fe XXI | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 1.69 | HSCS |
| 592.234(6) | 592.235(7) | 1.73 +4 | Fe XIX | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 1.47 | PSS |
| Q | 639.84(16) | 7.33 +1 | Fe XIX | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 1.47 | |
| 679.3(3) | 679.39(20) | 1.27 +4 | Fe XX | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 1.58 | H |
| | 723.2(1.6) | 1.64 +4 | Fe XX | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 1.58 | |
| Q | 785.3(1.9) | 2.27 +1 | Fe XXI | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 1.69 | |
| 786.1(3) | 786.1(3) | 1.51 +4 | Fe XXI | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 1.69 | HSCS |
| | 822.2(3) | 6.01 +3 | Fe XX | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 1.58 | |
| 845.55(1) | 845.5(3) | 1.48 +4 | Fe XXII | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.80 | SH(82) |
| | 847.43(20) | 2.09 +2 | Fe XV | 3s 3p | $^3P_0$ - $^1P_1$ | 0.46 | |
| | 890.84(17) | 1.34 +2 | Fe XV | 3s 3p | $^3P_1$ - $^1P_1$ | 0.46 | |
| 974.86(2) | 974.858(19) | 1.93 +4 | Fe XVIII | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 1.36 | PSS |
| | 1019.4(3) | 1.50 +2 | Fe XV | 3s 3p | $^3P_2$ - $^1P_1$ | 0.46 | |
| 1079.3(3) | 1079.3(5) | 1.02 +4 | Fe XXIII | 2s 2p | $^3P_1$ - $^3P_2$ | 1.96 | HSCS |
| 1118.060(10) | 1118.055(25) | 1.45 +4 | Fe XIX | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 1.47 | PSS |
| 1216.43(1) | 1216.46(15) | 1.01 +3 | Fe XIII | $3s^2$ $3p^2$ | $^3P_1$ - $^1S_0$ | 0.36 | SBT |
| 1242.00(1) | 1242.00(8) | 3.17 +2 | Fe XII | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.33 | SBT |
| | 1259.27(4) | 6.72 +2 | Fe XIX | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 1.47 | |
| 1349.40(1) | 1349.36(9) | 1.73 +2 | Fe XII | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.33 | SBT |
| 1354.08(5) | 1354.10(9) | 6.49 +3 | Fe XXI | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 1.69 | SBT |
| 1467.06(1) | 1467.4(1.1) | 9.90 +2 | Fe XI | $3s^2$ $3p^4$ | $^3P_1$ - $^1S_0$ | 0.29 | SBT |
| | 1585.5(1.1) | 1.59 +3 | Fe XX | $2s^2$ $2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.58 | |
| 2169.08(2) | 2169.69(24) | 1.84 +0* | Fe XII | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.33 | SBT |
| 2298.0(3) | 2298.0(5) | 8.46 +2 | Fe XXI | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 1.69 | HSCS |
| Q | 2301.3(5) | 1.20 +1 | Fe XIII | $3s^2$ $3p^2$ | $^1D_2$ - $^1S_0$ | 0.36 | |
| Q | 2321.0(2.7) | 8.31 +0 | Fe XI | $3s^2$ $3p^4$ | $^1D_2$ - $^1S_0$ | 0.29 | |
| 2405.68(1) | 2405.1(3) | 4.81 +1 | Fe XII | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.33 | SBT |
| 2565.93(6) | 2566.7(5) | 2.00 +2 | Fe XII | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.33 | SBT |
| 2578.77(1) | 2578.84(14) | 4.57 +1 | Fe XIII | $3s^2$ $3p^2$ | $^3P_1$ - $^1D_2$ | 0.36 | SBT |
| 2648.71(2) | 2648.67(7) | 9.23 +1 | Fe XI | $3s^2$ $3p^4$ | $^3P_2$ - $^1D_2$ | 0.29 | SBT |
| 2665.1(3) | 2665.2(3.0) | 4.17 +2 | Fe XX | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 1.58 | SH(78) |
| | 2902.8(6) | 8.13 +1* | Fe XII | $3s^2$ $3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.33 | |

Table 3. Iron wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| 3072.0(4) | 3072.0(7) | 7.21 +1* | Fe XII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.33 | J |
| | 3230.(16) | 5.70 +2 | Fe XXIII | 2s 2p | $^3P_0 - {}^3P_1$ | 1.96 | |
| 3388.5(4) | 3388.05(23) | 5.75 +1 | Fe XIII | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.36 | J |
| 3986.8(4) | 3986.80(22) | 9.44 +0 | Fe XI | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.29 | J |
| 5302.86(6) | 5302.9(6) | 6.02 +1 | Fe XIV | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.39 | E |
| 6374.6(4) | 6374.53(4) | 6.94 +1 | Fe X | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.26 | J |
| | 7045.(20) | 4.03 +1 | Fe XIX | $2s^2\ 2p^4$ | $^3P_0 - {}^3P_1$ | 1.47 | |
| 7058.6(4) | 7060.(10) | 3.74 +1 | Fe XV | 3s 3p | $^3P_1 - {}^3P_2$ | 0.46 | J |
| 7891.8(4) | 7891.8(6) | 4.37 +1 | Fe XI | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.29 | J |
| 10746.8(4) | 10746.9(5) | 1.40 +1 | Fe XIII | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.36 | J |
| 10797.9(4) | 10797.9(7) | 9.87 +0 | Fe XIII | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.36 | J |
| | 15606.(17) | 2.04 +0 | Fe XII | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.33 | |
| | 17390.(60) | 3.58 +0 | Fe XV | 3s 3p | $^3P_0 - {}^3P_1$ | 0.46 | |
| | 2.217(3) μm | 8.68 -1 | Fe XII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.33 | |
| | 6.082(19) μm | 2.23 -1 | Fe XI | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.29 | |

Table 24. Cobalt: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 229.40(15) | 4.59 +4 | Co XXIV | 2s 2p | $^3P_0 - {}^1P_1$ | 2.12 | |
| | 249.80(18) | 2.57 +4 | Co XXIV | 2s 2p | $^3P_1 - {}^1P_1$ | 2.12 | |
| | 278.55(17) | 3.72 +4 | Co XXI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.74 | |
| | 307.89(27) | 2.09 +5 | Co XXII | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 1.85 | |
| | 345.0(3) | 1.68 +4 | Co XXIV | 2s 2p | $^3P_2 - {}^1P_1$ | 2.12 | |
| | 356.8(3) | 5.10 +4 | Co XXI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.74 | |
| | 390.9(4) | 2.17 +5 | Co XX | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 1.60 | |
| | 471.8(6) | 7.39 +4 | Co XXI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 1.74 | |
| | 522.1(6) | 2.43 +3 | Co XXI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 1.74 | |
| | 523.3(8) | 2.58 +4 | Co XXII | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 1.85 | |
| | 528.3(6) | 2.73 +4 | Co XX | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 1.60 | |
| Q | 574.9(9) | 1.01 +2 | Co XX | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 1.60 | |
| | 597.1(1.0) | 1.95 +4 | Co XXI | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 1.74 | |
| | 680.1(1.0) | 2.62 +4 | Co XXI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 1.74 | |
| | 696.5(1.4) | 2.38 +4 | Co XXII | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 1.85 | |
| | 717.9(1.5) | 2.42 +4 | Co XXIII | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 1.96 | |
| Q | 747.9(1.6) | 2.36 +1 | Co XXII | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 1.85 | |
| | 750.6(1.6) | 7.57 +3 | Co XXI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 1.74 | |
| | 786.2(1.3) | 3.42 +2 | Co XVI | 3s 3p | $^3P_0 - {}^1P_1$ | 0.51 | |
| | 819.9(1.3) | 3.25 +4 | Co XIX | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 1.49 | |
| | 831.9(1.4) | 2.14 +2 | Co XVI | 3s 3p | $^3P_1 - {}^1P_1$ | 0.51 | |
| | 905.1(2.3) | 1.74 +4 | Co XXIV | 2s 2p | $^3P_1 - {}^3P_2$ | 2.12 | |
| | 930.9(1.9) | 2.47 +4 | Co XX | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 1.60 | |
| | 972.7(1.9) | 2.26 +2 | Co XVI | 3s 3p | $^3P_2 - {}^1P_1$ | 0.51 | |
| | 1102.2(2.7) | 1.12 +4 | Co XXII | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 1.85 | |
| | 1123.0(9) | 1.60 +3 | Co XIV | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.41 | |
| | 1134.17(26) | 4.85 +2 | Co XIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.38 | |
| | 1221.(4) | 8.38 +2 | Co XX | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 1.60 | |
| | 1258.5(3) | 2.87 +2 | Co XIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.38 | |
| | 1270.(5) | 3.02 +3 | Co XXI | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.74 | |
| | 1368.7(5) | 1.62 +3 | Co XII | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.34 | |
| | 2011.8(8) | 3.96 +0* | Co XIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.38 | |
| | 2104.(12) | 1.05 +3 | Co XXII | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 1.85 | |
| Q | 2137.9(1.3) | 9.72 +0 | Co XII | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.34 | |
| Q | 2166.(3) | 1.27 +1 | Co XIV | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.41 | |
| | 2245.5(1.4) | 3.49 +2 | Co XIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.38 | |
| | 2247.(14) | 6.75 +2 | Co XXI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 1.74 | |
| | 2290.2(1.0) | 9.05 +1 | Co XIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.38 | |
| | 2331.(4) | 1.09 +2 | Co XIV | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.41 | |
| | 2373.4(1.1) | 1.56 +2 | Co XII | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.34 | |
| | 2598.0(1.9) | 1.33 +2* | Co XIII | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.38 | |

Table 24. Cobalt: wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 2791.7(2.2) | 1.10 +2* | Co XIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.38 | |
| | 2809.(22) | 8.48 +2 | Co XXIV | 2s 2p | $^3P_0 - {}^3P_1$ | 2.12 | |
| | 3110.(7) | 1.24 +2 | Co XIV | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.41 | |
| 3801.2 | 3801.(4) | 1.34 +1 | Co XII | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.34 | P |
| | 4249.(50) | 1.75 +2 | Co XX | $2s^2\ 2p^4$ | $^3P_0 - {}^3P_1$ | 1.60 | |
| 4350.6 | 4352.(10) | 1.09 +2 | Co XV | $3s^2$ 3p | $^2P_{1/2} - {}^2P_{3/2}$ | 0.44 | P |
| T 5188.5 | 5168.(13) | 1.30 +2 | Co XI | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.31 | P |
| 5744. | 5746.(19) | 7.01 +1 | Co XVI | 3s 3p | $^3P_1 - {}^3P_2$ | 0.51 | P |
| | 6319.(8) | 8.42 +1 | Co XII | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.34 | |
| | 8310.(34) | 2.99 +1 | Co XIV | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.41 | |
| | 9300.(60) | 1.50 +1 | Co XIV | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.41 | |
| | 11478.(40) | 4.98 +0 | Co XIII | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.38 | |
| | 14300.(120) | 6.17 +0 | Co XVI | 3s 3p | $^3P_0 - {}^3P_1$ | 0.51 | |
| | 16550.(70) | 2.04 +0 | Co XIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.38 | |
| | 8.00(18) μm | 9.59 -2 | Co XII | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.34 | |

Table 25. Nickel: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 212.81(16) | 6.91 +4 | Ni XXV | 2s 2p | $^3P_0$ - $^1P_1$ | 2.30 | |
| | 232.89(11) | 3.79 +4 | Ni XXV | 2s 2p | $^3P_1$ - $^1P_1$ | 2.30 | |
| | 249.94(19) | 4.60 +4 | Ni XXII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 1.89 | |
| | 282.4(3) | 3.02 +5 | Ni XXIII | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 2.01 | |
| | 330.6(4) | 7.80 +4 | Ni XXII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 1.89 | |
| | 334.9(4) | 2.21 +4 | Ni XXV | 2s 2p | $^3P_2$ - $^1P_1$ | 2.30 | |
| | 359.1(5) | 3.31 +5 | Ni XXI | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 1.76 | |
| | 412.3(5) | 1.20 +5 | Ni XXII | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 1.89 | |
| 465.4(3) | 465.40(17) | 4.15 +4 | Ni XXIII | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 2.01 | HSCS |
| 471.15(5) | 471.14(6) | 4.24 +4 | Ni XXI | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 1.76 | W |
| 477.6(3) | 477.6(3) | 4.48 +3 | Ni XXII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 1.89 | HSCS |
| Q | 514.0(8) | 1.44 +2 | Ni XXI | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 1.76 | |
| | 524.3(9) | 2.99 +4 | Ni XXII | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 1.89 | |
| 609.9(3) | 609.9(3) | 3.94 +4 | Ni XXIV | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 2.13 | HSCS |
| 614.8(3) | 614.8(3) | 3.71 +4 | Ni XXIII | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 2.01 | HSCS |
| 634.8(3) | 634.8(3) | 4.11 +4 | Ni XXII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 1.89 | HSCS |
| | 689.8(1.5) | 9.11 +3 | Ni XXII | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 1.89 | |
| 694.64(3) | 694.64(3) | 5.34 +4 | Ni XX | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 1.65 | PSS |
| Q | 718.1(2.1) | 2.37 +1 | Ni XXIII | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 2.01 | |
| | 730.35(16) | 5.37 +2 | Ni XVII | 3s 3p | $^3P_0$ - $^1P_1$ | 0.57 | |
| | 764.6(1.8) | 2.87 +4 | Ni XXV | 2s 2p | $^3P_1$ - $^3P_2$ | 2.30 | |
| | 777.06(19) | 3.30 +2 | Ni XVII | 3s 3p | $^3P_1$ - $^1P_1$ | 0.57 | |
| 779.5(3) | 779.48(12) | 4.14 +4 | Ni XXI | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 1.76 | HSCS |
| 911.0(3) | 911.00(25) | 2.07 +4 | Ni XXIII | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 2.01 | HSCS |
| | 928.76(27) | 3.26 +2 | Ni XVII | 3s 3p | $^3P_2$ - $^1P_1$ | 0.57 | |
| | 1025.(5) | 5.61 +3 | Ni XXII | $2s^2$ $2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.89 | |
| | 1033.2(5) | 2.50 +3 | Ni XV | $3s^2$ $3p^2$ | $^3P_1$ - $^1S_0$ | 0.46 | |
| | 1034.9(5) | 7.17 +2 | Ni XIV | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.43 | |
| 1174.72(5) | 1174.720(7) | 4.66 +2 | Ni XIV | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.43 | SBT |
| 1191.1(4) | 1191.0(3) | 1.01 +3 | Ni XXI | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 1.76 | FBM |
| 1277.23(1) | 1277.231(18) | 2.57 +3 | Ni XIII | $3s^2$ $3p^4$ | $^3P_1$ - $^1S_0$ | 0.38 | SBT |
| 1866.75(1) | 1866.751(17) | 8.27 +0* | Ni XIV | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.43 | SBT |
| 1917.3(2) | 1914.98(21) | 1.32 +3 | Ni XXIII | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 2.01 | H |
| 1928.7(3) | 1929.(6) | 1.03 +3 | Ni XXII | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 1.89 | H |
| | 1966.1(1.9) | 5.97 +2 | Ni XIV | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.43 | |
| Q | 1968.38(4) | 1.16 +1 | Ni XIII | $3s^2$ $3p^4$ | $^1D_2$ - $^1S_0$ | 0.38 | |
| Q | 2046.5(2.1) | 1.34 +1 | Ni XV | $3s^2$ $3p^2$ | $^1D_2$ - $^1S_0$ | 0.46 | |
| 2085.51(5) | 2085.51(3) | 1.94 +2 | Ni XV | $3s^2$ $3p^2$ | $^3P_1$ - $^1D_2$ | 0.46 | SBT |
| 2125.50(2) | 2125.500(23) | 2.58 +2 | Ni XIII | $3s^2$ $3p^4$ | $^3P_2$ - $^1D_2$ | 0.38 | SBT |
| 2184.26(5) | 2184.259(24) | 1.63 +2 | Ni XIV | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.43 | SBT |
| | 2321.6(2.7) | 2.11 +2* | Ni XIV | $3s^2$ $3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.43 | |

Table 25. Nickel: wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | 2467.(19) | | 1.23 +3 | Ni XXV | 2s 2p | $^3P_0$ - $^3P_1$ | 2.30 | |
| | 2539.96(5) | | 1.59 +2 | Ni XIV | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.43 | |
| 2818.2(3) | 2817.7(3) | | 5.72 +2 | Ni XXI | $2s^2\ 2p^4$ | $^3P_0$ - $^3P_1$ | 1.76 | HSCS |
| | 2818.01(6) | | 2.05 +2 | Ni XV | $3s^2\ 3p^2$ | $^3P_2$ - $^1D_2$ | 0.46 | |
| 3601.1(4) | 3600.0(2.6) | | 1.93 +2 | Ni XVI | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.50 | J |
| | 3636.50(9) | | 1.84 +1 | Ni XIII | $3s^2\ 3p^4$ | $^3P_1$ - $^1D_2$ | 0.38 | |
| 4231.2(4) | 4230.9(1.8) | | 2.37 +2 | Ni XII | $3s^2\ 3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.35 | J |
| T 4744. | 4756.(10) | | 1.23 +2 | Ni XVII | 3s 3p | $^3P_1$ - $^3P_2$ | 0.57 | P |
| 5115.8(4) | 5115.81(10) | | 1.57 +2 | Ni XIII | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 0.38 | J |
| 6701.7(4) | 6701.68(22) | | 5.65 +1 | Ni XV | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 0.46 | J |
| 8024.1(4) | 8024.1(5) | | 2.27 +1 | Ni XV | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 0.46 | J |
| | 8690.(40) | | 1.11 +1 | Ni XIV | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.43 | |
| | 12150.(60) | | 1.00 +1 | Ni XVII | 3s 3p | $^3P_0$ - $^3P_1$ | 0.57 | |
| | 12815.0(1.2) | | 4.27 +0 | Ni XIV | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.43 | |
| | 19.3(4) | μm | - | Ni XIII | $3s^2\ 3p^4$ | $^3P_1$ - $^3P_0$ | 0.38 | |

Table 26. Copper: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 197.66(09) | 1.02 +5 | Cu XXVI | 2s 2p | $^3P_0 - {}^1P_1$ | 2.41 | |
| | 216.89(11) | 5.55 +4 | Cu XXVI | 2s 2p | $^3P_1 - {}^1P_1$ | 2.41 | |
| | 223.66(14) | 5.48 +4 | Cu XXIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.94 | |
| | 257.61(19) | 4.38 +5 | Cu XXIV | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 2.09 | |
| | 304.96(26) | 1.18 +5 | Cu XXIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.94 | |
| | 326.00(24) | 2.85 +4 | Cu XXVI | 2s 2p | $^3P_2 - {}^1P_1$ | 2.41 | |
| | 328.6(3) | 4.85 +5 | Cu XXII | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 1.67 | |
| | 362.0(4) | 1.90 +5 | Cu XXIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 1.94 | |
| 414.1(3) | 414.0(5) | 6.53 +4 | Cu XXIV | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 2.09 | HSCS |
| 420.0(3) | 419.8(5) | 6.52 +4 | Cu XXII | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 1.67 | HSCS |
| 434.8(3) | 434.7(5) | 7.98 +3 | Cu XXIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 1.94 | HSCS |
| | Q 458.3(6) | 2.10 +2 | Cu XXII | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 1.67 | |
| | 460.7(6) | 4.53 +4 | Cu XXIII | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 1.94 | |
| 522.8(3) | 522.66(27) | 6.26 +4 | Cu XXV | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 2.22 | HSCS |
| 540.0(3) | 539.8(8) | 5.78 +4 | Cu XXIV | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 2.09 | HSCS |
| 585.0(3) | 585.3(1.0) | 6.40 +4 | Cu XXIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 1.94 | HSCS |
| 592.3(3) | 592.2(4) | 8.62 +4 | Cu XXI | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 1.54 | HSCS |
| | 636.7(1.2) | 1.05 +4 | Cu XXIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 1.94 | |
| 648.0(3) | 648.0(6) | 4.74 +4 | Cu XXVI | 2s 2p | $^3P_1 - {}^3P_2$ | 2.41 | HSCS |
| 657.7(3) | 657.7(1.2) | 6.78 +4 | Cu XXII | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 1.67 | |
| | 670.1(1.8) | 8.36 +2 | Cu XVIII | 3s 3p | $^3P_0 - {}^1P_1$ | 0.60 | |
| | Q 681.9(1.3) | 2.53 +1 | Cu XXIV | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 2.09 | |
| | 726.4(2.1) | 5.04 +2 | Cu XVIII | 3s 3p | $^3P_1 - {}^1P_1$ | 0.60 | |
| 756.9(3) | 757.0(1.6) | 3.55 +4 | Cu XXIV | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 2.09 | HSCS |
| | 839.0(2.0) | 1.00 +4 | Cu XXIII | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.94 | |
| | 890.4(3.2) | 4.63 +2 | Cu XVIII | 3s 3p | $^3P_2 - {}^1P_1$ | 0.60 | |
| 944.6(2) | 942.4(1.8) | 1.03 +3 | Cu XV | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.48 | DHST |
| 952.8(3) | 953.3(1.8) | 3.81 +3 | Cu XVI | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.52 | DHSC |
| | 1097.1(2.4) | 7.45 +2 | Cu XV | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.48 | |
| | 1161.(4) | 1.21 +3 | Cu XXII | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 1.67 | |
| | 1191.3(2.8) | 4.01 +3 | Cu XIV | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.44 | |
| 1691.0(3) | 1690.(8) | 1.49 +3 | Cu XXIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 1.94 | H |
| | 1718.(5) | 1.01 +3 | Cu XV | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.48 | |
| | 1731.(5) | 1.68 +1* | Cu XV | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.48 | |
| 1776.0(3) | 1777.(9) | 1.57 +3 | Cu XXIV | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 2.09 | HSCS |
| | Q 1805.(7) | 1.42 +1 | Cu XIV | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.44 | |
| 1872.0(3) | 1874.(6) | 3.32 +2 | Cu XVI | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.52 | H |
| | 1906.(7) | 4.18 +2 | Cu XIV | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.44 | |
| | Q 1940.(7) | 1.39 +1 | Cu XVI | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.52 | |
| | 1985.(11) | 1.55 +3 | Cu XXII | $2s^2\ 2p^4$ | $^3P_0 - {}^3P_1$ | 1.67 | |
| | 2068.(9) | 3.33 +2* | Cu XV | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.48 | |

Table 26. Copper: wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|---|
| 2085.3(2) | 2086.(9) | | 2.81 +2 | Cu XV | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.48 | DHST |
| | 2228.(7) | | 1.55 +3 | Cu XXVI | 2s 2p | $^3P_0$ - $^3P_1$ | 2.41 | |
| | 2312.(10) | | 2.27 +2 | Cu XV | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.48 | |
| T 2539.7(3) | 2555.(12) | | 3.28 +2 | Cu XVI | $3s^2\ 3p^2$ | $^3P_2$ - $^1D_2$ | 0.52 | DHSC |
| 3007.6(3) | 3007.6(1.0) | | 3.30 +2 | Cu XVII | $3s^2\ 3p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.55 | HSCS |
| 3500.4(3) | 3500.4(1.0) | | 4.19 +2 | Cu XIII | $3s^2\ 3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.41 | HSCS |
| | 3502.(20) | | 2.43 +2 | Cu XIV | $3s^2\ 3p^4$ | $^3P_1$ - $^1D_2$ | 0.44 | |
| 3941.6(3) | 3941.6(2.2) | | 2.16 +2 | Cu XVIII | 3s 3p | $^3P_1$ - $^3P_2$ | 0.60 | DHSC |
| 4183.4(3) | 4181.(20) | | 2.83 +2 | Cu XIV | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 0.44 | RPSKR |
| 5375.8(3) | 5393.(30) | | 1.07 +2 | Cu XVI | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 0.52 | DHSC |
| | 6683.(40) | | 2.37 +1 | Cu XV | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.48 | |
| | 7030.(50) | | 3.25 +1 | Cu XVI | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 0.52 | |
| | 10130.(100) | | 8.43 +0 | Cu XV | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.48 | |
| | 10436.(120) | | 1.59 +1 | Cu XVIII | 3s 3p | $^3P_0$ - $^3P_1$ | 0.60 | |
| | 13.9(4) | μm | 5.80 -3 | Cu XIV | $3s^2\ 3p^4$ | $^3P_0$ - $^3P_1$ | 0.44 | |

Table 27. Zinc: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 183.18(11) | 1.50 +5 | Zn XXVII | 2s 2p | $^3P_0$ - $^1P_1$ | 2.60 | |
| | 199.73(14) | 6.31 +4 | Zn XXIV | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 2.10 | |
| | 201.65(14) | 8.03 +4 | Zn XXVII | 2s 2p | $^3P_1$ - $^1P_1$ | 2.60 | |
| | 235.54(24) | 6.23 +5 | Zn XXV | $2s^2\ 2p^2$ | $^3P_1$ - $^1S_0$ | 2.27 | |
| | 280.37(28) | 1.76 +5 | Zn XXIV | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 2.10 | |
| | 299.8(4) | 7.03 +5 | Zn XXIII | $2s^2\ 2p^4$ | $^3P_1$ - $^1S_0$ | 1.97 | |
| | 317.4(3) | 3.62 +4 | Zn XXVII | 2s 2p | $^3P_2$ - $^1P_1$ | 2.60 | |
| | 319.4(4) | 2.96 +5 | Zn XXIV | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 2.10 | |
| | 368.2(6) | 1.01 +5 | Zn XXV | $2s^2\ 2p^2$ | $^3P_1$ - $^1D_2$ | 2.27 | |
| | 374.1(6) | 9.91 +4 | Zn XXIII | $2s^2\ 2p^4$ | $^3P_2$ - $^1D_2$ | 1.97 | |
| | 393.7(6) | 1.38 +4 | Zn XXIV | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 2.10 | |
| | 405.4(6) | 6.79 +4 | Zn XXIV | $2s^2\ 2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 2.10 | |
| Q | 407.8(7) | 3.12 +2 | Zn XXIII | $2s^2\ 2p^4$ | $^1D_2$ - $^1S_0$ | 1.97 | |
| | 450.4(3) | 9.78 +4 | Zn XXVI | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 2.40 | |
| | 473.2(1.0) | 8.88 +4 | Zn XXV | $2s^2\ 2p^2$ | $^3P_2$ - $^1D_2$ | 2.27 | |
| | 507.9(4) | 1.37 +5 | Zn XXII | $2s^2\ 2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 1.83 | |
| | 533.0(1.0) | 9.91 +4 | Zn XXIV | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 2.10 | |
| | 552.9(6) | 7.57 +4 | Zn XXVII | 2s 2p | $^3P_1$ - $^3P_2$ | 2.60 | |
| | 558.7(1.3) | 1.09 +5 | Zn XXIII | $2s^2\ 2p^4$ | $^3P_2$ - $^3P_1$ | 1.97 | |
| | 591.6(1.2) | 1.17 +4 | Zn XXIV | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 2.10 | |
| | 632.2(2.3) | 1.28 +3 | Zn XIX | 3s 3p | $^3P_0$ - $^1P_1$ | 0.70 | |
| | 634.0(1.7) | 5.95 +4 | Zn XXV | $2s^2\ 2p^2$ | $^3P_0$ - $^3P_1$ | 2.27 | |
| Q | 653.8(1.8) | 2.61 +1 | Zn XXV | $2s^2\ 2p^2$ | $^1D_2$ - $^1S_0$ | 2.27 | |
| | 680.2(1.9) | 7.56 +2 | Zn XIX | 3s 3p | $^3P_1$ - $^1P_1$ | 0.70 | |
| | 694.4(1.7) | 1.73 +4 | Zn XXIV | $2s^2\ 2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 2.10 | |
| | 856.6(2.9) | 6.43 +2 | Zn XIX | 3s 3p | $^3P_2$ - $^1P_1$ | 0.70 | |
| | 856.6(1.9) | 1.42 +3 | Zn XVI | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.55 | |
| | 879.4(2.0) | 5.69 +3 | Zn XVII | $3s^2\ 3p^2$ | $^3P_1$ - $^1S_0$ | 0.59 | |
| | 1024.6(2.7) | 1.17 +3 | Zn XVI | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.55 | |
| | 1109.(3) | 6.13 +3 | Zn XV | $3s^2\ 3p^4$ | $^3P_1$ - $^1S_0$ | 0.51 | |
| | 1132.(5) | 1.42 +3 | Zn XXIII | $2s^2\ 2p^4$ | $^3P_1$ - $^1D_2$ | 1.97 | |
| | 1459.(9) | 3.73 +3 | Zn XXIII | $2s^2\ 2p^4$ | $^3P_0$ - $^3P_1$ | 1.97 | |
| 1507.5(1.0) | 1504.(5) | 1.68 +3 | Zn XVI | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.55 | RPSKR |
| | 1507.(8) | 2.02 +3 | Zn XXIV | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 2.10 | |
| | 1602.(6) | 3.32 +1* | Zn XVI | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.55 | |
| Q | 1651.(7) | 1.78 +1 | Zn XV | $3s^2\ 3p^4$ | $^1D_2$ - $^1S_0$ | 0.51 | |
| | 1659.(12) | 1.84 +3 | Zn XXV | $2s^2\ 2p^2$ | $^3P_1$ - $^3P_2$ | 2.27 | |
| 1676.9(2) | 1680.(7) | 5.56 +2 | Zn XVII | $3s^2\ 3p^2$ | $^3P_1$ - $^1D_2$ | 0.59 | RPSKR |
| 1702.8(2) | 1706.(7) | 6.67 +2 | Zn XV | $3s^2\ 3p^4$ | $^3P_2$ - $^1D_2$ | 0.51 | RPSKR |
| | 1842.(8) | 5.15 +2 | Zn XVI | $3s^2\ 3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.55 | |
| Q | 1846.(9) | 1.43 +1 | Zn XVII | $3s^2\ 3p^2$ | $^1D_2$ - $^1S_0$ | 0.59 | |

Table 27. Zinc: wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 1990.(5) | 4.69 +2 | Zn XVI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.55 | |
| | 2000.(8)[a] | 2.13 +3 | Zn XXVII | 2s 2p | $^3P_0 - {}^3P_1$ | 2.60 | |
| | 2111.(10) | 3.11 +2 | Zn XVI | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.55 | |
| 2284.6(1) | 2293.(10) | 5.26 +2 | Zn XVII | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.59 | BGBR |
| 2532.0(1) | 2531.5(1.0) | 5.53 +2 | Zn XVIII | $3s^2$ 3p | $^2P_{1/2} - {}^2P_{3/2}$ | 0.63 | BGBR |
| 2922.3(1) | 2922.5(1.0) | 7.20 +2 | Zn XIV | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.47 | BGBR |
| 3296.2(2) | 3304.0(3) | 3.67 +2 | Zn XIX | 3s 3p | $^3P_1 - {}^3P_2$ | 0.70 | BGBR |
| | 3374.(15) | 3.15 +1 | Zn XV | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.51 | |
| 3450.4(2) | 3449.(20) | 4.98 +2 | Zn XV | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.51 | BGBR |
| 4355.0(3) | 4365.(25) | 2.00 +2 | Zn XVII | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.59 | RPSKR |
| | 5224.(30) | 4.83 +1 | Zn XVI | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.55 | |
| | 6266.(50) | 4.40 +1 | Zn XVII | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.59 | |
| | 8206.(100) | 1.54 +1 | Zn XVI | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.55 | |
| | 8952.(150) | 2.46 +1 | Zn XIX | 3s 3p | $^3P_0 - {}^3P_1$ | 0.70 | |
| | 4.0(2) μm | 2.39 -1 | Zn XV | $3s^2\ 3p^4$ | $^3P_0 - {}^3P_1$ | 0.51 | |

[a]This is a wavelength in vacuum.

Table 28. Gallium: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 169.66(13) | 2.19 +5 | Ga XXVIII | 2s 2p | $^3P_0 - {}^1P_1$ | 2.79 | |
| | 178.06(13) | 7.58 +4 | Ga XXV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 2.28 | |
| | 187.22(16) | 1.15 +5 | Ga XXVIII | 2s 2p | $^3P_1 - {}^1P_1$ | 2.79 | |
| | 215.25(26) | 8.79 +5 | Ga XXVI | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 2.45 | |
| | 256.91(28) | 2.59 +5 | Ga XXV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 2.28 | |
| | 272.9(4) | 1.01 +6 | Ga XXIV | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 2.14 | |
| | 283.1(3) | 4.52 +5 | Ga XXV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 2.28 | |
| | 309.4(4) | 4.52 +4 | Ga XXVIII | 2s 2p | $^3P_2 - {}^1P_1$ | 2.79 | |
| | 327.5(6) | 1.55 +5 | Ga XXVI | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 2.45 | |
| | 333.4(6) | 1.49 +5 | Ga XXIV | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 2.14 | |
| | 355.0(5) | 2.34 +4 | Ga XXV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 2.28 | |
| | 357.2(5) | 2.28 +5 | Ga XXV | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 2.28 | |
| Q | 362.4(7) | 4.65 +2 | Ga XXIV | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 2.14 | |
| | 390.12(23) | 1.50 +5 | Ga XXVII | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 2.59 | |
| | 414.6(1.0) | 1.35 +5 | Ga XXVI | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 2.45 | |
| | 437.95(29) | 2.13 +5 | Ga XXIII | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 1.99 | |
| | 474.1(6) | 1.19 +5 | Ga XXVIII | 2s 2p | $^3P_1 - {}^3P_2$ | 2.79 | |
| | 477.6(1.3) | 1.72 +5 | Ga XXIV | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 2.14 | |
| | 479.9(1.0) | 1.52 +5 | Ga XXV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 2.28 | |
| | 535.1(1.6) | 9.76 +4 | Ga XXVI | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 2.45 | |
| | 552.9(1.3) | 1.25 +4 | Ga XXV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 2.28 | |
| | 580.1(1.4) | 2.91 +4 | Ga XXV | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 2.28 | |
| | 588.6(2.0) | 1.93 +3 | Ga XX | 3s 3p | $^3P_0 - {}^1P_1$ | 0.70 | |
| Q | 628.0(2.2) | 2.69 +1 | Ga XXVI | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 2.45 | |
| | 636.7(1.6) | 1.12 +3 | Ga XX | 3s 3p | $^3P_1 - {}^1P_1$ | 0.70 | |
| | 776.9(2.0) | 1.91 +3 | Ga XVII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.62 | |
| 813.1(3) | 811.1(2.1) | 8.40 +3 | Ga XVIII | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.66 | RPSKR |
| | 825.7(2.7) | 8.75 +2 | Ga XX | 3s 3p | $^3P_2 - {}^1P_1$ | 0.70 | |
| | 955.9(2.8) | 1.82 +3 | Ga XVII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.62 | |
| | 1030.(3) | 9.22 +3 | Ga XVI | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.58 | |
| | 1105.(7) | 1.66 +3 | Ga XXIV | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 2.14 | |
| | 1108.(7) | 8.11 +3 | Ga XXIV | $2s^2\ 2p^4$ | $^3P_0 - {}^3P_1$ | 2.14 | |
| 1319.1(3) | 1319.(5) | 2.76 +3 | Ga XVII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.62 | RPSKR |
| | 1365.(8) | 2.62 +3 | Ga XXV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 2.28 | |
| | 1478.(6) | 6.39 +1* | Ga XVII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.62 | |
| 1503.7(3) | 1503.(6) | 9.15 +2 | Ga XVIII | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.66 | RPSKR |
| Q | 1506.(7) | 2.28 +1 | Ga XVI | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.58 | |
| | 1526.(6) | 1.05 +3 | Ga XVI | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.58 | |
| | 1559.(14) | 2.11 +3 | Ga XXVI | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 2.45 | |
| | 1638.(7) | 7.79 +2 | Ga XVII | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.62 | |
| Q | 1762.(9) | 1.46 +1 | Ga XVIII | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.66 | |

Table 28. Gallium: wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | 1808.(9) | | 2.86 +3 | Ga XXVIII | 2s 2p | $^3P_0$ - $^3P_1$ | 2.79 | |
| | 1890.(10) | | 7.64 +2 | Ga XVII | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.62 | |
| | 1934.(10) | | 4.11 +2 | Ga XVII | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.62 | |
| | 2046.(10) | | 8.33 +2 | Ga XVIII | $3s^2$ $3p^2$ | $^3P_2$ - $^1D_2$ | 0.66 | |
| | 2146.9(1.0) | | 9.07 +2 | Ga XIX | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.70 | |
| 2456.3(3) | 2459.7(1.0) | | 1.21 +3 | Ga XV | $3s^2$ $3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.54 | RPSKR |
| | 2780.(6) | | 6.13 +2 | Ga XX | 3s 3p | $^3P_1$ - $^3P_2$ | 0.70 | |
| | 2868.(15) | | 8.54 +2 | Ga XVI | $3s^2$ $3p^4$ | $^3P_2$ - $^3P_1$ | 0.58 | |
| | 3258.(20) | | 4.00 +1 | Ga XVI | $3s^2$ $3p^4$ | $^3P_1$ - $^1D_2$ | 0.58 | |
| | 3566.(20) | | 3.62 +2 | Ga XVIII | $3s^2$ $3p^2$ | $^3P_0$ - $^3P_1$ | 0.66 | |
| | 4150.(30) | | 9.37 +1 | Ga XVII | $3s^2$ $3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.62 | |
| | 5650.(60) | | 5.74 +1 | Ga XVIII | $3s^2$ $3p^2$ | $^3P_1$ - $^3P_2$ | 0.66 | |
| | 6790.(80) | | 2.65 +1 | Ga XVII | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.62 | |
| | 7800.(100) | | 3.70 +1 | Ga XX | 3s 3p | $^3P_0$ - $^3P_1$ | 0.70 | |
| | 2.00(7) | μm | 1.82 +0 | Ga XVI | $3s^2$ $3p^4$ | $^3P_0$ - $^3P_1$ | 0.58 | |

Table 29. Germanium: wavelengths and transition probabilities

| | Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | | 157.03(14) | 3.16 +5 | Ge XXIX | 2s 2p | $^3P_0 - {}^1P_1$ | 3.00 | |
| | | 158.58(12) | 8.86 +4 | Ge XXVI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 2.46 | |
| | | 173.59(17) | 1.64 +5 | Ge XXIX | 2s 2p | $^3P_1 - {}^1P_1$ | 3.00 | |
| | | 196.65(27) | 1.23 +6 | Ge XXVII | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 2.64 | |
| | | 234.74(27) | 3.76 +5 | Ge XXVI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 2.46 | |
| | | 247.9(4) | 1.44 +6 | Ge XXV | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 2.31 | |
| | | 251.8(3) | 6.76 +5 | Ge XXVI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 2.46 | |
| | | 291.5(6) | 2.33 +5 | Ge XXVII | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 2.64 | |
| | 297.5(3) | 297.4(6) | 2.22 +5 | Ge XXV | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 2.31 | H |
| | | 301.9(5) | 5.56 +4 | Ge XXIX | 2s 2p | $^3P_2 - {}^1P_1$ | 3.00 | |
| | | 315.2(5) | 3.49 +5 | Ge XXVI | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 2.46 | |
| | 319.1(3) | 319.1(5) | 3.83 +4 | Ge XXVI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 2.46 | H |
| | | Q 321.8(7) | 7.02 +2 | Ge XXV | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 2.31 | |
| | 339.5(3) | 339.51(17) | 2.28 +5 | Ge XXVIII | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 2.79 | H |
| | | 363.4(9) | 2.04 +5 | Ge XXVII | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 2.64 | |
| | 379.5(1) | 379.59(22) | 3.27 +5 | Ge XXIV | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 2.16 | H |
| | 408.7(3) | 408.5(6) | 1.84 +5 | Ge XXIX | 2s 2p | $^3P_1 - {}^3P_2$ | 3.00 | H |
| | 410.7(3) | 410.6(1.2) | 2.66 +5 | Ge XXV | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 2.31 | HSCS |
| | 427.9(3) | 428.2(9) | 2.33 +5 | Ge XXVI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 2.46 | HSCS |
| | 454.8(3) | 454.7(1.5) | 1.57 +5 | Ge XXVII | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 2.64 | HSCS |
| | | 488.80(18) | 4.78 +4 | Ge XXVI | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 2.46 | |
| | | 519.6(1.3) | 1.30 +4 | Ge XXVI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 2.46 | |
| | | 547.9(8) | 2.89 +3 | Ge XXI | 3s 3p | $^3P_0 - {}^1P_1$ | 0.80 | |
| | | 595.6(7) | 1.64 +3 | Ge XXI | 3s 3p | $^3P_1 - {}^1P_1$ | 0.80 | |
| | | Q 604.2(2.6) | 2.75 +1 | Ge XXVII | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 2.64 | |
| | 703.6(2) | 703.1(1.9) | 2.47 +3 | Ge XVIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.69 | DHST |
| | 746.9(3) | 747.7(2.1) | 1.22 +4 | Ge XIX | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.73 | H |
| | | 797.7(1.3) | 1.17 +3 | Ge XXI | 3s 3p | $^3P_2 - {}^1P_1$ | 0.80 | |
| T | 859.9(3) | 864.(5) | 1.64 +4 | Ge XXV | $2s^2\ 2p^4$ | $^3P_0 - {}^3P_1$ | 2.31 | H |
| T | 890.2(2) | 890.(3) | 2.80 +3 | Ge XVIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.69 | DHST |
| T | 952.9(3) | 954.(3) | 1.37 +4 | Ge XVII | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.64 | DHSC |
| | | 1079.20(8) | 1.90 +3 | Ge XXV | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 2.31 | |
| | | 1161.(5) | 4.32 +3 | Ge XVIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.69 | |
| | | 1252.(8) | 3.28 +3 | Ge XXVI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 2.46 | |
| | | 1343.(6) | 1.48 +3 | Ge XIX | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.73 | |
| | | 1360.(6) | 1.18 +2* | Ge XVIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.69 | |
| | | 1364.(6) | 1.63 +3 | Ge XVII | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.63 | |
| | | Q 1368.(7) | 2.99 +1 | Ge XVII | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.64 | |
| | | 1456.(7) | 1.18 +3 | Ge XVIII | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.69 | |
| | 1473.7(1) | 1474.(15) | 2.39 +3 | Ge XXVII | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 2.64 | H |
| | | 1646.(9) | 3.76 +3 | Ge XXIX | 2s 2p | $^3P_0 - {}^3P_1$ | 3.00 | |

Table 29. Germanium: wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | Q 1687.(9) | 1.48 +1 | Ge XIX | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.73 | |
| T 1778.8(2) | 1779.(10) | 5.22 +2 | Ge XVIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.69 | DHST |
| T 1782.0(2) | 1783.(10) | 1.22 +3 | Ge XVIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.69 | DHST |
| 1810.4(3) | 1816.(10) | 1.31 +3 | Ge XIX | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.73 | H |
| 1832.7(3) | 1832.2(1.0) | 1.46 +3 | Ge XX | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.77 | DHSC |
| 2085.1(1) | 2085.1(1.0) | 1.98 +3 | Ge XVI | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.60 | DHSC |
| 2350.2(3) | 2350.2(4) | 1.01 +3 | Ge XXI | 3s 3p | $^3P_1 - {}^3P_2$ | 0.80 | DHSC |
| 2406.9(3) | 2404.(14) | 1.43 +3 | Ge XVII | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.64 | DHSC |
| 2933.7(2) | 2938.(18) | 6.39 +2 | Ge XIX | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.73 | DHSC |
| T 3131.3(3) | 3130.(20) | 4.97 +1 | Ge XVII | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.64 | DHSC |
| | 3340.(20) | 1.75 +2 | Ge XVIII | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.69 | |
| 5170.3(3) | 5150.(50) | 7.24 +1 | Ge XIX | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.73 | DHSC |
| T 5702.4(2) | 5730.(60) | 4.28 +1 | Ge XVIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.69 | DHST |
| | 6840.(50) | 5.46 +1 | Ge XXI | 3s 3p | $^3P_0 - {}^3P_1$ | 0.80 | |
| | 12060.(200) | 7.99 +0 | Ge XVII | $3s^2\ 3p^4$ | $^3P_0 - {}^3P_1$ | 0.64 | |

Table 30. Arsenic: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 141.19(11) | 9.89 +4 | As XXVII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 2.64 | |
| | 145.25(14) | 4.52 +5 | As XXX | 2s 2p | $^3P_0 - {}^1P_1$ | 3.20 | |
| | 160.74(17) | 2.31 +5 | As XXX | 2s 2p | $^3P_1 - {}^1P_1$ | 3.20 | |
| | 179.63(27) | 1.71 +6 | As XXVIII | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 2.83 | |
| | 213.99(26) | 5.42 +5 | As XXVII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 2.64 | |
| | 224.83(29) | 9.95 +5 | As XXVII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 2.64 | |
| | 225.0(4) | 2.04 +6 | As XXVI | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 2.49 | |
| | 259.8(6) | 3.47 +5 | As XXVIII | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 2.83 | |
| | 265.5(6) | 3.27 +5 | As XXVI | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 2.49 | |
| | 278.8(4) | 5.24 +5 | As XXVII | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 2.64 | |
| Q | 286.0(7) | 1.07 +3 | As XXVI | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 2.49 | |
| | 286.1(5) | 6.10 +4 | As XXVII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 2.64 | |
| | 294.8(6) | 6.77 +4 | As XXX | 2s 2p | $^3P_2 - {}^1P_1$ | 3.20 | |
| | 296.78(18) | 3.41 +5 | As XXIX | $2s^2\ 2p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 2.99 | |
| | 319.0(9) | 3.05 +5 | As XXVIII | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 2.83 | |
| | 330.58(22) | 4.95 +5 | As XXV | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 2.34 | |
| | 353.5(5) | 2.82 +5 | As XXX | 2s 2p | $^3P_1 - {}^3P_2$ | 3.20 | |
| | 354.9(1.1) | 4.07 +5 | As XXVI | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 2.49 | |
| | 379.6(8) | 3.56 +5 | As XXVII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 2.64 | |
| | 388.9(1.3) | 2.47 +5 | As XXVIII | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 2.83 | |
| | 415.0(1.0) | 7.69 +4 | As XXVII | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 2.64 | |
| | 490.6(1.4) | 1.32 +4 | As XXVII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 2.64 | |
| | 510.0(1.5) | 4.26 +3 | As XXII | 3s 3p | $^3P_0 - {}^1P_1$ | 0.90 | |
| | 556.9(1.3) | 2.38 +3 | As XXII | 3s 3p | $^3P_1 - {}^1P_1$ | 0.90 | |
| Q | 582.2(2.9) | 2.81 +1 | As XXVIII | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 2.83 | |
| | 634.8(1.8) | 3.11 +3 | As XIX | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.76 | |
| | 688.(4) | 3.10 +4 | As XXVI | $2s^2\ 2p^4$ | $^3P_0 - {}^3P_1$ | 2.49 | |
| | 689.0(2.1) | 1.75 +4 | As XX | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.81 | |
| | 771.6(2.4) | 1.54 +3 | As XXII | 3s 3p | $^3P_2 - {}^1P_1$ | 0.90 | |
| | 828.(3) | 4.24 +3 | As XIX | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.76 | |
| | 881.(3) | 2.00 +4 | As XVIII | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.71 | |
| | 1025.(4) | 7.06 +3 | As XIX | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.76 | |
| | 1055.(9) | 2.17 +3 | As XXVI | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 2.49 | |
| | 1162.(8) | 3.96 +3 | As XXVII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 2.64 | |
| 1195.3(2) | 1199.(5) | 2.34 +3 | As XX | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.81 | RPSKR |
| | 1219.(6) | 2.49 +3 | As XVIII | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.71 | |
| Q | 1238.(6) | 4.04 +1 | As XVIII | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.71 | |
| | 1246.(6) | 2.18 +2* | As XIX | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.76 | |
| 1292.4(2) | 1294.(6) | 1.77 +3 | As XIX | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.76 | RPSKR |
| | 1400.(17) | 2.68 +3 | As XXVIII | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 2.83 | |
| | 1507.(10) | 4.85 +3 | As XXX | 2s 2p | $^3P_0 - {}^3P_1$ | 3.20 | |

Table 30. Arsenic: wavelengths and transition probabilities - Continued

| | Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | 1573.2(5) | 1573.2(1.0) | 2.30 +3 | As XXI | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.85 | RKSPR |
| T | 1600.3(2) | 1606.(10) | 2.03 +3 | As XX | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.81 | RPSKR |
| | | Q 1619.(11) | 1.49 +1 | As XX | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.81 | |
| | | 1642.(10) | 6.39 +2 | As XIX | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.76 | |
| | 1660.4(2) | 1668.(10) | 1.93 +3 | As XIX | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.76 | RPSKR |
| | 1777.2(3) | 1779.8(1.0) | 3.18 +3 | As XVII | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.67 | RPSKR |
| | | 2000.7(2.8) | 1.63 +3 | As XXII | 3s 3p | $^3P_1 - {}^3P_2$ | 0.90 | |
| | 2032.6(3) | 2030.(14) | 2.34 +3 | As XVIII | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.71 | RPSKR |
| | 2438.0(3) | 2440.(16) | 1.10 +3 | As XX | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.81 | RPSKR |
| | | 2724.(20) | 3.15 +2 | As XIX | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.76 | |
| | | 3051.(20) | 6.07 +1 | As XVIII | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.71 | |
| | | 4730.(50) | 8.91 +1 | As XX | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.81 | |
| | | 4920.(60) | 6.56 +1 | As XIX | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.76 | |
| | | 6055.(70) | 7.84 +1 | As XXII | 3s 3p | $^3P_0 - {}^3P_1$ | 0.90 | |
| | | 7990.(100) | 2.63 +1 | As XVIII | $3s^2\ 3p^4$ | $^3P_0 - {}^3P_1$ | 0.71 | |

Table 31. Selenium: wavelengths and transition probabilities

| | Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | | 125.75(11) | 1.02 +5 | Se XXVIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 2.83 | |
| | | 134.29(14) | 6.41 +5 | Se XXXI | 2s 2p | $^3P_0 - {}^1P_1$ | 3.42 | |
| | | 148.67(17) | 3.24 +5 | Se XXXI | 2s 2p | $^3P_1 - {}^1P_1$ | 3.42 | |
| | | 164.08(27) | 2.37 +6 | Se XXIX | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 3.03 | |
| | | 194.75(27) | 7.71 +5 | Se XXVIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 2.83 | |
| | | 201.31(29) | 1.44 +6 | Se XXVIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 2.83 | |
| | | 204.0(4) | 2.88 +6 | Se XXVII | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 2.68 | |
| | | 231.8(5) | 5.10 +5 | Se XXIX | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 3.03 | |
| | | 237.4(6) | 4.76 +5 | Se XXVII | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 2.68 | |
| | | 247.0(4) | 7.72 +5 | Se XXVIII | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 2.83 | |
| | Q | 254.2(6) | 1.65 +3 | Se XXVII | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 2.68 | |
| | | 256.2(5) | 9.50 +4 | Se XXVIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 2.83 | |
| | | 260.50(14) | 5.04 +5 | Se XXX | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 3.20 | |
| | | 280.4(8) | 4.51 +5 | Se XXIX | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 3.03 | |
| | | 288.0(6) | 8.13 +4 | Se XXXI | 2s 2p | $^3P_2 - {}^1P_1$ | 3.42 | |
| | 289.1(3) | 289.16(17) | 7.39 +5 | Se XXVI | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 2.52 | H |
| | | 307.3(5) | 4.25 +5 | Se XXXI | 2s 2p | $^3P_1 - {}^3P_2$ | 3.42 | |
| | | 308.3(9) | 3.37 +5 | Se XXVII | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 2.68 | |
| | | 334.7(1.1) | 3.83 +5 | Se XXIX | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 3.03 | |
| | | 335.0(8) | 5.40 +5 | Se XXVIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 2.83 | |
| | | 354.9(9) | 1.21 +5 | Se XXVIII | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 2.83 | |
| | | 465.2(1.5) | 1.32 +4 | Se XXVIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 2.83 | |
| | | 474.8(1.3) | 6.20 +3 | Se XXIII | 3s 3p | $^3P_0 - {}^1P_1$ | 1.00 | |
| | | 520.6(1.1) | 3.40 +3 | Se XXIII | 3s 3p | $^3P_1 - {}^1P_1$ | 1.00 | |
| | | 557.(3) | 5.60 +4 | Se XXVII | $2s^2\ 2p^4$ | $^3P_0 - {}^3P_1$ | 2.68 | |
| | Q | 562.(3) | 2.88 +1 | Se XXIX | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 3.03 | |
| T | 569.2(5) | 572.0(1.6) | 3.77 +3 | Se XX | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.83 | H |
| T | 639.6(3) | 634.5(2.0) | 2.49 +4 | Se XXI | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.88 | DHSC |
| | | 747.7(2.2) | 1.99 +3 | Se XXIII | 3s 3p | $^3P_2 - {}^1P_1$ | 1.00 | |
| T | 766.6(2) | 767.(3) | 6.36 +3 | Se XX | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.83 | DHST |
| | 810.3(3) | 811.(3) | 2.89 +4 | Se XIX | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.79 | H |
| T | 908.8(2) | 908.(4) | 1.10 +4 | Se XX | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.83 | DHST |
| | | 1032.(11) | 2.44 +3 | Se XXVII | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 2.68 | |
| | | 1070.(6) | 3.65 +3 | Se XXI | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.88 | |
| | | 1089.(8) | 4.68 +3 | Se XXVIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 2.83 | |
| | | 1090.(6) | 3.77 +3 | Se XIX | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.79 | |
| | Q | 1117.(6) | 5.56 +1 | Se XIX | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.79 | |
| | | 1137.(6) | 3.88 +2* | Se XX | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.83 | |
| | | 1151.(6) | 2.62 +3 | Se XX | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.83 | |
| | | 1335.(18) | 2.97 +3 | Se XXIX | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 3.03 | |
| | | 1357.9(1.0) | 3.58 +3 | Se XXII | $3s^2$ 3p | $^2P_{1/2} - {}^2P_{3/2}$ | 0.93 | |

Table 31. Selenium: wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 1388.(10) | 6.14 +3 | Se XXXI | 2s 2p | $^3P_0$ - $^3P_1$ | 3.42 | |
| | 1416.(8) | 3.13 +3 | Se XXI | $3s^2$ $3p^2$ | $^3P_2$ - $^1D_2$ | 0.88 | |
| | 1524.(9) | 7.51 +2 | Se XX | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.83 | |
| 1527.8(3) | 1527.8(1.0) | 5.03 +3 | Se XVIII | $3s^2$ $3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.74 | DHSC |
| 1545.9(2) | 1545.(9) | 3.01 +3 | Se XX | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.83 | DHST |
| | Q 1558.(10) | 1.49 +1 | Se XXI | $3s^2$ $3p^2$ | $^1D_2$ - $^1S_0$ | 0.88 | |
| 1714.1(3) | 1714.1(4) | 2.58 +3 | Se XXIII | 3s 3p | $^3P_1$ - $^3P_2$ | 1.00 | DHSC |
| 1727.7(3) | 1726.(12) | 3.76 +3 | Se XIX | $3s^2$ $3p^4$ | $^3P_2$ - $^3P_1$ | 0.79 | DHSC |
| 2042.0(3) | 2043.(15) | 1.85 +3 | Se XXI | $3s^2$ $3p^2$ | $^3P_0$ - $^3P_1$ | 0.88 | DHSC |
| | 2246.(15) | 5.48 +2 | Se XX | $3s^2$ $3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.83 | |
| T 2935.8(3) | 2958.(20) | 7.31 +1 | Se XIX | $3s^2$ $3p^4$ | $^3P_1$ - $^1D_2$ | 0.79 | DHSC |
| 4276.0(3) | 4305.(40) | 9.47 +1 | Se XX | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.83 | DHSC |
| 4396.5(3)[a] | 4383.(50) | 1.07 +2 | Se XXI | $3s^2$ $3p^2$ | $^3P_1$ - $^3P_2$ | 0.88 | DHSC |
| | 5397.(60) | 1.10 +2 | Se XXIII | 3s 3p | $^3P_0$ - $^3P_1$ | 1.00 | |
| T 5645.0(3)[a] | 5620.(80) | 7.22 +1 | Se XIX | $3s^2$ $3p^4$ | $^3P_0$ - $^3P_1$ | 0.79 | DHSC |

[a]Alternate wavelength for these transitions were given by reference BGBR. They are 4424.1(2) and 5593.9(6) Å for Se XXI and Se XIX, respectively.

Table 32. Bromine: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 112.07(11) | 9.08 +4 | Br XXIX | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 3.03 | |
| | 124.10(12) | 9.02 +5 | Br XXXII | 2s 2p | $^3P_0$ - $^1P_1$ | 3.64 | |
| | 137.37(15) | 4.51 +5 | Br XXXII | 2s 2p | $^3P_1$ - $^1P_1$ | 3.64 | |
| | 149.90(22) | 3.24 +6 | Br XXX | $2s^2\ 2p^2$ | $^3P_1$ - $^1S_0$ | 3.24 | |
| | 177.03(27) | 1.09 +6 | Br XXIX | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 3.03 | |
| | 180.71(28) | 2.07 +6 | Br XXIX | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 3.03 | |
| | 184.9(3) | 4.02 +6 | Br XXVIII | $2s^2\ 2p^4$ | $^3P_1$ - $^1S_0$ | 2.87 | |
| | 207.1(4) | 7.42 +5 | Br XXX | $2s^2\ 2p^2$ | $^3P_1$ - $^1D_2$ | 3.24 | |
| | 212.4(4) | 6.87 +5 | Br XXVIII | $2s^2\ 2p^4$ | $^3P_2$ - $^1D_2$ | 2.87 | |
| | 219.3(4) | 4.50 +5 | Br XXIX | $2s^2\ 2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 3.03 | |
| Q | 226.4(5) | 2.54 +3 | Br XXVIII | $2s^2\ 2p^4$ | $^1D_2$ - $^1S_0$ | 2.87 | |
| | 229.2(4) | 1.46 +5 | Br XXIX | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 3.03 | |
| | 229.55(13) | 7.37 +5 | Br XXXI | $2s^2\ 2p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 3.41 | |
| | 247.2(6) | 6.59 +5 | Br XXX | $2s^2\ 2p^2$ | $^3P_2$ - $^1D_2$ | 3.24 | |
| | 253.98(16) | 1.09 +6 | Br XXVII | $2s^2\ 2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 2.70 | |
| | 268.2(4) | 6.32 +5 | Br XXXII | 2s 2p | $^3P_1$ - $^3P_2$ | 3.64 | |
| | 269.1(7) | 9.10 +5 | Br XXVIII | $2s^2\ 2p^4$ | $^3P_2$ - $^3P_1$ | 2.87 | |
| | 281.5(6) | 9.66 +4 | Br XXXII | 2s 2p | $^3P_2$ - $^1P_1$ | 3.64 | |
| | 289.6(8) | 5.85 +5 | Br XXX | $2s^2\ 2p^2$ | $^3P_0$ - $^3P_1$ | 3.24 | |
| | 295.0(7) | 8.10 +5 | Br XXIX | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 3.03 | |
| | 305.4(8) | 1.88 +5 | Br XXIX | $2s^2\ 2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 3.03 | |
| | 442.2(1.4) | 8.93 +3 | Br XXIV | 3s 3p | $^3P_0$ - $^1P_1$ | 1.10 | |
| | 442.6(1.7) | 1.29 +4 | Br XXIX | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 3.03 | |
| | 458.3(2.1) | 9.72 +4 | Br XXVIII | $2s^2\ 2p^4$ | $^3P_0$ - $^3P_1$ | 2.87 | |
| | 486.6(1.2) | 4.81 +3 | Br XXIV | 3s 3p | $^3P_1$ - $^1P_1$ | 1.10 | |
| | 514.4(1.5) | 4.44 +3 | Br XXI | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.91 | |
| Q | 542.7(2.9) | 2.94 +1 | Br XXX | $2s^2\ 2p^2$ | $^1D_2$ - $^1S_0$ | 3.24 | |
| | 584.1(1.9) | 3.51 +4 | Br XXII | $3s^2\ 3p^2$ | $^3P_1$ - $^1S_0$ | 0.96 | |
| | 709.5(2.8) | 9.37 +3 | Br XXI | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.91 | |
| | 725.9(2.7) | 2.52 +3 | Br XXIV | 3s 3p | $^3P_2$ - $^1P_1$ | 1.10 | |
| | 745.(3) | 4.14 +4 | Br XX | $3s^2\ 3p^4$ | $^3P_1$ - $^1S_0$ | 0.86 | |
| | 808.(4) | 1.68 +4 | Br XXI | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.91 | |
| | 956.(5) | 5.58 +3 | Br XXII | $3s^2\ 3p^2$ | $^3P_1$ - $^1D_2$ | 0.96 | |
| | 975.(5) | 5.64 +3 | Br XX | $3s^2\ 3p^4$ | $^3P_2$ - $^1D_2$ | 0.86 | |
| Q | 1006.(5) | 7.80 +1 | Br XX | $3s^2\ 3p^4$ | $^1D_2$ - $^1S_0$ | 0.86 | |
| | 1010.(10) | 2.73 +3 | Br XXVIII | $2s^2\ 2p^4$ | $^3P_1$ - $^1D_2$ | 2.87 | |
| | 1024.(6) | 3.84 +3 | Br XXI | $3s^2\ 3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.91 | |
| | 1028.(9) | 5.41 +3 | Br XXIX | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 3.03 | |
| | 1034.(6) | 6.60 +2 | Br XXI | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.91 | |
| | 1178.1(1.0) | 5.48 +3 | Br XXIII | $3s^2\ 3p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.01 | |
| | 1248.(8) | 4.76 +3 | Br XXII | $3s^2\ 3p^2$ | $^3P_2$ - $^1D_2$ | 0.96 | |

Table 32. Bromine: wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 1279.(16) | 3.27 +3 | Br XXX | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 3.24 | |
| | 1286.(9) | 7.65 +3 | Br XXXII | 2s 2p | $^3P_0 - {}^3P_1$ | 3.64 | |
| | 1319.1(1.0) | 7.82 +3 | Br XIX | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.81 | |
| | 1416.(10) | 4.66 +3 | Br XXI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.91 | |
| | 1422.(10) | 8.50 +2 | Br XXI | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.91 | |
| | 1476.(3) | 4.01 +3 | Br XXIV | 3s 3p | $^3P_1 - {}^3P_2$ | 1.10 | |
| | 1476.(10) | 5.93 +3 | Br XX | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.86 | |
| Q | 1502.(12) | 1.49 +1 | Br XXII | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.96 | |
| | 1723.(15) | 3.04 +3 | Br XXII | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.96 | |
| | 1871.(15) | 9.27 +2 | Br XXI | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.91 | |
| | 2871.(30) | 8.68 +1 | Br XX | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.86 | |
| | 3825.(40) | 1.30 +2 | Br XXI | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.91 | |
| | 4087.(40) | 1.26 +2 | Br XXII | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.96 | |
| | 4130.(50) | 1.74 +2 | Br XX | $3s^2\ 3p^4$ | $^3P_0 - {}^3P_1$ | 0.86 | |
| | 4844.(60) | 1.51 +2 | Br XXIV | 3s 3p | $^3P_0 - {}^3P_1$ | 1.10 | |

Table 33. Krypton: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | 99.99(10) | | 9.37 +4 | Kr XXX | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 3.23 | |
| | 114.65(11) | | 1.13 +6 | Kr XXXIII | 2s 2p | $^3P_0$ - $^1P_1$ | 3.87 | |
| | 126.80(13) | | 6.24 +5 | Kr XXXIII | 2s 2p | $^3P_1$ - $^1P_1$ | 3.87 | |
| | 137.00(19) | | 4.42 +6 | Kr XXXI | $2s^2\ 2p^2$ | $^3P_1$ - $^1S_0$ | 3.46 | |
| | 160.82(26) | | 1.52 +6 | Kr XXX | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 3.23 | |
| | 162.61(26) | | 2.93 +6 | Kr XXX | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 3.23 | |
| | 167.60(28) | | 5.59 +6 | Kr XXIX | $2s^2\ 2p^4$ | $^3P_1$ - $^1S_0$ | 3.07 | |
| | 185.4(3) | | 1.07 +6 | Kr XXXI | $2s^2\ 2p^2$ | $^3P_1$ - $^1D_2$ | 3.46 | |
| | 190.4(4) | | 9.82 +5 | Kr XXIX | $2s^2\ 2p^4$ | $^3P_2$ - $^1D_2$ | 3.07 | |
| | 195.1(4) | | 6.40 +5 | Kr XXX | $2s^2\ 2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 3.23 | |
| | | Q 201.8(4) | 3.87 +3 | Kr XXIX | $2s^2\ 2p^4$ | $^1D_2$ - $^1S_0$ | 3.07 | |
| | 203.01(12) | | 1.06 +6 | Kr XXXII | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 3.63 | |
| | 205.1(4) | | 2.19 +5 | Kr XXX | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 3.23 | |
| | 218.4(5) | | 9.54 +5 | Kr XXXI | $2s^2\ 2p^2$ | $^3P_2$ - $^1D_2$ | 3.46 | |
| | 223.95(15) | | 1.59 +6 | Kr XXVIII | $2s^2\ 2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 2.90 | |
| | 235.1(4) | | 9.29 +5 | Kr XXXIII | 2s 2p | $^3P_1$ - $^3P_2$ | 3.87 | |
| | 235.9(6) | | 1.34 +6 | Kr XXIX | $2s^2\ 2p^4$ | $^3P_2$ - $^3P_1$ | 3.07 | |
| | 252.0(6) | | 8.78 +5 | Kr XXXI | $2s^2\ 2p^2$ | $^3P_0$ - $^3P_1$ | 3.46 | |
| | 259.7(7) | | 1.21 +6 | Kr XXX | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 3.23 | |
| | 264.4(7) | | 2.86 +5 | Kr XXX | $2s^2\ 2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 3.23 | |
| | 275.3(6) | | 1.14 +5 | Kr XXXIII | 2s 2p | $^3P_2$ - $^1P_1$ | 3.87 | |
| | 381.8(1.4) | | 1.63 +5 | Kr XXIX | $2s^2\ 2p^4$ | $^3P_0$ - $^3P_1$ | 3.07 | |
| | 411.8(1.2) | | 1.27 +4 | Kr XXV | 3s 3p | $^3P_0$ - $^1P_1$ | 1.22 | |
| | 422.5(1.8) | | 1.25 +4 | Kr XXX | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 3.23 | |
| | 454.5(1.1) | | 6.75 +3 | Kr XXV | 3s 3p | $^3P_1$ - $^1P_1$ | 1.22 | |
| | 462.(5) | | 5.04 +3 | Kr XXII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.99 | |
| | | Q 524.8(2.7) | 3.02 +1 | Kr XXXI | $2s^2\ 2p^2$ | $^1D_2$ - $^1S_0$ | 3.46 | |
| | 538.(5) | | 4.88 +4 | Kr XXIII | $3s^2\ 3p^2$ | $^3P_1$ - $^1S_0$ | 1.05 | |
| | 654.(5) | | 1.37 +4 | Kr XXII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.99 | |
| | 683.3(2.9) | | 5.87 +4 | Kr XXI | $3s^2\ 3p^4$ | $^3P_1$ - $^1S_0$ | 0.94 | |
| | 705.7(2.5) | | 3.16 +3 | Kr XXV | 3s 3p | $^3P_2$ - $^1P_1$ | 1.22 | |
| | 721.(3) | | 2.52 +4 | Kr XXII | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.99 | |
| 853.8(1.0) | 854.(5) | | 8.43 +3 | Kr XXIII | $3s^2\ 3p^2$ | $^3P_1$ - $^1D_2$ | 1.05 | RPSKR |
| 868.4(2) | 872.(5) | | 8.35 +3 | Kr XXI | $3s^2\ 3p^4$ | $^3P_2$ - $^1D_2$ | 0.94 | RPSKR |
| | | Q 905.(5) | 1.11 +2 | Kr XXI | $3s^2\ 3p^4$ | $^1D_2$ - $^1S_0$ | 0.94 | |
| 912.0(3) | 912.(5) | | 5.59 +3 | Kr XXII | $3s^2\ 3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.99 | RPSKR |
| | 936.(5) | | 1.11 +3 | Kr XXII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.99 | |
| | 977.(9) | | 6.14 +3 | Kr XXX | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 3.23 | |
| | 989.(10) | | 3.04 +4 | Kr XXIX | $2s^2\ 2p^4$ | $^3P_1$ - $^1D_2$ | 3.07 | |
| | 1027.0(1.0) | | 8.27 +3 | Kr XXIV | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.10 | |
| | 1099.(7) | | 7.17 +3 | Kr XXIII | $3s^2\ 3p^2$ | $^3P_2$ - $^1D_2$ | 1.05 | |

Table XV. Krypton wavelengths and transition probabilities - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| 1142.5(2) | 1144.7(1.0) | 1.20 +4 | Kr XX | $3s^2\ 3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.89 | RPSKR |
| | 1197.(9) | 9.39 +3 | Kr XXXIII | 2s 2p | $^3P_0$ - $^3P_1$ | 3.87 | |
| | 1228.(15) | 3.57 +3 | Kr XXXI | $2s^2\ 2p^2$ | $^3P_1$ - $^3P_2$ | 3.46 | |
| 1268.7(2) | 1269.(9) | 9.19 +3 | Kr XXI | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 0.94 | RPSKR |
| 1277.1(1.0) | 1277.0(2.3) | 6.16 +3 | Kr XXV | 3s 3p | $^3P_1$ - $^3P_2$ | 1.22 | RPSKR |
| | 1286.(9) | 7.16 +3 | Kr XXII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.99 | |
| | 1333.(9) | 9.30 +2 | Kr XXII | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.99 | |
| | Q 1450.(12) | 1.48 +1 | Kr XXIII | $3s^2\ 3p^2$ | $^1D_2$ - $^1S_0$ | 1.05 | |
| 1461.8(2) | 1462.(10) | 4.91 +3 | Kr XXIII | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 1.05 | RPSKR |
| | 1572.(10) | 1.53 +3 | Kr XXII | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.99 | |
| | 2788.(25) | 1.02 +2 | Kr XXI | $3s^2\ 3p^4$ | $^3P_1$ - $^1D_2$ | 0.94 | |
| | 3134.(30) | 3.81 +2 | Kr XXI | $3s^2\ 3p^4$ | $^3P_0$ - $^3P_1$ | 0.94 | |
| | 3446.(30) | 1.72 +2 | Kr XXII | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.99 | |
| 3840.9(3) | 3832.(40) | 1.46 +2 | Kr XXIII | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 1.05 | RPSKR |
| | 4376.(50) | 2.04 +2 | Kr XXV | 3s 3p | $^3P_0$ - $^3P_1$ | 1.22 | |

Table 34. Rubidium: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 198.18(16) | 2.29 +6 | Rb XXIX | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 3.10 | |
| | 383.4(1.0) | 1.80 +4 | Rb XXVI | 3s 3p | $^3P_0 - {}^1P_1$ | 1.30 | |
| | 416.2(1.2) | 5.51 +3 | Rb XXIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.07 | |
| | 424.3(9) | 9.39 +3 | Rb XXVI | 3s 3p | $^3P_1 - {}^1P_1$ | 1.30 | |
| | 494.6(1.7) | 6.76 +4 | Rb XXIV | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 1.13 | |
| | 603.6(2.5) | 1.93 +4 | Rb XXIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.07 | |
| | 625.4(2.6) | 8.27 +4 | Rb XXII | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 1.02 | |
| | 648.2(2.8) | 3.67 +4 | Rb XXIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 1.07 | |
| | 687.0(2.4) | 3.91 +3 | Rb XXVI | 3s 3p | $^3P_2 - {}^1P_1$ | 1.30 | |
| | 764.(4) | 1.25 +4 | Rb XXIV | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 1.13 | |
| | 781.(4) | 1.22 +4 | Rb XXII | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 1.02 | |
| Q | 813.(5) | 1.60 +2 | Rb XXII | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 1.02 | |
| | 817.(5) | 7.95 +3 | Rb XXIII | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 1.07 | |
| | 849.(5) | 1.80 +3 | Rb XXIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 1.07 | |
| | 899.2(9) | 1.23 +4 | Rb XXV | $3s^2$ 3p | $^2P_{1/2} - {}^2P_{3/2}$ | 1.19 | |
| | 969.(6) | 1.07 +4 | Rb XXIV | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 1.13 | |
| | 998.1(9) | 1.80 +4 | Rb XXI | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.97 | |
| | 1098.(7) | 1.40 +4 | Rb XXII | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 1.02 | |
| | 1109.4(1.7) | 9.32 +3 | Rb XXVI | 3s 3p | $^3P_1 - {}^3P_2$ | 1.30 | |
| | 1161.(7) | 1.08 +4 | Rb XXIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 1.07 | |
| | 1250.(8) | 7.75 +3 | Rb XXIV | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 1.13 | |
| | 1257.(8) | 9.83 +2 | Rb XXIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 1.07 | |
| | 1341.(8) | 2.42 +3 | Rb XXIII | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.07 | |
| Q | 1403.(10) | 1.48 +1 | Rb XXIV | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 1.13 | |
| | 2442.(20) | 7.71 +2 | Rb XXII | $3s^2\ 3p^4$ | $^3P_0 - {}^3P_1$ | 1.02 | |
| | 2710.(25) | 1.18 +2 | Rb XXII | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 1.02 | |
| | 3152.(30) | 2.17 +2 | Rb XXIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 1.07 | |
| | 3611.(40) | 1.67 +2 | Rb XXIV | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 1.13 | |
| | 3975.(40) | 2.70 +2 | Rb XXVI | 3s 3p | $^3P_0 - {}^3P_1$ | 1.30 | |

Table 35. Strontium: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 175.99(15) | 3.27 +6 | Sr XXX | $2s^2\ 2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 3.31 | |
| | 356.9(9) | 2.52 +4 | Sr XXVII | 3s 3p | $^3P_0$ - $^1P_1$ | 1.40 | |
| | 371.9(1.0) | 6.00 +3 | Sr XXIV | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 1.16 | |
| | 395.8(8) | 1.30 +4 | Sr XXVII | 3s 3p | $^3P_1$ - $^1P_1$ | 1.40 | |
| | 455.0(1.5) | 9.30 +4 | Sr XXV | $3s^2\ 3p^2$ | $^3P_1$ - $^1S_0$ | 1.22 | |
| | 552.8(2.3) | 2.81 +4 | Sr XXIV | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 1.16 | |
| | 571.8(2.4) | 1.16 +5 | Sr XXIII | $3s^2\ 3p^4$ | $^3P_1$ - $^1S_0$ | 1.10 | |
| | 580.9(2.4) | 5.39 +4 | Sr XXIV | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 1.16 | |
| | 669.7(2.3) | 4.77 +3 | Sr XXVII | 3s 3p | $^3P_2$ - $^1P_1$ | 1.40 | |
| | 684.(3) | 1.84 +4 | Sr XXV | $3s^2\ 3p^2$ | $^3P_1$ - $^1D_2$ | 1.22 | |
| | 700.(3) | 1.78 +4 | Sr XXIII | $3s^2\ 3p^4$ | $^3P_2$ - $^1D_2$ | 1.10 | |
| | 726.(4) | 1.15 +4 | Sr XXIV | $3s^2\ 3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 1.16 | |
| Q | 730.(4) | 2.32 +2 | Sr XXIII | $3s^2\ 3p^4$ | $^1D_2$ - $^1S_0$ | 1.10 | |
| | 762.(4) | 2.91 +3 | Sr XXIV | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 1.16 | |
| | 790.6(8) | 1.81 +4 | Sr XXVI | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.28 | |
| | 855.(5) | 1.57 +4 | Sr XXV | $3s^2\ 3p^2$ | $^3P_2$ - $^1D_2$ | 1.22 | |
| | 874.1(8) | 2.69 +4 | Sr XXII | $3s^2\ 3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 1.05 | |
| | 954.(6) | 2.11 +4 | Sr XXIII | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 1.10 | |
| | 967.5(1.3) | 1.39 +4 | Sr XXVII | 3s 3p | $^3P_1$ - $^3P_2$ | 1.40 | |
| | 1034.(7) | 1.66 +4 | Sr XXIV | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 1.16 | |
| | 1074.(7) | 1.21 +4 | Sr XXV | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 1.22 | |
| | 1137.(8) | 3.90 +3 | Sr XXIV | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.16 | |
| | 1188.(8) | 1.02 +3 | Sr XXIV | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 1.16 | |
| Q | 1359.(10) | 1.47 +1 | Sr XXV | $3s^2\ 3p^2$ | $^1D_2$ - $^1S_0$ | 1.22 | |
| | 1945.(15) | 1.47 +3 | Sr XXIII | $3s^2\ 3p^4$ | $^3P_0$ - $^3P_1$ | 1.10 | |
| | 2636.(25) | 1.36 +2 | Sr XXIII | $3s^2\ 3p^4$ | $^3P_1$ - $^1D_2$ | 1.10 | |
| | 2898.(30) | 2.69 +2 | Sr XXIV | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 1.16 | |
| | 3418.(40) | 1.89 +2 | Sr XXV | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 1.22 | |
| | 3630.(30) | 3.52 +2 | Sr XXVII | 3s 3p | $^3P_0$ - $^3P_1$ | 1.40 | |

Table 36. Yttrium: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 156.78(12) | 4.63 +6 | Y XXXI | $2s^2\ 2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 3.52 | |
| | 331.9(8) | 3.52 +4 | Y XXVIII | 3s 3p | $^3P_0$ - $^1P_1$ | 1.50 | |
| | 333.6(9) | 6.31 +3 | Y XXV | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 1.24 | |
| | 368.6(7) | 1.79 +4 | Y XXVIII | 3s 3p | $^3P_1$ - $^1P_1$ | 1.50 | |
| | 418.6(1.4) | 1.26 +5 | Y XXVI | $3s^2\ 3p^2$ | $^3P_1$ - $^1S_0$ | 1.32 | |
| | 506.7(2.1) | 3.96 +4 | Y XXV | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 1.24 | |
| | 522.4(2.2) | 1.60 +5 | Y XXIV | $3s^2\ 3p^4$ | $^3P_1$ - $^1S_0$ | 1.18 | |
| | 523.7(2.2) | 1.62 +4 | Y XXV | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 1.24 | |
| | 614.(3) | 8.92 +3 | Y XXVI | $3s^2\ 3p^2$ | $^3P_1$ - $^1D_2$ | 1.32 | |
| | 629.(3) | 2.55 +4 | Y XXIV | $3s^2\ 3p^4$ | $^3P_2$ - $^1D_2$ | 1.18 | |
| | 650.(3) | 4.03 +4 | Y XXV | $3s^2\ 3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 1.24 | |
| | 653.6(2.2) | 3.68 +4 | Y XXVIII | 3s 3p | $^3P_2$ - $^1P_1$ | 1.50 | |
| | Q 656.(4) | 3.40 +2 | Y XXIV | $3s^2\ 3p^4$ | $^1D_2$ - $^1S_0$ | 1.18 | |
| | 686.(5) | 9.24 +3 | Y XXV | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 1.24 | |
| 698.3(2) | 697.9(7) | 2.60 +4 | Y XXVII | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.37 | RPSKR |
| | 756.(5) | 2.26 +4 | Y XXVI | $3s^2\ 3p^2$ | $^3P_2$ - $^1D_2$ | 1.32 | |
| 769.1(4) | 768.8(7) | 9.67 +3 | Y XXIII | $3s^2\ 3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 1.12 | RPSKR |
| 833.1(2) | 833.(5) | 2.07 +4 | Y XXIV | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 1.18 | RPSKR |
| | 845.6(1.0) | 1.64 +4 | Y XXVIII | 3s 3p | $^3P_1$ - $^3P_2$ | 1.50 | |
| 914.7(1.0) | 919.(6) | 1.15 +4 | Y XXV | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 1.24 | RPSKR |
| 927.7(3) | 929.(6) | 1.80 +4 | Y XXVI | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 1.32 | RPSKR |
| | 977.(7) | 5.87 +3 | Y XXV | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.24 | |
| | 1129.(8) | 2.70 +4 | Y XXV | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 1.24 | |
| | Q 1317.(10) | 6.95 +2 | Y XXVI | $3s^2\ 3p^2$ | $^1D_2$ - $^1S_0$ | 1.32 | |
| 1572.9(1.0) | 1576.(12) | 1.92 +3 | Y XXIV | $3s^2\ 3p^4$ | $^3P_0$ - $^3P_1$ | 1.18 | RPSKR |
| | 2565.(30) | 3.52 +1 | Y XXIV | $3s^2\ 3p^4$ | $^3P_1$ - $^1D_2$ | 1.18 | |
| 2717.8(3) | 2700.(30) | 7.87 +0 | Y XXV | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 1.24 | RPSKR |
| 3254.8(1.0) | 3250.(40) | 2.44 +2 | Y XXVI | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 1.32 | RPSKR |
| | 3330.(30) | 4.52 +2 | Y XXVIII | 3s 3p | $^3P_0$ - $^3P_1$ | 1.50 | |

Table 37. Zirconium: wavelengths and transition probabilities

| | Wavelength Observed | Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | | 140.09(10) | 6.48 +6 | Zr XXXII | $2s^2\ 2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 3.74 | |
| | | 299.4(8) | 6.58 +3 | Zr XXVI | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 1.32 | |
| | | 308.6(7) | 4.88 +4 | Zr XXIX | 3s 3p | $^3P_0$ - $^1P_1$ | 1.60 | |
| | | 343.1(6) | 2.45 +4 | Zr XXIX | 3s 3p | $^3P_1$ - $^1P_1$ | 1.60 | |
| | | 385.2(1.3) | 1.72 +5 | Zr XXVII | $3s^2\ 3p^2$ | $^3P_1$ - $^1S_0$ | 1.41 | |
| | 463.2(2) | 463.9(1.9) | 5.54 +4 | Zr XXVI | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 1.32 | DHST |
| | 474.1(2) | 473.2(2.0) | 1.09 +5 | Zr XXVI | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 1.32 | DHST |
| T | 477.1(5) | 477.0(2.0) | 2.21 +5 | Zr XXV | $3s^2\ 3p^4$ | $^3P_1$ - $^1S_0$ | 1.26 | H |
| | 551.5(3) | 551.1(2.6) | 3.83 +4 | Zr XXVII | $3s^2\ 3p^2$ | $^3P_1$ - $^1D_2$ | 1.41 | DH |
| | 564.9(3) | 565.4(2.7) | 3.63 +4 | Zr XXV | $3s^2\ 3p^4$ | $^3P_2$ - $^1D_2$ | 1.26 | DHSC |
| | 582.3(2) | 582.(3) | 2.29 +4 | Zr XXVI | $3s^2\ 3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 1.32 | DHST |
| | | Q 590.(3) | 5.00 +2 | Zr XXV | $3s^2\ 3p^4$ | $^1D_2$ - $^1S_0$ | 1.26 | |
| | 616.0(2) | 616.(3) | 6.97 +3 | Zr XXVI | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 1.32 | DHST |
| | 618.5(3) | 618.5(7) | 3.78 +4 | Zr XXVIII | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.47 | DHSC |
| | | 638.5(2.0) | 6.88 +3 | Zr XXIX | 3s 3p | $^3P_2$ - $^1P_1$ | 1.60 | |
| | 670.8(3) | 670.(4) | 3.31 +4 | Zr XXVII | $3s^2\ 3p^2$ | $^3P_2$ - $^1D_2$ | 1.41 | DH |
| | 679.1(3) | 679.5(7) | 5.73 +4 | Zr XXIV | $3s^2\ 3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 1.20 | DHSC |
| | 731.8(2) | 731.(5) | 4.58 +4 | Zr XXV | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 1.26 | DHSC |
| | 741.5(3) | 741.5(4) | 3.04 +4 | Zr XXIX | 3s 3p | $^3P_1$ - $^3P_2$ | 1.60 | DHSC |
| | 807.1(3) | 807.(5) | 2.77 +4 | Zr XXVII | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 1.41 | DHSC |
| | 812.1(2) | 815.(5) | 3.73 +4 | Zr XXVI | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 1.32 | DHST |
| | 846.2(2) | 844.(5) | 9.25 +3 | Zr XXVI | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.32 | DHST |
| | | 1077.(8) | 1.02 +3 | Zr XXVI | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 1.32 | |
| | | Q 1279.(10) | 1.47 +1 | Zr XXVII | $3s^2\ 3p^2$ | $^1D_2$ - $^1S_0$ | 1.41 | |
| | | 1296.(10) | 4.59 +3 | Zr XXV | $3s^2\ 3p^4$ | $^3P_0$ - $^3P_1$ | 1.26 | |
| T | 2476. | 2497.(30) | 1.76 +2 | Zr XXV | $3s^2\ 3p^4$ | $^3P_1$ - $^1D_2$ | 1.26 | DHSC |
| | 2549.8(2) | 2529.(30) | 3.80 +2 | Zr XXVI | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 1.32 | DHST |
| | | 3067.(30) | 5.73 +2 | Zr XXIX | 3s 3p | $^3P_0$ - $^3P_1$ | 1.60 | |
| | 3101.1(3) | 3094.(40) | 2.37 +2 | Zr XXVII | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 1.41 | H |

Table 38. Niobium: wavelengths and transition probabilities

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|
| | 125.54(8) | 9.00 +6 | Nb XXXIII | $2s^2\ 2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 3.96 | |
| | 268.9(7) | 6.66 +3 | Nb XXVII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 1.41 | |
| | 286.8(6) | 6.70 +4 | Nb XXX | 3s 3p | $^3P_0$ - $^1P_1$ | 1.70 | |
| | 319.0(5) | 3.33 +4 | Nb XXX | 3s 3p | $^3P_1$ - $^1P_1$ | 1.70 | |
| | 354.(5) | 2.32 +5 | Nb XXVIII | $3s^2\ 3p^2$ | $^3P_1$ - $^1S_0$ | 1.50 | |
| | 424.4(1.6) | 7.69 +4 | Nb XXVII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 1.41 | |
| | 428.7(1.7) | 1.51 +5 | Nb XXVII | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 1.41 | |
| | 435.5(1.8) | 3.03 +3 | Nb XXVI | $3s^2\ 3p^4$ | $^3P_1$ - $^1S_0$ | 1.34 | |
| | 495.8(2.3) | 5.43 +4 | Nb XXVIII | $3s^2\ 3p^2$ | $^3P_1$ - $^1D_2$ | 1.50 | |
| | 509.0(2.4) | 5.13 +4 | Nb XXVI | $3s^2\ 3p^4$ | $^3P_2$ - $^1D_2$ | 1.34 | |
| | 522.5(2.5) | 3.21 +4 | Nb XXVII | $3s^2\ 3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 1.41 | |
| Q | 530.(3) | 7.37 +2 | Nb XXVI | $3s^2\ 3p^4$ | $^1D_2$ - $^1S_0$ | 1.34 | |
| | 550.5(6) | 5.38 +4 | Nb XXIX | $3s^2\ 3p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.56 | |
| | 554.2(2.7) | 1.05 +4 | Nb XXVII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 1.41 | |
| | 596.(3) | 4.70 +4 | Nb XXVIII | $3s^2\ 3p^2$ | $^3P_2$ - $^1D_2$ | 1.50 | |
| | 601.6(6) | 8.23 +4 | Nb XXV | $3s^2\ 3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 1.28 | |
| | 623.6(2.0) | 8.15 +3 | Nb XXX | 3s 3p | $^3P_2$ - $^1P_1$ | 1.70 | |
| | 644.(4) | 6.64 +4 | Nb XXVI | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 1.34 | |
| | 653.1(6) | 4.42 +4 | Nb XXX | 3s 3p | $^3P_1$ - $^3P_2$ | 1.70 | |
| | 705.(5) | 4.11 +4 | Nb XXVIII | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 1.50 | |
| | 722.(5) | 5.50 +4 | Nb XXVII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 1.41 | |
| | 734.(5) | 1.39 +4 | Nb XXVII | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.41 | |
| | 1030.(8) | 1.01 +3 | Nb XXVII | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 1.41 | |
| | 1080.(8) | 7.66 +3 | Nb XXVI | $3s^2\ 3p^4$ | $^3P_0$ - $^3P_1$ | 1.34 | |
| Q | 1243.(10) | 1.47 +1 | Nb XXVIII | $3s^2\ 3p^2$ | $^1D_2$ - $^1S_0$ | 1.50 | |
| | 2386.(30) | 4.39 +2 | Nb XXVII | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 1.41 | |
| | 2433.(30) | 1.99 +2 | Nb XXVI | $3s^2\ 3p^4$ | $^3P_1$ - $^1D_2$ | 1.34 | |
| | 2839.(25) | 7.16 +2 | Nb XXX | 3s 3p | $^3P_0$ - $^3P_1$ | 1.70 | |
| | 2958.(40) | 2.63 +2 | Nb XXVIII | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 1.50 | |

wavelengths and transition probabilities

| | Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | | 112.80(6) | 1.24 +7 | Mo XXXIV | $2s^2\ 2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 4.19 | |
| | | 241.8(6) | 6.65 +3 | Mo XXVIII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 1.49 | |
| | | 266.6(4) | 9.14 +4 | Mo XXXI | 3s 3p | $^3P_0$ - $^1P_1$ | 1.80 | |
| | | 296.6(4) | 4.50 +4 | Mo XXXI | 3s 3p | $^3P_1$ - $^1P_1$ | 1.80 | |
| T | 325.3(3) | 326.2(1.0) | 3.10 +5 | Mo XXIX | $3s^2\ 3p^2$ | $^3P_1$ - $^1S_0$ | 1.59 | DHSC |
| | 387.7(3) | 388.2(1.5) | 1.05 +5 | Mo XXVIII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 1.49 | DHST |
| | 389.9(2) | 389.1(1.5) | 2.10 +5 | Mo XXVIII | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 1.49 | DHST |
| | 397.2(3) | 397.6(1.6) | 4.13 +5 | Mo XXVII | $3s^2\ 3p^4$ | $^3P_1$ - $^1S_0$ | 1.43 | H |
| | 446.9(2) | 446.8(2.0) | 7.59 +4 | Mo XXIX | $3s^2\ 3p^2$ | $^3P_1$ - $^1D_2$ | 1.59 | H |
| | 458.6(2) | 459.0(2.1) | 7.18 +4 | Mo XXVII | $3s^2\ 3p^4$ | $^3P_2$ - $^1D_2$ | 1.43 | DHSC |
| | 470.0(2) | 469.8(2.2) | 4.42 +4 | Mo XXVIII | $3s^2\ 3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 1.49 | DHST |
| | | Q 478.(2) | 1.08 +3 | Mo XXVII | $3s^2\ 3p^4$ | $^1D_2$ - $^1S_0$ | 1.43 | |
| | 490.1(3) | 490.1(5) | 7.60 +4 | Mo XXX | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.66 | DHSC |
| | 498.2(2) | 498.5(2.5) | 1.55 +4 | Mo XXVIII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 1.49 | DHST |
| | 530.3(3) | 530.3(2.8) | 6.68 +4 | Mo XXIX | $3s^2\ 3p^2$ | $^3P_2$ - $^1D_2$ | 1.59 | H |
| | 534.9(3) | 534.9(5) | 1.17 +5 | Mo XXVI | $3s^2\ 3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 1.37 | DHSC |
| | 569.8(1) | 569.(3) | 9.50 +4 | Mo XXVII | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 1.43 | DHSC |
| | 577.5(3) | 577.5(4) | 6.33 +4 | Mo XXXI | 3s 3p | $^3P_1$ - $^3P_2$ | 1.80 | DHSC |
| T | 609.8(3) | 609.6(1.5) | 9.56 +3 | Mo XXXI | 3s 3p | $^3P_2$ - $^1P_1$ | 1.80 | DHSC |
| | 618.5(3) | 618.(4) | 6.03 +4 | Mo XXIX | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 1.59 | DHSC |
| | 637.1(2) | 639.(4) | 8.04 +4 | Mo XXVIII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 1.49 | DHST |
| | 643.0(5) | 642.(4) | 2.04 +4 | Mo XXVIII | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.49 | DHST |
| | | 910.(8) | 1.24 +4 | Mo XXVII | $3s^2\ 3p^4$ | $^3P_0$ - $^3P_1$ | 1.43 | |
| | | 989.(8) | 9.74 +2 | Mo XXVIII | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 1.49 | |
| | | Q 1209.(14) | 1.47 +1 | Mo XXIX | $3s^2\ 3p^2$ | $^1D_2$ - $^1S_0$ | 1.59 | |
| | 2285.4(1) | 2264.(30) | 5.01 +2 | Mo XXVIII | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 1.49 | DHSC |
| | 2350.8(3) | 2371.(30) | 2.23 +2 | Mo XXVII | $3s^2\ 3p^4$ | $^3P_1$ - $^1D_2$ | 1.43 | H |
| | | 2640.(25) | 8.82 +2 | Mo XXXI | 3s 3p | $^3P_0$ - $^3P_1$ | 1.80 | |
| | 2841.1(2) | 2834.(40) | 2.91 +2 | Mo XXIX | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 1.49 | DHSC |

Table 40. Wavelengths and transition probabilities ordered by wavelength

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 99.99(10) | 9.37 +4 | Kr XXX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 3.23 | |
| | 112.07(11) | 9.08 +4 | Br XXIX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 3.03 | |
| | 112.80(6) | 1.24 +7 | Mo XXXIV | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 4.19 | |
| | 114.65(11) | 1.26 +6 | Kr XXXIII | 2s 2p | $^3P_0 - {}^1P_1$ | 3.87 | |
| | 124.10(12) | 9.02 +5 | Br XXXII | 2s 2p | $^3P_0 - {}^1P_1$ | 3.64 | |
| | 125.54(8) | 9.00 +6 | Nb XXXIII | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 3.96 | |
| | 125.75(11) | 1.02 +5 | Se XXVIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 2.83 | |
| | 126.80(13) | 6.24 +5 | Kr XXXIII | 2s 2p | $^3P_1 - {}^1P_1$ | 3.87 | |
| | 134.29(14) | 6.41 +5 | Se XXXI | 2s 2p | $^3P_0 - {}^1P_1$ | 3.42 | |
| | 137.00(19) | 4.42 +6 | Kr XXXI | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 3.46 | |
| | 137.37(15) | 4.51 +5 | Br XXXII | 2s 2p | $^3P_1 - {}^1P_1$ | 3.64 | |
| | 140.09(10) | 6.48 +6 | Zr XXXII | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 3.74 | |
| | 141.19(11) | 9.89 +4 | As XXVII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 2.64 | |
| | 145.25(14) | 4.52 +5 | As XXX | 2s 2p | $^3P_0 - {}^1P_1$ | 3.20 | |
| | 148.67(17) | 3.24 +5 | Se XXXI | 2s 2p | $^3P_1 - {}^1P_1$ | 3.42 | |
| | 149.90(22) | 3.24 +6 | Br XXX | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 3.24 | |
| | 156.78(12) | 4.63 +6 | Y XXXI | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 3.52 | |
| | 157.03(14) | 3.16 +5 | Ge XXIX | 2s 2p | $^3P_0 - {}^1P_1$ | 3.00 | |
| | 158.58(12) | 8.86 +4 | Ge XXVI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 2.46 | |
| | 160.74(17) | 2.31 +5 | As XXX | 2s 2p | $^3P_1 - {}^1P_1$ | 3.20 | |
| | 160.82(26) | 1.52 +6 | Kr XXX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 3.23 | |
| | 162.61(26) | 2.93 +6 | Kr XXX | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 3.23 | |
| | 164.08(27) | 2.37 +6 | Se XXIX | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 3.03 | |
| | 167.60(28) | 5.59 +6 | Kr XXIX | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 3.07 | |
| | 169.66(13) | 2.19 +5 | Ga XXVIII | 2s 2p | $^3P_0 - {}^1P_1$ | 2.79 | |
| | 173.59(17) | 1.64 +5 | Ge XXIX | 2s 2p | $^3P_1 - {}^1P_1$ | 3.00 | |
| | 175.99(15) | 3.27 +6 | Sr XXX | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 3.31 | |
| | 177.03(27) | 1.09 +6 | Br XXIX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 3.03 | |
| | 178.06(13) | 7.58 +4 | Ga XXV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 2.28 | |
| | 179.63(27) | 1.71 +6 | As XXVIII | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 2.83 | |
| | 180.71(28) | 2.07 +6 | Br XXIX | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 3.03 | |
| | 183.18(11) | 1.50 +5 | Zn XXVII | 2s 2p | $^3P_0 - {}^1P_1$ | 2.60 | |
| | 184.9(3) | 4.02 +6 | Br XXVIII | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 2.87 | |
| | 185.4(3) | 1.07 +6 | Kr XXXI | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 3.46 | |
| | 187.22(16) | 1.15 +5 | Ga XXVIII | 2s 2p | $^3P_1 - {}^1P_1$ | 2.79 | |
| | 190.4(4) | 9.82 +5 | Kr XXIX | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 3.07 | |
| | 194.75(27) | 7.71 +5 | Se XXVIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 2.83 | |
| | 195.1(4) | 6.40 +5 | Kr XXX | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 3.23 | |
| | 196.65(27) | 1.23 +6 | Ge XXVII | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 2.64 | |
| | 197.66(09) | 1.02 +5 | Cu XXVI | 2s 2p | $^3P_0 - {}^1P_1$ | 2.41 | |
| | 198.18(16) | 2.29 +6 | Rb XXIX | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 3.10 | |
| | 199.73(14) | 6.31 +4 | Zn XXIV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 2.10 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 201.31(29) | 1.44 +6 | Se XXVIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 2.83 | |
| | 201.65(14) | 8.03 +4 | Zn XXVII | 2s 2p | $^3P_1 - {}^1P_1$ | 2.60 | |
| Q | 201.8(4) | 3.87 +3 | Kr XXIX | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 3.07 | |
| | 203.01(12) | 1.06 +6 | Kr XXXII | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 3.63 | |
| | 204.0(4) | 2.88 +6 | Se XXVII | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 2.68 | |
| | 205.1(4) | 2.19 +5 | Kr XXX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 3.23 | |
| | 207.1(4) | 7.42 +5 | Br XXX | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 3.24 | |
| | 212.4(4) | 6.87 +5 | Br XXVIII | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 2.87 | |
| | 212.81(16) | 6.91 +4 | Ni XXV | 2s 2p | $^3P_0 - {}^1P_1$ | 2.30 | |
| | 213.99(26) | 5.42 +5 | As XXVII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 2.64 | |
| | 215.25(26) | 8.79 +5 | Ga XXVI | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 2.45 | |
| | 216.89(11) | 5.55 +4 | Cu XXVI | 2s 2p | $^3P_1 - {}^1P_1$ | 2.41 | |
| | 218.4(5) | 9.54 +5 | Kr XXXI | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 3.46 | |
| | 219.3(4) | 4.50 +5 | Br XXIX | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 3.03 | |
| | 223.66(14) | 5.48 +4 | Cu XXIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.94 | |
| | 223.95(15) | 1.59 +6 | Kr XXVIII | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 2.90 | |
| | 224.83(29) | 9.95 +5 | As XXVII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 2.64 | |
| | 225.0(4) | 2.04 +6 | As XXVI | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 2.49 | |
| Q | 226.4(5) | 2.54 +3 | Br XXVIII | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 2.87 | |
| | 229.2(4) | 1.46 +5 | Br XXIX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 3.03 | |
| | 229.40(15) | 4.59 +4 | Co XXIV | 2s 2p | $^3P_0 - {}^1P_1$ | 2.12 | |
| | 229.55(13) | 7.37 +5 | Br XXXI | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 3.41 | |
| | 231.8(5) | 5.10 +5 | Se XXIX | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 3.03 | |
| | 232.89(11) | 3.79 +4 | Ni XXV | 2s 2p | $^3P_1 - {}^1P_1$ | 2.30 | |
| | 234.74(27) | 3.76 +5 | Ge XXVI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 2.46 | |
| | 235.1(4) | 9.29 +5 | Kr XXXIII | 2s 2p | $^3P_1 - {}^3P_2$ | 3.87 | |
| | 235.54(24) | 6.23 +5 | Zn XXV | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 2.27 | |
| | 235.9(6) | 1.34 +6 | Kr XXIX | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 3.07 | |
| | 237.4(6) | 4.76 +5 | Se XXVII | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 2.68 | |
| | 241.8(6) | 6.65 +3 | Mo XXVIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.49 | |
| | 247.0(4) | 7.72 +5 | Se XXVIII | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 2.83 | |
| | 247.12(14) | 3.01 +4 | Fe XXIII | 2s 2p | $^3P_0 - {}^1P_1$ | 1.96 | |
| | 247.2(6) | 6.59 +5 | Br XXX | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 3.24 | |
| | 247.9(4) | 1.44 +6 | Ge XXV | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 2.31 | |
| | 249.80(18) | 2.57 +4 | Co XXIV | 2s 2p | $^3P_1 - {}^1P_1$ | 2.12 | |
| | 249.94(19) | 4.60 +4 | Ni XXII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.89 | |
| | 251.8(3) | 6.76 +5 | Ge XXVI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 2.46 | |
| | 252.0(6) | 8.78 +5 | Kr XXXI | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 3.46 | |
| | 253.98(16) | 1.09 +6 | Br XXVII | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 2.70 | |
| O | 254.2(6) | 1.65 +3 | Se XXVII | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 2.68 | |
| | 256.2(5) | 9.50 +4 | Se XXVIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 2.83 | |
| | 256.91(28) | 2.59 +5 | Ga XXV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 2.28 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | 257.61(19) | | 4.38 +5 | Cu XXIV | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 2.09 | |
| | 259.7(7) | | 1.21 +6 | Kr XXX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 3.23 | |
| | 259.8(6) | | 3.47 +5 | As XXVIII | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 2.83 | |
| | 260.50(14) | | 5.04 +5 | Se XXX | $2s^2\ 2p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 3.20 | |
| | 264.4(7) | | 2.86 +5 | Kr XXX | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 3.23 | |
| | 265.5(6) | | 3.27 +5 | As XXVI | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 2.49 | |
| | 266.37(28) | | 1.94 +4 | Mn XXII | $2s\ 2p$ | $^3P_0 - {}^1P_1$ | 1.79 | |
| | 266.6(4) | | 9.14 +4 | Mo XXXI | $3s\ 3p$ | $^3P_0 - {}^1P_1$ | 1.80 | |
| | 267.59(12) | | 1.72 +4 | Fe XXIII | $2s\ 2p$ | $^3P_1 - {}^1P_1$ | 1.96 | |
| | 268.2(4) | | 6.32 +5 | Br XXXII | $2s\ 2p$ | $^3P_1 - {}^3P_2$ | 3.64 | |
| | 268.9(7) | | 6.66 +3 | Nb XXVII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.41 | |
| | 269.1(7) | | 9.10 +5 | Br XXVIII | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 2.87 | |
| | 272.9(4) | | 1.01 +6 | Ga XXIV | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 2.14 | |
| | 275.3(6) | | 1.14 +5 | Kr XXXIII | $2s\ 2p$ | $^3P_2 - {}^1P_1$ | 3.87 | |
| | 278.55(17) | | 3.72 +4 | Co XXI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.74 | |
| | 278.8(4) | | 5.24 +5 | As XXVII | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 2.64 | |
| | 280.37(28) | | 1.76 +5 | Zn XXIV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 2.10 | |
| | 280.4(8) | | 4.51 +5 | Se XXIX | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 3.03 | |
| | 281.5(6) | | 9.66 +4 | Br XXXII | $2s\ 2p$ | $^3P_2 - {}^1P_1$ | 3.64 | |
| | 282.4(3) | | 3.02 +5 | Ni XXIII | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 2.01 | |
| | 283.1(3) | | 4.52 +5 | Ga XXV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 2.28 | |
| | Q 286.0(7) | | 1.07 +3 | As XXVI | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 2.49 | |
| | 286.1(5) | | 6.10 +4 | As XXVII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 2.64 | |
| | 286.51(17) | | 1.24 +4 | Cr XXI | $2s\ 2p$ | $^3P_0 - {}^1P_1$ | 1.63 | |
| | 286.70(25) | | 1.14 +4 | Mn XXII | $2s\ 2p$ | $^3P_1 - {}^1P_1$ | 1.79 | |
| | 286.8(6) | | 6.70 +4 | Nb XXX | $3s\ 3p$ | $^3P_0 - {}^1P_1$ | 1.70 | |
| | 288.0(6) | | 8.13 +4 | Se XXXI | $2s\ 2p$ | $^3P_2 - {}^1P_1$ | 3.42 | |
| 289.1(3) | 289.16(17) | | 7.39 +5 | Se XXVI | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 2.52 | H |
| | 289.6(8) | | 5.85 +5 | Br XXX | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 3.24 | |
| | 291.5(6) | | 2.33 +5 | Ge XXVII | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 2.64 | |
| | 294.8(6) | | 6.77 +4 | As XXX | $2s\ 2p$ | $^3P_2 - {}^1P_1$ | 3.20 | |
| | 295.0(7) | | 8.10 +5 | Br XXIX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 3.03 | |
| | 296.6(4) | | 4.50 +4 | Mo XXXI | $3s\ 3p$ | $^3P_1 - {}^1P_1$ | 1.80 | |
| | 296.78(18) | | 3.41 +5 | As XXIX | $2s^2\ 2p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 2.99 | |
| 297.5(3) | 297.4(6) | | 2.22 +5 | Ge XXV | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 2.31 | H |
| | 299.4(8) | | 6.58 +3 | Zr XXVI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.32 | |
| | 299.8(4) | | 7.03 +5 | Zn XXIII | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 1.97 | |
| | 301.9(5) | | 5.56 +4 | Ge XXIX | $2s\ 2p$ | $^3P_2 - {}^1P_1$ | 3.00 | |
| | 304.96(26) | | 1.18 +5 | Cu XXIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.94 | |
| | 305.4(8) | | 1.88 +5 | Br XXIX | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 3.03 | |
| | 306.80(5) | | 7.42 +3 | Cr XXI | $2s\ 2p$ | $^3P_1 - {}^1P_1$ | 1.63 | |
| | 307.3(5) | | 4.52 +4 | Se XXXI | $2s\ 2p$ | $^3P_1 - {}^3P_2$ | 3.42 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| | Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | | 307.89(27) | 2.09 +5 | Co XXII | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 1.85 | |
| | | 308.26(21) | 7.77 +3 | V XX | 2s 2p | $^3P_0 - {}^1P_1$ | 1.49 | |
| | | 308.3(9) | 3.37 +5 | Se XXVII | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 2.68 | |
| | | 308.6(7) | 4.88 +4 | Zr XXIX | 3s 3p | $^3P_0 - {}^1P_1$ | 1.60 | |
| | | 309.4(4) | 4.52 +4 | Ga XXVIII | 2s 2p | $^3P_2 - {}^1P_1$ | 2.79 | |
| | 309.26(3) | 309.6(3) | 2.91 +4 | Fe XX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.58 | SBST |
| | | 315.2(5) | 3.49 +5 | Ge XXVI | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 2.46 | |
| | | 317.4(3) | 3.62 +4 | Zn XXVII | 2s 2p | $^3P_2 - {}^1P_1$ | 2.60 | |
| | | 319.0(5) | 3.33 +4 | Nb XXX | 3s 3p | $^3P_1 - {}^1P_1$ | 1.70 | |
| | | 319.0(9) | 3.05 +5 | As XXVIII | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 2.83 | |
| | 319.1(3) | 319.1(5) | 3.83 +4 | Ge XXVI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 2.46 | H |
| | | 319.4(4) | 2.96 +5 | Zn XXIV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 2.10 | |
| | Q | 321.8(7) | 7.02 +2 | Ge XXV | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 2.31 | |
| T | 325.3(3) | 326.2(1.0) | 3.10 +5 | Mo XXIX | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 1.59 | DHSC |
| | | 326.00(24) | 2.85 +4 | Cu XXVI | 2s 2p | $^3P_2 - {}^1P_1$ | 2.41 | |
| | | 327.5(6) | 1.55 +5 | Ga XXVI | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 2.45 | |
| | | 327.98(24) | 4.75 +3 | V XX | 2s 2p | $^3P_1 - {}^1P_1$ | 1.49 | |
| | | 328.6(3) | 4.85 +5 | Cu XXII | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 1.67 | |
| | | 330.58(22) | 4.95 +5 | As XXV | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 2.34 | |
| | | 330.6(4) | 7.80 +4 | Ni XXII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.89 | |
| | | 331.68(3) | 4.79 +3 | Ti XIX | 2s 2p | $^3P_0 - {}^1P_1$ | 1.35 | |
| | | 331.9(8) | 3.52 +4 | Y XXVIII | 3s 3p | $^3P_0 - {}^1P_1$ | 1.50 | |
| | | 333.4(6) | 1.49 +5 | Ga XXIV | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 2.14 | |
| | | 333.6(9) | 6.31 +3 | Y XXV | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.24 | |
| | | 334.7(1.1) | 3.83 +5 | Se XXIX | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 3.03 | |
| | | 334.9(4) | 2.21 +4 | Ni XXV | 2s 2p | $^3P_2 - {}^1P_1$ | 2.30 | |
| | | 335.0(8) | 5.40 +5 | Se XXVIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 2.83 | |
| | | 335.5(3) | 1.43 +5 | Fe XXI | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 1.69 | |
| | 339.5(3) | 339.51(17) | 2.28 +5 | Ge XXVIII | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 2.79 | H |
| | | 342.78(26) | 2.19 +4 | Mn XIX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.44 | |
| | | 343.1(6) | 2.45 +4 | Zr XXIX | 3s 3p | $^3P_1 - {}^1P_1$ | 1.60 | |
| | | 345.0(3) | 1.68 +4 | Co XXIV | 2s 2p | $^3P_2 - {}^1P_1$ | 2.12 | |
| | | 350.78(4) | 2.99 +3 | Ti XIX | 2s 2p | $^3P_1 - {}^1P_1$ | 1.35 | |
| | | 353.5(5) | 2.82 +5 | As XXX | 2s 2p | $^3P_1 - {}^3P_2$ | 3.20 | |
| | | 354.(5) | 2.32 +5 | Nb XXVIII | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 1.50 | |
| | | 354.9(1.1) | 4.07 +5 | As XXVI | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 2.49 | |
| | | 354.9(9) | 1.21 +5 | Se XXVIII | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 2.83 | |
| | | 355.0(5) | 2.34 +4 | Ga XXV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 2.28 | |
| | | 355.80(22) | 1.26 +4 | Fe XXIII | 2s 2p | $^3P_2 - {}^1P_1$ | 1.96 | |
| | | 356.8(3) | 5.10 +4 | Co XXI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.74 | |
| | | 356.84(7) | 2.90 +3 | Sc XVIII | 2s 2p | $^3P_0 - {}^1P_1$ | 1.21 | |
| | | 356.9(9) | 2.52 +4 | Sr XXVII | 3s 3p | $^3P_0 - {}^1P_1$ | 1.40 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 357.2(5) | 2.28 +5 | Ga XXV | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 2.28 | |
| | 359.1(5) | 3.31 +5 | Ni XXI | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 1.76 | |
| | 362.0(4) | 1.90 +5 | Cu XXIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 1.94 | |
| | Q 362.4(7) | 4.65 +2 | Ga XXIV | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 2.14 | |
| | 363.4(9) | 2.04 +5 | Ge XXVII | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 2.64 | |
| | 365.6(5) | 9.65 +4 | Mn XX | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 1.54 | |
| | 368.2(6) | 1.01 +5 | Zn XXV | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 2.27 | |
| | 368.4(5) | 9.16 +3 | Mn XXII | 2s 2p | $^3P_2 - {}^1P_1$ | 1.79 | |
| | 368.6(7) | 1.79 +4 | Y XXVIII | 3s 3p | $^3P_1 - {}^1P_1$ | 1.50 | |
| | 371.9(1.0) | 6.00 +3 | Sr XXIV | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.16 | |
| | 374.1(6) | 9.91 +4 | Zn XXIII | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 1.97 | |
| | 375.12(7) | 1.85 +3 | Sc XVIII | 2s 2p | $^3P_1 - {}^1P_1$ | 1.21 | |
| 378.0(3) | 378.1(3) | 1.61 +4 | Cr XVIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.30 | DH |
| 379.5(1) | 379.59(22) | 3.27 +5 | Ge XXIV | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 2.16 | H |
| | 379.6(8) | 3.56 +5 | As XXVII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 2.64 | |
| | 381.6(3) | 6.56 +3 | Cr XXI | 2s 2p | $^3P_2 - {}^1P_1$ | 1.63 | |
| | 381.8(1.4) | 1.63 +5 | Kr XXIX | $2s^2\ 2p^4$ | $^3P_0 - {}^3P_1$ | 3.07 | |
| | 383.4(1.0) | 1.80 +4 | Rb XXVI | 3s 3p | $^3P_0 - {}^1P_1$ | 1.30 | |
| | 384.13(8) | 1.72 +3 | Ca XVII | 2s 2p | $^3P_0 - {}^1P_1$ | 1.16 | |
| | 384.8(4) | 3.27 +4 | Fe XX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.58 | |
| | 385.2(1.3) | 1.72 +5 | Zr XXVII | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 1.41 | |
| 387.7(3) | 388.2(1.5) | 1.05 +5 | Mo XXVIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.49 | DHST |
| | 388.9(1.3) | 2.47 +5 | As XXVIII | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 2.83 | |
| 389.9(2) | 389.1(1.5) | 2.10 +5 | Mo XXVIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 1.49 | DHST |
| | 390.12(23) | 1.50 +5 | Ga XXVII | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 2.59 | |
| | 390.9(4) | 2.17 +5 | Co XX | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 1.60 | |
| | 393.7(6) | 1.38 +4 | Zn XXIV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 2.10 | |
| | 395.8(8) | 1.30 +4 | Sr XXVII | 3s 3p | $^3P_1 - {}^1P_1$ | 1.40 | |
| | 396.0(4) | 4.57 +3 | V XX | 2s 2p | $^3P_2 - {}^1P_1$ | 1.49 | |
| 397.2(3) | 397.6(1.6) | 4.13 +5 | Mo XXVII | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 1.43 | H |
| 398.4(3) | 398.42(16) | 6.38 +4 | Cr XIX | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 1.40 | HSCS |
| | 401.35(9) | 1.12 +3 | Ca XVII | 2s 2p | $^3P_1 - {}^1P_1$ | 1.16 | |
| | 405.4(6) | 6.79 +4 | Zn XXIV | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 2.10 | |
| | Q 407.8(7) | 3.12 +2 | Zn XXIII | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 1.97 | |
| 408.7(3) | 408.5(6) | 1.84 +5 | Ge XXIX | 2s 2p | $^3P_1 - {}^3P_2$ | 3.00 | H |
| 410.7(3) | 410.6(1.2) | 2.66 +5 | Ge XXV | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 2.31 | HSCS |
| | 411.8(1.2) | 1.27 +4 | Kr XXV | 3s 3p | $^3P_0 - {}^1P_1$ | 1.22 | |
| | 412.3(5) | 1.20 +5 | Ni XXII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 1.89 | |
| | 412.47(5) | 3.11 +3 | Ti XIX | 2s 2p | $^3P_2 - {}^1P_1$ | 1.35 | |
| | 413.0(4) | 2.08 +4 | Mn XIX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.44 | |
| 414.1(3) | 414.0(5) | 6.53 +4 | Cu XXIV | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 2.09 | HSCS |
| | 414.5(4) | 9.84 +2 | K XVI | 2s 2p | $^3P_0 - {}^1P_1$ | 0.97 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| | Wavelength Observed | | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|---|---|
| | | | 414.6(1.0) | 1.35 +5 | Ga XXVI | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 2.45 | |
| | | | 415.0(1.0) | 7.69 +4 | As XXVII | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 2.64 | |
| | | | 415.80(5) | 1.13 +4 | V XVII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.17 | |
| | | | 416.2(1.2) | 5.51 +3 | Rb XXIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.07 | |
| | | | 418.6(1.4) | 1.26 +5 | Y XXVI | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 1.32 | |
| | 420.0(3) | | 419.8(5) | 6.52 +4 | Cu XXII | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 1.67 | HSCS |
| | | | 422.5(1.8) | 1.25 +4 | Kr XXX | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 3.23 | |
| | | | 424.4(1.6) | 7.69 +4 | Nb XXVII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.41 | |
| | 424.26(5) | | 424.27(7) | 1.50 +5 | Fe XIX | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 1.47 | W |
| | | | 424.3(9) | 9.39 +3 | Rb XXVI | 3s 3p | $^3P_1 - {}^1P_1$ | 1.30 | |
| | 427.9(3) | | 428.2(9) | 2.33 +5 | Ge XXVI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 2.46 | HSCS |
| | | | 428.7(1.7) | 1.51 +5 | Nb XXVII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 1.41 | |
| | | | 430.5(4) | 6.54 +2 | K XVI | 2s 2p | $^3P_1 - {}^1P_1$ | 0.97 | |
| | | | 430.66(9) | 2.06 +3 | Sc XVIII | 2s 2p | $^3P_2 - {}^1P_1$ | 1.21 | |
| T | 434.2(2) | | 432.82(19) | 4.19 +4 | V XVIII | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 1.26 | FBM |
| | 434.8(3) | | 434.7(5) | 7.98 +3 | Cu XXIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 1.94 | HSCS |
| | | | 435.5(1.8) | 3.03 +3 | Nb XXVI | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 1.34 | |
| | | | 437.95(29) | 2.13 +5 | Ga XXIII | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 1.99 | |
| | | | 442.2(1.4) | 8.93 +3 | Br XXIV | 3s 3p | $^3P_0 - {}^1P_1$ | 1.10 | |
| | 442.1(3) | | 442.3(4) | 1.31 +4 | Cr XVIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.30 | DH |
| | | | 442.6(1.7) | 1.29 +4 | Br XXIX | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 3.03 | |
| | 446.9(2) | | 446.8(2.0) | 7.59 +4 | Mo XXIX | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 1.59 | H |
| | | | 447.33(14) | 5.55 +2 | Ar XV | 2s 2p | $^3P_0 - {}^1P_1$ | 0.855 | |
| | | | 450.4(3) | 9.78 +4 | Zn XXVI | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 2.40 | |
| | | | 451.12(11) | 1.33 +3 | Ca XVII | 2s 2p | $^3P_2 - {}^1P_1$ | 1.16 | |
| | | | 454.5(1.1) | 6.75 +3 | Kr XXV | 3s 3p | $^3P_1 - {}^1P_1$ | 1.22 | |
| | 454.8(3) | | 454.7(1.5) | 1.57 +5 | Ge XXVII | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 2.64 | HSCS |
| | | | 455.0(1.5) | 9.30 +4 | Sr XXV | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 1.22 | |
| | 456.1(3) | | 456.10(5) | 7.72 +3 | Ti XVI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 1.04 | H |
| | | | 457.8(8) | 9.94 +4 | Mn XVIII | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 1.32 | |
| | | | 458.3(2.1) | 9.72 +4 | Br XXVIII | $2s^2\ 2p^4$ | $^3P_0 - {}^3P_1$ | 2.87 | |
| | | Q | 458.3(6) | 2.10 +2 | Cu XXII | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 1.67 | |
| | 458.6(2) | | 459.0(2.1) | 7.18 +4 | Mo XXVII | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 1.43 | DHSC |
| | | | 460.7(6) | 4.53 +4 | Cu XXIII | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 1.94 | |
| | | | 462.(5) | 5.04 +3 | Kr XXII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.99 | |
| | | | 462.19(15) | 3.75 +2 | Ar XV | 2s 2p | $^3P_1 - {}^1P_1$ | 0.855 | |
| | 463.2(2) | | 463.9(1.9) | 5.54 +4 | Zr XXVI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.32 | DHST |
| | | | 465.2(1.5) | 1.32 +4 | Se XXVIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 2.83 | |
| | 465.4(3) | | 465.40(17) | 4.15 +4 | Ni XXIII | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 2.01 | HSCS |
| | 470.0(2) | | 469.8(2.2) | 4.42 +4 | Mo XXVIII | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 1.49 | DHST |
| | 470.4(3) | | 470.54(11) | 2.68 +4 | Ti XVII | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 1.13 | H |
| | 471.15(5) | | 471.14(6) | 4.24 +4 | Ni XXI | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 1.76 | W |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| | Wavelength Observed | | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|---|---|
| | | | 471.8(6) | 7.39 +4 | Co XXI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 1.74 | |
| | | | 472.99(6) | 8.10 +3 | V XVII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.17 | |
| | 474.1(2) | | 473.2(2.0) | 1.09 +5 | Zr XXVI | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 1.32 | DHST |
| | | | 473.2(1.0) | 8.88 +4 | Zn XXV | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 2.27 | |
| | | | 474.1(6) | 1.19 +5 | Ga XXVIII | 2s 2p | $^3P_1 - {}^3P_2$ | 2.79 | |
| | | | 474.6(5) | 8.19 +2 | K XVI | 2s 2p | $^3P_2 - {}^1P_1$ | 0.97 | |
| | | | 474.8(1.3) | 6.20 +3 | Se XXIII | 3s 3p | $^3P_0 - {}^1P_1$ | 1.00 | |
| T | 477.1(5) | | 477.0(2.0) | 2.21 +5 | Zr XXV | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 1.26 | H |
| | | | 477.6(1.3) | 1.72 +5 | Ga XXIV | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 2.14 | |
| | 477.6(3) | | 477.6(3) | 4.48 +3 | Ni XXII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 1.89 | HSCS |
| | | Q | 478.(2) | 1.08 +3 | Mo XXVII | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 1.43 | |
| | | | 479.9(1.0) | 1.52 +5 | Ga XXV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 2.28 | |
| | | | 483.99(17) | 3.02 +2 | Cl XIV | 2s 2p | $^3P_0 - {}^1P_1$ | 0.750 | |
| | | | 486.6(1.2) | 4.81 +3 | Br XXIV | 3s 3p | $^3P_1 - {}^1P_1$ | 1.10 | |
| | | | 488.80(18) | 4.78 +4 | Ge XXVI | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 2.46 | |
| | 490.1(3) | | 490.1(5) | 7.60 +4 | Mo XXX | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.66 | DHSC |
| | | | 490.6(1.4) | 1.32 +4 | As XXVII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 2.64 | |
| | 493.8(3) | | 493.79(24) | 6.42 +4 | Cr XVII | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 1.19 | HSCS |
| | | | 494.6(1.7) | 6.76 +4 | Rb XXIV | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 1.13 | |
| | | | 495.8(2.3) | 5.43 +4 | Nb XXVIII | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 1.50 | |
| | | | 497.59(17) | 2.08 +2 | Cl XIV | 2s 2p | $^3P_1 - {}^1P_1$ | 0.750 | |
| | 498.2(2) | | 498.5(2.5) | 1.55 +4 | Mo XXVIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 1.49 | DHST |
| | | | 498.88(6) | 5.09 +3 | Sc XV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.93 | |
| | | | 501.15(18) | 4.93 +2 | Ar XV | 2s 2p | $^3P_2 - {}^1P_1$ | 0.855 | |
| | 505.9(3) | | 505.82(6) | 4.94 +3 | Ti XVI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.04 | H |
| | | | 506.7(2.1) | 3.96 +4 | Y XXV | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.24 | |
| | | | 507.9(4) | 1.37 +5 | Zn XXII | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 1.83 | |
| | | | 509.0(2.4) | 5.13 +4 | Nb XXVI | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 1.34 | |
| | | | 510.0(1.5) | 4.26 +3 | As XXII | 3s 3p | $^3P_0 - {}^1P_1$ | 0.90 | |
| | 511.2(5) | | 510.83(13) | 1.68 +4 | Sc XVI | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 1.01 | H |
| | | | 514.4(1.5) | 4.44 +3 | Br XXI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.91 | |
| | | Q | 514.0(8) | 1.44 +2 | Ni XXI | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 1.76 | |
| | | | 519.6(1.3) | 1.30 +4 | Ge XXVI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 2.46 | |
| | | | 520.6(1.1) | 3.40 +3 | Se XXIII | 3s 3p | $^3P_1 - {}^1P_1$ | 1.00 | |
| | | | 522.5(2.5) | 3.21 +4 | Nb XXVII | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 1.41 | |
| | | | 522.4(2.2) | 1.60 +5 | Y XXIV | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 1.18 | |
| | | | 522.1(6) | 2.43 +3 | Co XXI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 1.74 | |
| | 522.8(3) | | 522.66(27) | 6.26 +4 | Cu XXV | $2s^2\ 2p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 2.22 | HSCS |
| | | | 523.3(8) | 2.58 +4 | Co XXII | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 1.85 | |
| | | | 523.7(2.2) | 1.62 +4 | Y XXV | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 1.24 | |
| | | | 524.3(9) | 2.99 +4 | Ni XXII | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 1.89 | |
| | | Q | 524.8(2.7) | 3.02 +1 | Kr XXXI | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 3.46 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | | 525.21(6) | 1.58 +2 | S XIII | 2s 2p | $^3P_0 - {}^1P_1$ | 0.652 | |
| | | 528.3(6) | 2.73 +4 | Co XX | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 1.60 | |
| 529.9(2) | | 529.75(15) | 4.09 +4 | V XVI | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 1.06 | FBM |
| | Q | 530.(3) | 7.37 +2 | Nb XXVI | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 1.34 | |
| 530.3(3) | | 530.3(2.8) | 6.68 +4 | Mo XXIX | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 1.59 | H |
| | | 531.69(20) | 2.85 +2 | Cl XIV | 2s 2p | $^3P_2 - {}^1P_1$ | 0.750 | |
| | | 533.0(1.0) | 9.91 +4 | Zn XXIV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 2.10 | |
| 534.9(3) | | 534.9(5) | 1.17 +5 | Mo XXVI | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 1.37 | DHSC |
| | | 535.1(1.6) | 9.76 +4 | Ga XXVI | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 2.45 | |
| | | 537.29(6) | 1.10 +2 | S XIII | 2s 2p | $^3P_1 - {}^1P_1$ | 0.652 | |
| | | 538.(5) | 4.88 +4 | Kr XXIII | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 1.05 | |
| 540.0(3) | | 539.8(8) | 5.78 +4 | Cu XXIV | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 2.09 | HSCS |
| | | 541.01(7) | 2.96 +3 | Sc XV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.93 | |
| 541.35(5) | | 541.42(12) | 4.49 +4 | Fe XX | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 1.58 | W |
| | Q | 542.7(2.9) | 2.94 +1 | Br XXX | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 3.24 | |
| | | 545.38(13) | 3.23 +3 | Ca XIV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.82 | |
| | | 547.9(8) | 2.89 +3 | Ge XXI | 3s 3p | $^3P_0 - {}^1P_1$ | 0.80 | |
| | | 550.5(6) | 5.38 +4 | Nb XXIX | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.56 | |
| 551.5(3) | | 551.1(2.6) | 3.83 +4 | Zr XXVII | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 1.41 | DH |
| | | 552.9(1.3) | 1.25 +4 | Ga XXV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 2.28 | |
| | | 552.9(6) | 7.57 +4 | Zn XXVII | 2s 2p | $^3P_1 - {}^3P_2$ | 2.60 | |
| | | 552.8(2.3) | 2.81 +4 | Sr XXIV | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.16 | |
| | | 554.2(2.7) | 1.05 +4 | Nb XXVII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 1.41 | |
| | | 555.21(15) | 1.03 +4 | Ca XV | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 0.89 | |
| | | 556.9(1.3) | 2.38 +3 | As XXII | 3s 3p | $^3P_1 - {}^1P_1$ | 0.90 | |
| | | 557.(3) | 5.60 +4 | Se XXVII | $2s^2\ 2p^4$ | $^3P_0 - {}^3P_1$ | 2.68 | |
| | | 558.7(1.3) | 1.09 +5 | Zn XXIII | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 1.97 | |
| | Q | 562.(3) | 2.88 +1 | Se XXIX | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 3.03 | |
| 564.9(3) | | 565.4(2.7) | 3.63 +4 | Zr XXV | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 1.26 | DHSC |
| | | 566.96(7) | 1.57 +2 | S XIII | 2s 2p | $^3P_2 - {}^1P_1$ | 0.652 | |
| | | 567.41(16) | 2.55 +4 | Ti XV | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 0.94 | |
| 567.76(5) | | 568.9(1.0) | 1.27 +3 | Fe XX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 1.58 | W |
| 569.8(1) | | 569.(3) | 9.50 +4 | Mo XXVII | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 1.43 | DHSC |
| | | 571.87(7) | 9.46 +1 | P XII | 2s 2p | $^3P_0 - {}^1P_1$ | 0.561 | |
| T 569.2(5) | | 572.0(1.6) | 3.77 +3 | Se XX | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.83 | H |
| | | 571.8(2.4) | 1.16 +5 | Sr XXIII | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 1.10 | |
| | Q | 574.9(9) | 1.01 +2 | Co XX | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 1.60 | |
| 577.5(3) | | 577.5(4) | 6.33 +4 | Mo XXXI | 3s 3p | $^3P_1 - {}^3P_2$ | 1.80 | DHSC |
| | | 580.05(14) | 1.73 +3 | Ca XIV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.82 | |
| | | 580.1(1.4) | 2.91 +4 | Ga XXV | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 2.28 | |
| | | 580.9(2.4) | 5.39 +4 | Sr XXIV | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 1.16 | |
| 582.3(2) | | 582.(3) | 2.29 +4 | Zr XXVI | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 1.32 | DHST |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| | Wavelength Observed | | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|---|---|
| | | Q | 582.2(2.9) | 2.81 +1 | As XXVIII | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 2.83 | |
| | | | 582.57(5) | 6.76 +1 | P XII | 2s 2p | $^3P_1 - {}^1P_1$ | 0.561 | |
| | | | 584.1(1.9) | 3.51 +4 | Br XXII | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.96 | |
| | 585.0(3) | | 585.3(1.0) | 6.40 +4 | Cu XXIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 1.94 | HSCS |
| | 585.8(3) | | 585.79(17) | 1.59 +4 | Fe XXI | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 1.69 | HSCS |
| | | | 588.6(2.0) | 1.93 +3 | Ga XX | 3s 3p | $^3P_0 - {}^1P_1$ | 0.70 | |
| | | Q | 590.(3) | 5.00 +2 | Zr XXV | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 1.26 | |
| | | | 591.6(1.2) | 1.17 +4 | Zn XXIV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 2.10 | |
| | 592.3(3) | | 592.2(4) | 8.62 +4 | Cu XXI | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 1.54 | HSCS |
| | 592.234(6) | | 592.235(7) | 1.73 +4 | Fe XIX | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 1.47 | PSS |
| | | | 594.6(4) | 1.98 +3 | K XIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.71 | |
| | | | 595.6(7) | 1.64 +3 | Ge XXI | 3s 3p | $^3P_1 - {}^1P_1$ | 0.80 | |
| | | | 596.(3) | 4.70 +4 | Nb XXVIII | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 1.50 | |
| | | | 597.1(1.0) | 1.95 +4 | Co XXI | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 1.74 | |
| | | | 601.6(6) | 8.23 +4 | Nb XXV | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 1.28 | |
| | | | 603.58(20) | 6.10 +3 | K XIV | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 0.79 | |
| | | | 603.6(2.5) | 1.93 +4 | Rb XXIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 1.07 | |
| | | Q | 604.2(2.6) | 2.75 +1 | Ge XXVII | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 2.64 | |
| | 606.5(5) | | 606.77(15) | 1.55 +4 | Sc XIV | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 0.83 | H |
| | | | 607.95(8) | 1.01 +2 | P XII | 2s 2p | $^3P_2 - {}^1P_1$ | 0.561 | |
| T | 609.8(3) | | 609.6(1.5) | 9.56 +3 | Mo XXXI | 3s 3p | $^3P_2 - {}^1P_1$ | 1.80 | DHSC |
| | 609.9(3) | | 609.9(3) | 3.94 +4 | Ni XXIV | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 2.13 | HSCS |
| | | | 614.(3) | 8.92 +3 | Y XXVI | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 1.32 | |
| | 614.8(3) | | 614.8(3) | 3.71 +4 | Ni XXIII | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 2.01 | HSCS |
| | | | 615.6(8) | 6.50 +2 | Mn XIX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 1.44 | |
| | 616.0(2) | | 616.(3) | 6.97 +3 | Zr XXVI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 1.32 | DHST |
| | 618.5(3) | | 618.(4) | 6.03 +4 | Mo XXIX | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 1.59 | DHSC |
| | 618.5(3) | | 618.5(7) | 3.78 +4 | Zr XXVIII | $3s^2$ 3p | $^2P_{1/2} - {}^2P_{3/2}$ | 1.47 | DHSC |
| | | | 622.1(4) | 9.91 +2 | K XIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.71 | |
| | | | 623.6(2.0) | 8.15 +3 | Nb XXX | 3s 3p | $^3P_2 - {}^1P_1$ | 1.70 | |
| | | | 625.4(2.6) | 8.27 +4 | Rb XXII | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 1.02 | |
| | | | 625.2(1.1) | 2.66 +4 | Mn XIX | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 1.44 | |
| | | | 625.48(6) | 3.75 +1 | Si XI | 2s 2p | $^3P_0 - {}^1P_1$ | 0.476 | |
| | | Q | 628.0(2.2) | 2.69 +1 | Ga XXVI | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 2.45 | |
| | | | 629.(3) | 2.55 +4 | Y XXIV | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 1.18 | |
| | | | 632.2(2.3) | 1.28 +3 | Zn XIX | 3s 3p | $^3P_0 - {}^1P_1$ | 0.70 | |
| | | | 634.0(1.7) | 5.95 +4 | Zn XXV | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 2.27 | |
| | | | 634.78(6) | 2.68 +1 | Si XI | 2s 2p | $^3P_1 - {}^1P_1$ | 0.476 | |
| | 634.8(3) | | 634.8(3) | 4.11 +4 | Ni XXII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 1.89 | HSCS |
| T | 639.6(3) | | 634.5(2.0) | 2.49 +4 | Se XXI | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.88 | DHSC |
| | | | 634.8(1.8) | 3.11 +3 | As XIX | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.76 | |
| | | | 636.7(1.2) | 1.05 +4 | Cu XXIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 1.94 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | | 636.7(1.6) | 1.12 +3 | Ga XX | 3s 3p | $^3P_1$ - $^1P_1$ | 0.70 | |
| | | 638.5(2.0) | 6.88 +3 | Zr XXIX | 3s 3p | $^3P_2$ - $^1P_1$ | 1.60 | |
| 637.1(2) | | 639.(4) | 8.04 +4 | Mo XXVIII | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 1.49 | DHST |
| | Q | 639.84(16) | 7.33 +1 | Fe XIX | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 1.47 | |
| 643.0(5) | | 642.(4) | 2.04 +4 | Mo XXVIII | $3s^2$ $3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.49 | DHST |
| | | 644.(4) | 6.64 +4 | Nb XXVI | $3s^2$ $3p^4$ | $^3P_2$ - $^3P_1$ | 1.34 | |
| 648.0(3) | | 648.0(6) | 4.74 +4 | Cu XXVI | 2s 2p | $^3P_1$ - $^3P_2$ | 2.41 | HSCS |
| | | 648.71(21) | 9.17 +3 | Ca XIII | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 0.73 | |
| | | 648.93(27) | 1.17 +3 | Ar XII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.618 | |
| | | 648.8(2.8) | 3.67 +4 | Rb XXIII | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 1.07 | |
| | | 650.(3) | 4.03 +4 | Y XXV | $3s^2$ $3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 1.24 | |
| | | 653.1(6) | 4.42 +4 | Nb XXX | 3s 3p | $^3P_1$ - $^3P_2$ | 1.70 | |
| | | 653.6(2.2) | 3.68 +4 | Y XXVIII | 3s 3p | $^3P_2$ - $^1P_1$ | 1.50 | |
| | Q | 653.8(1.8) | 2.61 +1 | Zn XXV | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 2.27 | |
| | | 654.(5) | 1.37 +4 | Kr XXII | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.99 | |
| | | 655.0(1.2) | 9.56 +3 | Mn XX | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 1.54 | |
| | Q | 656.(4) | 3.40 +2 | Y XXIV | $3s^2$ $3p^4$ | $^1D_2$ - $^1S_0$ | 1.18 | |
| | | 656.34(6) | 4.05 +1 | Si XI | 2s 2p | $^3P_2$ - $^1P_1$ | 0.476 | |
| | | 656.73(28) | 3.51 +3 | Ar XIII | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 0.686 | |
| 657.7(3) | | 657.7(1.2) | 6.78 +4 | Cu XXII | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 1.67 | |
| 663.1(3) | | 663.1(9) | 3.22 +2 | Cr XVIII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 1.30 | DH |
| | | 664.0(1.4) | 1.08 +4 | Mn XVIII | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 1.32 | |
| | | 669.7(2.3) | 4.77 +3 | Sr XXVII | 3s 3p | $^3P_2$ - $^1P_1$ | 1.40 | |
| | | 669.97(29) | 5.49 +2 | Ar XII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.618 | |
| 670.8(3) | | 670.(4) | 3.31 +4 | Zr XXVII | $3s^2$ $3p^2$ | $^3P_2$ - $^1D_2$ | 1.41 | DH |
| | | 679.1(1.8) | 8.36 +2 | Cu XVIII | 3s 3p | $^3P_0$ - $^1P_1$ | 0.60 | |
| 679.3(3) | | 679.39(20) | 1.27 +4 | Fe XX | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 1.58 | H |
| 679.1(3) | | 679.5(7) | 5.73 +4 | Zr XXIV | $3s^2$ $3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 1.20 | DHSC |
| | | 680.1(1.0) | 2.62 +4 | Co XXI | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 1.74 | |
| | | 680.2(1.9) | 7.56 +2 | Zn XIX | 3s 3p | $^3P_1$ - $^1P_1$ | 0.70 | |
| | Q | 681.9(1.3) | 2.53 +1 | Cu XXIV | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 2.09 | |
| | | 683.3(2.0) | 5.87 +4 | Kr XXI | $3s^2$ $3p^4$ | $^3P_1$ - $^1S_0$ | 0.94 | |
| | | 684.(3) | 1.84 +4 | Sr XXV | $3s^2$ $3p^2$ | $^3P_1$ - $^1D_2$ | 1.22 | |
| | | 686.(5) | 9.24 +3 | Y XXV | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 1.24 | |
| | | 687.0(2.4) | 3.91 +3 | Rb XXVI | 3s 3p | $^3P_2$ - $^1P_1$ | 1.30 | |
| | | 688.(4) | 3.10 +4 | As XXVI | $2s^2$ $2p^4$ | $^3P_0$ - $^3P_1$ | 2.49 | |
| | | 688.03(17) | 1.67 +1 | Al X | 2s 2p | $^3P_0$ - $^1P_1$ | 0.399 | |
| | | 689.0(2.1) | 1.75 +4 | As XX | $3s^2$ $3p^2$ | $^3P_1$ - $^1S_0$ | 0.81 | |
| | | 689.8(1.5) | 9.11 +3 | Ni XXII | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 1.89 | |
| | | 694.13(25) | 5.27 +3 | K XII | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 0.63 | |
| | | 694.4(1.7) | 1.73 +4 | Zn XXIV | $2s^2$ $2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 2.10 | |
| 694.64(3) | | 694.64(3) | 5.34 +4 | Ni XX | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 1.65 | PSS |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | | 695.93(18) | 1.21 +1 | Al X | 2s 2p | $^3P_1 - {}^1P_1$ | 0.399 | |
| | | 696.5(1.4) | 2.38 +4 | Co XXII | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 1.85 | |
| 698.3(2) | | 697.9(7) | 2.60 +4 | Y XXVII | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.37 | RPSKR |
| | | 700.(3) | 1.78 +4 | Sr XXIII | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 1.10 | |
| 703.6(2) | | 703.1(1.9) | 2.47 +3 | Ge XVIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.69 | DHST |
| | | 705.(5) | 4.11 +4 | Nb XXVIII | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 1.50 | |
| | | 705.7(2.5) | 3.16 +3 | Kr XXV | 3s 3p | $^3P_2 - {}^1P_1$ | 1.22 | |
| | Q | 707.2(2.1) | 5.53 +1 | Mn XVIII | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 1.32 | |
| | | 708.6(5) | 6.54 +2 | Cl XI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.529 | |
| | | 709.5(2.8) | 9.37 +3 | Br XXI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.91 | |
| | | 712.96(14) | 1.53 +2 | V XVII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 1.17 | |
| | | 713.98(18) | 1.87 +1 | Al X | 2s 2p | $^3P_2 - {}^1P_1$ | 0.399 | |
| | | 716.1(5) | 1.95 +3 | Cl XII | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 0.592 | |
| | | 717.9(1.5) | 2.42 +4 | Co XXIII | $2s^2\ 2p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.96 | |
| | Q | 718.1(2.1) | 2.37 +1 | Ni XXIII | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 2.01 | |
| | | 721.(3) | 2.52 +4 | Kr XXII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.99 | |
| | | 722.(5) | 5.50 +4 | Nb XXVII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 1.41 | |
| 722.1(3) | | 722.56(16) | 1.56 +4 | Cr XVIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 1.30 | DH |
| | | 723.2(1.6) | 1.64 +4 | Fe XX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 1.58 | |
| | | 724.4(5) | 2.94 +2 | Cl XI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.529 | |
| | | 725.9(2.7) | 2.52 +3 | Br XXIV | 3s 3p | $^3P_2 - {}^1P_1$ | 1.10 | |
| | | 726.(4) | 1.15 +4 | Sr XXIV | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 1.16 | |
| | | 726.4(2.1) | 5.04 +2 | Cu XVIII | 3s 3p | $^3P_1 - {}^1P_1$ | 0.60 | |
| | Q | 730.(4) | 2.32 +2 | Sr XXIII | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 1.10 | |
| | | 730.35(16) | 5.37 +2 | Ni XVII | 3s 3p | $^3P_0 - {}^1P_1$ | 0.57 | |
| 731.8(2) | | 731.(5) | 4.58 +4 | Zr XXV | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 1.26 | DHSC |
| 731.1(3) | | 731.07(8) | 5.62 +3 | Cr XIX | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 1.40 | HSCS |
| | | 734.(5) | 1.39 +4 | Nb XXVII | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.41 | |
| 740.75(3) | | 740.75(3) | 6.67 +3 | Cr XVII | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 1.19 | PSS |
| 741.5(3) | | 741.5(4) | 3.04 +4 | Zr XXIX | 3s 3p | $^3P_1 - {}^3P_2$ | 1.60 | DHSC |
| | | 745.(3) | 4.14 +4 | Br XX | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.86 | |
| | | 746.0(4) | 2.91 +3 | Ar XI | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 0.539 | |
| | | 747.7(2.2) | 1.99 +3 | Se XXIII | 3s 3p | $^3P_2 - {}^1P_1$ | 1.00 | |
| | Q | 747.9(1.6) | 2.36 +1 | Co XXII | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 1.85 | |
| 746.9(3) | | 747.7(2.1) | 1.22 +4 | Ge XIX | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.73 | H |
| | | 750.6(1.6) | 7.57 +3 | Co XXI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 1.74 | |
| | | 756.(5) | 2.26 +4 | Y XXVI | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 1.32 | |
| 756.9(3) | | 757.0(1.6) | 3.55 +4 | Cu XXIV | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 2.09 | HSCS |
| | | 758.9(1.3) | 1.02 +4 | Mn XIX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 1.44 | |
| | | 762.(4) | 2.91 +3 | Sr XXIV | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 1.16 | |
| | | 762.29(20) | 6.92 +0 | Mg IX | 2s 2p | $^3P_0 - {}^1P_1$ | 0.328 | |
| | | 764.(4) | 1.25 +4 | Rb XXIV | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 1.13 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| | Wavelength Observed | | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|---|---|
| | | | 764.6(1.8) | 2.87 +4 | Ni XXV | 2s 2p | $^3P_1$ - $^3P_2$ | 2.30 | |
| | | | 764.99(15) | 7.16 +1* | Ti XVI | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 1.04 | |
| T | 766.6(2) | | 767.(3) | 6.36 +3 | Se XX | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.83 | DHST |
| | 769.1(4) | | 768.8(7) | 9.67 +3 | Y XXIII | $3s^2$ $3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 1.12 | RPSKR |
| | | | 768.90(20) | 5.05 +0 | Mg IX | 2s 2p | $^3P_1$ - $^1P_1$ | 0.328 | |
| | | | 771.6(2.4) | 1.54 +3 | As XXII | 3s 3p | $^3P_2$ - $^1P_1$ | 0.90 | |
| | | | 773.5(1.7) | 8.13 +3 | Mn XIX | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 1.44 | |
| | | | 776.37(3) | 3.48 +2 | S X | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.447 | |
| | | | 776.9(2.0) | 1.91 +3 | Ga XVII | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.62 | |
| | | | 777.06(19) | 3.30 +2 | Ni XVII | 3s 3p | $^3P_1$ - $^1P_1$ | 0.57 | |
| | 779.5(3) | | 779.48(12) | 4.14 +4 | Ni XXI | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 1.76 | HSCS |
| | | | 781.(4) | 1.22 +4 | Rb XXII | $3s^2$ $3p^4$ | $^3P_2$ - $^1D_2$ | 1.02 | |
| | | Q | 781.9(6) | 4.19 +1 | Cr XVII | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 1.19 | |
| | | | 782.96(17) | 1.04 +3 | S XI | $2s^2$ $2p^2$ | $^3P_1$ - $^1S_0$ | 0.505 | |
| | | | 783.72(21) | 7.95 +0 | Mg IX | 2s 2p | $^3P_2$ - $^1P_1$ | 0.328 | |
| | | Q | 785.3(1.9) | 2.27 +1 | Fe XXI | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 1.69 | |
| | 786.1(3) | | 786.1(3) | 1.51 +4 | Fe XXI | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 1.69 | HSCS |
| | | | 786.2(1.3) | 3.42 +2 | Co XVI | 3s 3p | $^3P_0$ - $^1P_1$ | 0.51 | |
| | | | 787.56(3) | 1.50 +2 | S X | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.447 | |
| | | | 790.6(8) | 1.81 +4 | Sr XXVI | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.28 | |
| | 793.3(3) | | 793.3(1.3) | 6.12 +3 | Cr XVIII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 1.30 | HSCS |
| | | | 797.7(1.3) | 1.17 +3 | Ge XXI | 3s 3p | $^3P_2$ - $^1P_1$ | 0.80 | |
| | | | 804.0(3) | 1.55 +3 | Cl X | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 0.456 | |
| | 807.1(3) | | 807.(5) | 2.77 +4 | Zr XXVII | $3s^2$ $3p^2$ | $^3P_0$ - $^3P_1$ | 1.41 | DHSC |
| | | | 808.(4) | 1.68 +4 | Br XXI | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.91 | |
| | 813.1(3) | | 811.1(2.1) | 8.40 +3 | Ga XVIII | $3s^2$ $3p^2$ | $^3P_1$ - $^1S_0$ | 0.66 | RPSKR |
| T | 810.3(3) | | 811.(3) | 2.89 +4 | Se XIX | $3s^2$ $3p^4$ | $^3P_1$ - $^1S_0$ | 0.79 | H |
| | | Q | 813.(5) | 1.60 +2 | Rb XXII | $3s^2$ $3p^4$ | $^1D_2$ - $^1S_0$ | 1.02 | |
| | | | 813.3(4) | 3.33 +3 | V XVIII | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 1.26 | |
| | 812.1(2) | | 815.(5) | 3.73 +4 | Zr XXVI | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 1.32 | DHST |
| | | | 817.(5) | 7.95 +3 | Rb XXIII | $3s^2$ $3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 1.07 | |
| | | | 819.9(1.3) | 3.25 +4 | Co XIX | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 1.49 | |
| | | | 819.94(17) | 3.20 +1* | Sc XV | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.93 | |
| | | | 822.2(3) | 6.01 +3 | Fe XX | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 1.58 | |
| | | | 825.7(2.7) | 8.75 +2 | Ga XX | 3s 3p | $^3P_2$ - $^1P_1$ | 0.70 | |
| | | | 826.2(3) | 4.05 +3 | V XVI | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 1.06 | |
| | | | 826.92(19) | 3.57 +3 | V XVII | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 1.17 | |
| | | Q | 827.7(2.5) | 2.16 +1 | Mn XX | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 1.54 | |
| | | | 828.(3) | 4.24 +3 | As XIX | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.76 | |
| | | | 831.9(1.4) | 2.14 +2 | Co XVI | 3s 3p | $^3P_1$ - $^1P_1$ | 0.51 | |
| | 833.1(2) | | 833.(5) | 2.07 +4 | Y XXIV | $3s^2$ $3p^4$ | $^3P_2$ - $^3P_1$ | 1.18 | RPSKR |
| | | | 836.33(20) | 9.04 +3 | V XVII | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 1.17 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| | Wavelength Observed | Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | | 839.0(2.0) | 1.00 +4 | Cu XXIII | $2s^2\ 2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.94 | |
| | 846.2(2) | 844.(5) | 9.25 +3 | Zr XXVI | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.32 | DHST |
| | 845.55(1) | 845.5(3) | 1.48 +4 | Fe XXII | $2s^2\ 2p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.80 | SH(82) |
| | | 845.6(1.0) | 1.64 +4 | Y XXVIII | 3s 3p | $^3P_1$ - $^3P_2$ | 1.50 | |
| | | 847.43(20) | 2.09 +2 | Fe XV | 3s 3p | $^3P_0$ - $^1P_1$ | 0.46 | |
| | | 849.(5) | 1.80 +3 | Rb XXIII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 1.07 | |
| | | 852.31(5) | 2.62 +0 | Na VIII | 2s 2p | $^3P_0$ - $^1P_1$ | 0.264 | |
| | | 853.61(15) | 1.74 +2 | P IX | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.372 | |
| | 853.8(1.0) | 854.(5) | 8.43 +3 | Kr XXIII | $3s^2\ 3p^2$ | $^3P_1$ - $^1D_2$ | 1.05 | RPSKR |
| | | 855.(5) | 1.57 +4 | Sr XXV | $3s^2\ 3p^2$ | $^3P_2$ - $^1D_2$ | 1.22 | |
| | | 856.6(2.9) | 6.43 +2 | Zn XIX | 3s 3p | $^3P_2$ - $^1P_1$ | 0.70 | |
| | | 856.6(1.9) | 1.42 +3 | Zn XVI | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.55 | |
| | Q | 857.1(5) | 3.33 +1 | V XVI | $2s^2\ 2p^4$ | $^1D_2$ - $^1S_0$ | 1.06 | |
| | | 857.66(5) | 1.92 +0 | Na VIII | 2s 2p | $^3P_1$ - $^1P_1$ | 0.264 | |
| | | 860.08(21) | 5.24 +2 | P X | $2s^2\ 2p^2$ | $^3P_1$ - $^1S_0$ | 0.424 | |
| | | 861.26(15) | 7.34 +1 | P IX | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.372 | |
| | 861.8(1) | 861.85(19) | 2.00 +3 | Ti XVI | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 1.04 | H |
| T | 859.9(3) | 864.(5) | 1.64 +4 | Ge XXV | $2s^2\ 2p^4$ | $^3P_0$ - $^3P_1$ | 2.31 | H |
| | | 869.64(5) | 3.08 +0 | Na VIII | 2s 2p | $^3P_2$ - $^1P_1$ | 0.264 | |
| | | 871.73(16) | 7.91 +2 | S IX | $2s^2\ 2p^4$ | $^3P_1$ - $^1S_0$ | 0.379 | |
| | 868.4(2) | 872.(5) | 8.35 +3 | Kr XXI | $3s^2\ 3p^4$ | $^3P_2$ - $^1D_2$ | 0.94 | RPSKR |
| | | 874.1(8) | 2.69 +4 | Sr XXII | $3s^2\ 3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 1.05 | |
| | Q | 875.6(8) | 2.03 +1 | Cr XIX | $2s^2\ 2p^2$ | $^1D_2$ - $^1S_0$ | 1.40 | |
| | | 879.96(23) | 5.14 +3 | Cr XVIII | $2s^2\ 2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 1.30 | |
| | | 879.4(2.0) | 5.69 +3 | Zn XVII | $3s^2\ 3p^2$ | $^3P_1$ - $^1S_0$ | 0.59 | |
| | | 880.2(2.2) | 9.51 +3 | Mn XX | $2s^2\ 2p^2$ | $^3P_2$ - $^1D_2$ | 1.54 | |
| | | 880.9(3) | 1.35 +1* | Ca XIV | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.82 | |
| | | 881.(3) | 2.00 +4 | As XVIII | $3s^2\ 3p^4$ | $^3P_1$ - $^1S_0$ | 0.71 | |
| T | 890.2(2) | 890.(3) | 2.80 +3 | Ge XVIII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.69 | DHST |
| | | 890.4(3.2) | 4.63 +2 | Cu XVIII | 3s 3p | $^3P_2$ - $^1P_1$ | 0.60 | |
| | | 890.84(17) | 1.34 +2 | Fe XV | 3s 3p | $^3P_1$ - $^1P_1$ | 0.46 | |
| | | 899.2(9) | 1.23 +4 | Rb XXV | $3s^2\ 3p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.19 | |
| | 899.8(5) | 899.28(20) | 1.07 +3 | Sc XV | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.93 | H |
| T | 899.7(3) | 900.9(4) | 1.84 +3 | Ti XVII | $2s^2\ 2p^2$ | $^3P_1$ - $^1D_2$ | 1.13 | H |
| | Q | 905.(5) | 1.11 +2 | Kr XXI | $3s^2\ 3p^4$ | $^1D_2$ - $^1S_0$ | 0.94 | |
| | | 905.1(2.3) | 1.74 +4 | Co XXIV | 2s 2p | $^3P_1$ - $^3P_2$ | 2.12 | |
| | | 906.3(2.3) | 4.54 +3 | Mn XIX | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 1.44 | |
| T | 908.8(2) | 908.(4) | 1.10 +4 | Se XX | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.83 | DHST |
| | | 910.(8) | 1.24 +4 | Mo XXVII | $3s^2\ 3p^4$ | $^3P_0$ - $^3P_1$ | 1.43 | |
| | 911.0(3) | 911.00(25) | 2.07 +4 | Ni XXIII | $2s^2\ 2p^2$ | $^3P_0$ - $^3P_1$ | 2.01 | HSCS |
| | 912.0(3) | 912.(5) | 5.59 +3 | Kr XXII | $3s^2\ 3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.99 | RPSKR |
| | | 914.8(8) | 1.26 +2 | Mn XIV | 3s 3p | $^3P_0$ - $^1P_1$ | 0.40 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| | Wavelength Observed | | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|---|---|
| | 914.7(1.0) | | 919.(6) | 1.15 +4 | Y XXV | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 1.24 | RPSKR |
| | 919.73(8) | | 919.71(9) | 2.42 +3 | Ti XV | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 0.94 | PSS |
| | | Q | 925.2(1.0) | 1.93 +1 | V XVIII | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 1.26 | |
| | | | 928.76(27) | 3.26 +2 | Ni XVII | 3s 3p | $^3P_2 - {}^1P_1$ | 0.57 | |
| | 927.7(3) | | 929.(6) | 1.80 +4 | Y XXVI | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 1.32 | RPSKR |
| | | | 930.9(1.9) | 2.47 +4 | Co XX | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 1.60 | |
| | | | 936.(5) | 1.11 +3 | Kr XXII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.99 | |
| | | Q | 936.3(4) | 2.72 +1 | Ti XV | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 0.94 | |
| | 944.6(2) | | 942.4(1.8) | 1.03 +3 | Cu XV | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.48 | DHST |
| | | | 944.38(4) | 8.14 +1 | Si VIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.304 | |
| | | | 944.6(4) | 5.35 +2 | Ca XIV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.82 | |
| | | | 945.1(9) | 5.58 +0* | K XIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.71 | |
| | | | 949.24(4) | 3.37 +1 | Si VIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.304 | |
| | | | 950.08(23) | 2.51 +2 | Si IX | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 0.351 | |
| | | | 952.1(3) | 3.82 +2 | P VIII | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 0.310 | |
| | 952.8(3) | | 953.3(1.8) | 3.81 +3 | Cu XVI | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.52 | DHSC |
| | | | 954.(6) | 2.11 +4 | Sr XXIII | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 1.10 | |
| T | 952.9(3) | | 954.(3) | 1.37 +4 | Ge XVII | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.64 | DHSC |
| | | | 955.9(2.8) | 1.82 +3 | Ga XVII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.62 | |
| | | | 956.(5) | 5.58 +3 | Br XXII | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.96 | |
| | | | 956.7(9) | 8.21 +1 | Mn XIV | 3s 3p | $^3P_1 - {}^1P_1$ | 0.40 | |
| | | | 964.20(19) | 8.85 -1 | Ne VII | 2s 2p | $^3P_0 - {}^1P_1$ | 0.207 | |
| | | | 967.5(1.3) | 1.39 +4 | Sr XXVII | 3s 3p | $^3P_1 - {}^3P_2$ | 1.40 | |
| | | | 968.45(19) | 6.54 -1 | Ne VII | 2s 2p | $^3P_1 - {}^1P_1$ | 0.207 | |
| | 968.9(3) | | 968.80(20) | 5.16 +3 | Ti XVI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 1.04 | H |
| | | | 969.(6) | 1.07 +4 | Rb XXIV | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 1.13 | |
| | | | 972.7(1.9) | 2.26 +2 | Co XVI | 3s 3p | $^3P_2 - {}^1P_1$ | 0.51 | |
| | 974.86(2) | | 974.858(19) | 1.93 +4 | Fe XVIII | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 1.36 | PSS |
| | | | 975.(5) | 5.64 +3 | Br XX | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.86 | |
| | | | 977.(7) | 5.87 +3 | Y XXV | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.24 | |
| | | | 977.(9) | 6.14 +3 | Kr XXX | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 3.23 | |
| | | | 977.86(20) | 1.06 +0 | Ne VII | 2s 2p | $^3P_2 - {}^1P_1$ | 0.207 | |
| | 979.0(3) | | 979.06(14) | 5.93 +3 | Cr XIX | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 1.40 | HSCS |
| | | Q | 985.0(7) | 1.77 +1 | Ti XVII | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 1.13 | |
| | | | 988.5(1.0) | 7.59 +1 | Cr XIII | 3s 3p | $^3P_0 - {}^1P_1$ | 0.35 | |
| | | | 989.(10) | 3.04 +4 | Kr XXIX | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 3.07 | |
| | | | 989.(8) | 9.74 +2 | Mo XXVIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 1.49 | |
| | | | 993.6(1.0) | 2.54 +2 | K XIII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.71 | |
| | | | 996.0(5) | 1.02 +3 | Sc XVI | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 1.01 | |
| | | | 997.61(28) | 3.23 +3 | V XVII | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 1.17 | |
| | | | 998.1(9) | 1.80 +4 | Rb XXI | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.97 | |
| | | | 999.6(3) | 3.33 +3 | Cr XVIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 1.30 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | Q 1006.(5) | 7.80 +1 | Br XX | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.86 | |
| | 1006.4(3.0) | 8.79 +3 | Mn XXI | $2s^2\ 2p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.64 | |
| | 1010.(10) | 2.73 +3 | Br XXVIII | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 2.87 | |
| | Q 1018.4(6) | 2.28 +1 | Sc XIV | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 0.83 | |
| | 1018.6(7) | 2.17 +0* | Ar XII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.618 | |
| | 1019.4(3) | 1.50 +2 | Fe XV | 3s 3p | $^3P_2 - {}^1P_1$ | 0.46 | |
| | 1022.6(4) | 1.41 +3 | Sc XIV | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 0.83 | |
| | 1024.(6) | 3.84 +3 | Br XXI | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.91 | |
| | 1024.6(2.7) | 1.17 +3 | Zn XVI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.55 | |
| | 1025.(5) | 5.61 +3 | Ni XXII | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.89 | |
| | 1025.(4) | 7.06 +3 | As XIX | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.76 | |
| | 1027.0(1.0) | 8.27 +3 | Kr XXIV | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.10 | |
| | 1028.(9) | 5.41 +3 | Br XXIX | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 3.03 | |
| | 1028.49(10) | 5.03 +1 | Cr XIII | 3s 3p | $^3P_1 - {}^1P_1$ | 0.35 | |
| | 1030.(8) | 1.01 +3 | Nb XXVII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 1.41 | |
| | 1030.(3) | 9.22 +3 | Ga XVI | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.58 | |
| | 1032.(11) | 2.44 +3 | Se XXVII | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 2.68 | |
| | 1033.2(5) | 2.50 +3 | Ni XV | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.46 | |
| | 1034.(7) | 1.66 +4 | Sr XXIV | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 1.16 | |
| | 1034.(6) | 6.60 +2 | Br XXI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.91 | |
| | 1034.9(5) | 7.17 +2 | Ni XIV | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.43 | |
| | Q 1048.7(8) | 1.65 +1 | Sc XVI | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 1.01 | |
| | 1049.2(3) | 1.73 +2 | Si VII | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 0.247 | |
| | 1054.08(3) | 3.51 +1 | Al VII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.241 | |
| | 1054.9(8) | 1.11 +2 | Ar XII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.618 | |
| | 1055.(9) | 2.17 +3 | As XXVI | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 2.49 | |
| | 1057.05(3) | 1.44 +1 | Al VII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.241 | |
| | 1058.0(7) | 1.12 +2 | Al VIII | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 0.285 | |
| | 1070.(6) | 3.65 +3 | Se XXI | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.88 | |
| | 1072.2(1.6) | 4.22 +1 | V XII | 3s 3p | $^3P_0 - {}^1P_1$ | 0.31 | |
| | 1073.8(1.2) | 9.75 +1 | Mn XIV | 3s 3p | $^3P_2 - {}^1P_1$ | 0.40 | |
| | 1074.(7) | 1.21 +4 | Sr XXV | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 1.22 | |
| | 1077.(8) | 1.02 +3 | Zr XXVI | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 1.32 | |
| 1078.2(1.4) | 1078.5(6) | 3.67 +3 | V XVIII | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 1.26 | FBM |
| | 1079.20(8) | 1.90 +3 | Ge XXV | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 2.31 | |
| 1079.3(3) | 1079.3(5) | 1.02 +4 | Fe XXIII | 2s 2p | $^3P_1 - {}^3P_2$ | 1.96 | HSCS |
| | 1080.(8) | 7.66 +3 | Nb XXVI | $3s^2\ 3p^4$ | $^3P_0 - {}^3P_1$ | 1.34 | |
| | 1089.(8) | 4.68 +3 | Se XXVIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 2.83 | |
| | 1090.(6) | 3.77 +3 | Se XIX | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.79 | |
| | 1097.1(2.4) | 7.45 +2 | Cu XV | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.48 | |
| | 1098.(7) | 1.40 +4 | Rb XXII | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 1.02 | |
| | 1098.4(1) | 5.51 +2 | Ca XV | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 0.89 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 1099.(7) | 7.17 +3 | Kr XXIII | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 1.05 | |
| | 1100.3(1.2) | 8.08 -1* | Cl XI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.529 | |
| | 1102.2(2.7) | 1.12 +4 | Co XXII | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 1.85 | |
| | 1105.(7) | 1.66 +3 | Ga XXIV | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 2.14 | |
| | 1105.1(3) | 2.35 +3 | V XVII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 1.17 | |
| | Q 1106.1(8) | 1.96 +1 | Ca XIII | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 0.73 | |
| | 1108.(7) | 8.11 +3 | Ga XXIV | $2s^2\ 2p^4$ | $^3P_0 - {}^3P_1$ | 2.14 | |
| | 1108.13(7) | 2.56 -1 | F VI | 2s 2p | $^3P_0 - {}^1P_1$ | 0.157 | |
| | 1108.9(1.7) | 2.85 +1 | V XII | 3s 3p | $^3P_1 - {}^1P_1$ | 0.31 | |
| | 1109.(3) | 6.13 +3 | Zn XV | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.51 | |
| | 1109.4(1.7) | 9.32 +3 | Rb XXVI | 3s 3p | $^3P_1 - {}^3P_2$ | 1.30 | |
| | 1111.33(7) | 1.90 -1 | F VI | 2s 2p | $^3P_1 - {}^1P_1$ | 0.157 | |
| | Q 1117.(6) | 5.56 +1 | Se XIX | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.79 | |
| 1118.060(10) | 1118.055(25) | 1.45 +4 | Fe XIX | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 1.47 | PSS |
| | 1118.49(7) | 3.11 -1 | F VI | 2s 2p | $^3P_2 - {}^1P_1$ | 0.157 | |
| | 1120.45(27) | 2.90 +3 | Sc XV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.93 | |
| | Q 1122.7(6) | 1.50 +1 | Ca XV | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 0.89 | |
| | 1123.0(9) | 1.60 +3 | Co XIV | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.41 | |
| | 1125.5(1.3) | 4.51 +1 | Cl XI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.529 | |
| | 1129.(8) | 2.70 +4 | Y XXV | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 1.24 | |
| 1129.2(4) | 1129.6(3) | 1.99 +3 | Ti XVI | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 1.04 | FBM |
| | 1132.(5) | 1.42 +3 | Zn XXIII | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 1.97 | |
| T 1133.68 | 1133.7(5) | 8.06 +2 | Ca XIII | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 0.73 | CFD |
| | 1134.17(26) | 4.85 +2 | Co XIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.38 | |
| | 1135.8(1.3) | 6.25 +1 | Cr XIII | 3s 3p | $^3P_2 - {}^1P_1$ | 0.35 | |
| | 1137.(6) | 3.88 +2* | Se XX | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.83 | |
| | 1137.(8) | 3.90 +3 | Sr XXIV | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.16 | |
| 1142.5(2) | 1144.7(1.0) | 1.20 +4 | Kr XX | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.89 | RPSKR |
| | 1151.(6) | 2.62 +3 | Se XX | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.83 | |
| | 1161.(4) | 1.21 +3 | Cu XXII | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 1.67 | |
| | 1161.(5) | 4.32 +3 | Ge XVIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.69 | |
| | 1161.(7) | 1.08 +4 | Rb XXIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 1.07 | |
| | 1162.(8) | 3.96 +3 | As XXVII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 2.64 | |
| | 1165.69(19) | 2.46 +1 | Ti XI | 3s 3p | $^3P_0 - {}^1P_1$ | 0.27 | |
| | 1169.85(14) | 7.29 +1 | Al VI | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 0.154 | |
| | 1170.(7) | 1.12 +4 | Mn XVII | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 1.24 | |
| 1174.72(5) | 1174.720(7) | 4.66 +2 | Ni XIV | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.43 | SBT |
| | 1177.4(7) | 2.25 +3 | Ti XVII | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 1.13 | |
| | 1178.1(1.0) | 5.48 +3 | Br XXIII | $3s^2$ 3p | $^2P_{1/2} - {}^2P_{3/2}$ | 1.01 | |
| | 1188.(8) | 1.02 +3 | Sr XXIV | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 1.16 | |
| 1189.82(1) | 1189.82(16) | 4.58 +1 | Mg VII | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 0.225 | SBT |
| 1190.07(1) | 1190.074(20) | 1.37 +1 | Mg VI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.187 | SBT |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 1191.3(2.8) | 4.01 +3 | Cu XIV | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.44 | |
| 1191.1(4) | 1191.0(3) | 1.01 +3 | Ni XXI | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 1.76 | FBM |
| 1191.62(1) | 1191.611(20) | 5.62 +0 | Mg VI | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.187 | SBT |
| 1196.24(1) | 1196.245(14) | 2.87 -1* | S X | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.447 | SBT |
| | 1197.(9) | 9.39 +3 | Kr XXXIII | 2s 2p | $^3P_0 - {}^3P_1$ | 3.87 | |
| 1195.3(2) | 1199.(5) | 2.34 +3 | As XX | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.81 | RPSKR |
| | Q 1199.5(9) | 1.71 +1 | K XII | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 0.63 | |
| | 1201.63(20) | 1.68 +1 | Ti XI | 3s 3p | $^3P_1 - {}^1P_1$ | 0.27 | |
| | 1204.5(2.1) | 3.72 +1 | V XII | 3s 3p | $^3P_2 - {}^1P_1$ | 0.31 | |
| | Q 1204.8(9) | 1.36 +1 | K XIV | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 0.79 | |
| 1205.9(3) | 1205.9(3) | 5.11 +3 | Cr XX | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 1.50 | HSCS |
| | Q 1209.(14) | 1.47 +1 | Mo XXIX | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 1.59 | |
| | 1209.5(7) | 2.91 +2 | K XIV | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 0.79 | |
| 1212.96(1) | 1212.970(15) | 1.64 +1 | S X | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.447 | SBT |
| 1216.43(1) | 1216.46(15) | 1.01 +3 | Fe XIII | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.36 | SBT |
| | 1219.(6) | 2.49 +3 | As XVIII | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.71 | |
| | 1221.(4) | 8.38 +2 | Co XX | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 1.60 | |
| 1224.1(4) | 1224.4(3) | 1.60 +3 | Ti XVI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 1.04 | FBM |
| | 1228.(15) | 3.57 +3 | Kr XXXI | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 3.46 | |
| | Q 1238.(6) | 4.04 +1 | As XVIII | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.71 | |
| 1242.00(1) | 1242.00(8) | 3.17 +2 | Fe XII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.33 | SBT |
| | Q 1243.(10) | 1.47 +1 | Nb XXVIII | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 1.50 | |
| | 1246.(6) | 2.180+2* | As XIX | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.76 | |
| | 1248.(8) | 4.76 +3 | Br XXII | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.96 | |
| | 1250.(8) | 7.75 +3 | Rb XXIV | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 1.13 | |
| | 1252.(8) | 3.28 +3 | Ge XXVI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 2.46 | |
| | 1255.4(6) | 4.49 +2 | K XII | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 0.63 | |
| | 1257.(8) | 9.83 +2 | Rb XXIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 1.07 | |
| | 1258.5(3) | 2.87 +2 | Co XIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.38 | |
| | 1259.27(4) | 6.72 +2 | Fe XIX | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 1.47 | |
| 1268.7(2) | 1269.(9) | 9.19 +3 | Kr XXI | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.94 | RPSKR |
| | 1270.(5) | 3.02 +3 | Co XXI | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.74 | |
| | 1274.0(3) | 1.21 +3 | Sc XV | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.93 | |
| | 1276.0(7) | 1.31 +1 | Sc X | 3s 3p | $^3P_0 - {}^1P_1$ | 0.23 | |
| | 1276.6(8) | 1.36 +3 | Sc XVI | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 1.01 | |
| 1277.1(1.0) | 1277.0(2.3) | 6.16 +3 | Kr XXV | 3s 3p | $^3P_1 - {}^3P_2$ | 1.22 | RPSKR |
| 1277.23(1) | 1277.231(18) | 2.57 +3 | Ni XIII | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.38 | SBT |
| | Q 1279.(10) | 1.47 +1 | Zr XXVII | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 1.41 | |
| | 1279.(16) | 3.27 +3 | Br XXX | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 3.24 | |
| | 1286.(9) | 7.16 +3 | Kr XXII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.99 | |
| | 1286.(9) | 7.65 +3 | Br XXXII | 2s 2p | $^3P_0 - {}^3P_1$ | 3.64 | |
| | 1289.09(24) | 2.27 +1 | Ti XI | 3s 3p | $^3P_2 - {}^1P_1$ | 0.27 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 1290.5(4) | 1.62 +3 | Ca XIV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.82 | |
| | 1293.(4) | 5.94 +3 | Mn XXII | 2s 2p | $^3P_1 - {}^3P_2$ | 1.79 | |
| 1292.4(2) | 1294.(6) | 1.77 +3 | As XIX | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.76 | RPSKR |
| | 1296.(10) | 4.59 +3 | Zr XXV | $3s^2\ 3p^4$ | $^3P_0 - {}^3P_1$ | 1.26 | |
| | Q 1296.8(1.2) | 1.23 +1 | Ar XIII | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 0.686 | |
| | 1298.(6) | 5.30 +2 | Mn XVIII | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 1.32 | |
| | 1301.148(12) | 6.10 -2 | O V | 2s 2p | $^3P_0 - {}^1P_1$ | 0.114 | |
| | 1303.456(12) | 4.57 -2 | O V | 2s 2p | $^3P_1 - {}^1P_1$ | 0.114 | |
| | Q 1304.9(1.2) | 1.49 +1 | Ar XI | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 0.539 | |
| | 1307.51(5) | 9.90 -2* | P IX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.372 | |
| | 1308.688(12) | 7.49 -2 | O V | 2s 2p | $^3P_2 - {}^1P_1$ | 0.114 | |
| | 1309.6(7) | 9.11 +0 | Sc X | 3s 3p | $^3P_1 - {}^1P_1$ | 0.23 | |
| | Q 1317.(10) | 6.95 +2 | Y XXVI | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 1.32 | |
| 1317.65(3) | 1318.06(5) | 5.46 +0 | P IX | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.372 | ST |
| 1319.1(3) | 1319.(5) | 2.76 +3 | Ga XVII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.62 | RPSKR |
| | 1319.1(1.0) | 7.82 +3 | Br XIX | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.81 | |
| 1322.23(4) | 1322.(6) | 6.20 +2 | Mn XII | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.31 | ST |
| 1324.44(1) | 1324.58(8) | 2.79 +1 | Mg V | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 0.141 | SBT |
| T 1331.52(1) | 1330.5(1.1) | 1.50 +2 | Ar XIII | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 0.686 | SBT |
| | 1333.(9) | 9.30 +2 | Kr XXII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.99 | |
| | 1335.(18) | 2.97 +3 | Se XXIX | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 3.03 | |
| 1340.7(4) | 1340.09(20) | 4.09 +2 | Cr XVII | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 1.19 | FBM |
| | 1341.(8) | 2.42 +3 | Rb XXIII | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.07 | |
| | 1343.(6) | 1.48 +3 | Ge XIX | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.73 | |
| 1349.40(1) | 1349.36(9) | 1.73 +2 | Fe XII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.33 | SBT |
| 1354.08(5) | 1354.10(9) | 6.49 +3 | Fe XXI | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 1.69 | SBT |
| | 1356.6(4) | 1.69 +1 | Na VI | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 0.172 | |
| | 1357.9(1.0) | 3.58 +3 | Se XXII | $3s^2$ 3p | $^2P_{1/2} - {}^2P_{3/2}$ | 0.93 | |
| | 1358.0(4) | 1.05 +3 | Sc XV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.93 | |
| | Q 1359.(10) | 1.47 +1 | Sr XXV | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 1.22 | |
| | 1359.(4) | 8.17 +3 | Mn XVIII | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 1.32 | |
| 1359.57(2) | 1359.58(9) | 2.00 +2 | Mn XI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.29 | SBT |
| | 1360.(6) | 1.18 +2* | Ge XVIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.69 | |
| | 1364.(6) | 1.63 +3 | Ge XVII | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.63 | |
| | 1365.(8) | 2.62 +3 | Ga XXV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 2.28 | |
| | 1365.1(6) | 4.74 +0 | Na V | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.138 | |
| | 1365.8(6) | 1.96 +0 | Na V | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.138 | |
| | Q 1368.(7) | 2.99 +1 | Ge XVII | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.64 | |
| | 1368.7(5) | 1.62 +3 | Co XII | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.34 | |
| T 1375.95(3) | 1375.95(5) | 8.10 +2 | Ca XV | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 0.89 | SBT |
| | 1386.9(1.0) | 3.07 +2 | V XVI | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 1.06 | |
| | 1387.8(8) | 1.28 +1 | Sc X | 3s 3p | $^3P_2 - {}^1P_1$ | 0.23 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 1388.(10) | 6.14 +3 | Se XXXI | 2s 2p | $^3P_0$ - $^3P_1$ | 3.42 | |
| 1392.12(1) | 1392.1(1.0) | 2.41 +2 | Ar XI | $2s^2\ 2p^4$ | $^3P_2$ - $^1D_2$ | 0.539 | SBT |
| | 1400.(17) | 2.68 +3 | As XXVIII | $2s^2\ 2p^2$ | $^3P_1$ - $^3P_2$ | 2.83 | |
| | Q 1400.8(2.8) | 1.11 +1 | Cl XII | $2s^2\ 2p^2$ | $^1D_2$ - $^1S_0$ | 0.592 | |
| | 1402.4(2.0) | 6.68 +0 | Ca IX | 3s 3p | $^3P_0$ - $^1P_1$ | 0.19 | |
| | Q 1403.(10) | 1.48 +1 | Rb XXIV | $3s^2\ 3p^2$ | $^1D_2$ - $^1S_0$ | 1.13 | |
| 1410.60(2) | 1410.62(4) | 6.39 +3 | Cr XVI | $2s^2\ 2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 1.10 | PSS |
| | 1416.(10) | 4.66 +3 | Br XXI | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.91 | |
| | 1416.(8) | 3.13 +3 | Se XXI | $3s^2\ 3p^2$ | $^3P_2$ - $^1D_2$ | 0.88 | |
| | Q 1420.6(1.4) | 1.32 +1 | Cl X | $2s^2\ 2p^4$ | $^1D_2$ - $^1S_0$ | 0.456 | |
| | 1422.(10) | 8.50 +2 | Br XXI | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.91 | |
| | 1431.8(4) | 7.25 +2 | Ca XIV | $2s^2\ 2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.82 | |
| | 1432.5(2.1) | 4.70 +0 | Ca IX | 3s 3p | $^3P_1$ - $^1P_1$ | 0.19 | |
| 1440.2(8) | 1440.05(22) | 2.23 +2 | Ti XV | $2s^2\ 2p^4$ | $^3P_1$ - $^1D_2$ | 0.94 | FBM |
| 1440.50(1) | 1440.497(10) | 3.42 -2* | Si VIII | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.304 | SBT |
| 1440.01(2) | 1440.8(2.1) | 3.68 +2 | Cr XI | $3s^2\ 3p^2$ | $^3P_1$ - $^1S_0$ | 0.27 | SBT |
| 1445.75(1) | 1445.753(10) | 1.70 +0 | Si VIII | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.304 | SBT |
| | Q 1450.(12) | 1.48 +1 | Kr XXIII | $3s^2\ 3p^2$ | $^1D_2$ - $^1S_0$ | 1.05 | |
| 1450.49(5) | 1450.43(10) | 1.02 +2 | Mn XI | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.29 | SBT |
| | 1456.(7) | 1.18 +3 | Ge XVIII | $3s^2\ 3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.69 | |
| 1457.6(9) | 1458.(4) | 2.89 +3 | V XIX | $2s^2\ 2p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.36 | FBM |
| | 1459.(9) | 3.73 +3 | Zn XXIII | $2s^2\ 2p^4$ | $^3P_0$ - $^3P_1$ | 1.97 | |
| 1461.8(2) | 1462.(10) | 4.91 +3 | Kr XXIII | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 1.05 | RPSKR |
| | 1464.9(2.2) | 7.49 +1 | Cl XII | $2s^2\ 2p^2$ | $^3P_1$ - $^1D_2$ | 0.592 | |
| 1467.06(1) | 1467.4(1.1) | 9.90 +2 | Fe XI | $3s^2\ 3p^4$ | $^3P_1$ - $^1S_0$ | 0.29 | SBT |
| 1473.7(1) | 1474.(15) | 2.39 +3 | Ge XXVII | $2s^2\ 2p^2$ | $^3P_1$ - $^3P_2$ | 2.64 | H |
| | 1476.(3) | 4.01 +3 | Br XXIV | 3s 3p | $^3P_1$ - $^3P_2$ | 1.10 | |
| | 1476.(10) | 5.93 +3 | Br XX | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 0.86 | |
| | 1477.4(9) | 4.71 +2 | K XIV | $2s^2\ 2p^2$ | $^3P_2$ - $^1D_2$ | 0.79 | |
| | 1478.(6) | 6.390+1* | Ga XVII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.62 | |
| | 1480.8(5) | 8.84 +2 | K XIII | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.71 | |
| 1489.04(3) | 1489.05(16) | 1.21 +2 | Cr X | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.24 | SBT |
| | 1501.2(9) | 1.56 +2 | Sc XIV | $2s^2\ 2p^4$ | $^3P_1$ - $^1D_2$ | 0.83 | |
| | Q 1502.(12) | 1.49 +1 | Br XXII | $3s^2\ 3p^2$ | $^1D_2$ - $^1S_0$ | 0.96 | |
| | 1502.2(2.3) | 6.80 +0 | Ca IX | 3s 3p | $^3P_2$ - $^1P_1$ | 0.19 | |
| 1503.7(3) | 1503.(6) | 9.15 +2 | Ga XVIII | $3s^2\ 3p^2$ | $^3P_1$ - $^1D_2$ | 0.66 | RPSKR |
| | 1503.1(5) | 6.66 +2 | Ca XIV | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.82 | |
| 1507.5(1.0) | 1504.(5) | 1.68 +3 | Zn XVI | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.55 | RPSKR |
| | Q 1506.(7) | 2.28 +1 | Ga XVI | $3s^2\ 3p^4$ | $^1D_2$ - $^1S_0$ | 0.58 | |
| | 1507.(10) | 4.85 +3 | As XXX | 2s 2p | $^3P_0$ - $^3P_1$ | 3.20 | |
| | 1507.(8) | 2.02 +3 | Zn XXIV | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 2.10 | |
| | Q 1520.2(7) | 1.00 +1 | S XI | $2s^2\ 2p^2$ | $^1D_2$ - $^1S_0$ | 0.505 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 1524.(9) | 7.51 +2 | Se XX | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.83 | |
| | 1526.(6) | 1.05 +3 | Ga XVI | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.58 | |
| 1527.8(3) | 1527.8(1.0) | 5.03 +3 | Se XVIII | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.74 | DHSC |
| | 1529.29(5) | 9.48 +0 | Na IV | $2s^2\ 2p^4$ | $^3P_1 - {}^1S_0$ | 0.099 | |
| | 1542.7(1.2) | 1.25 +2 | Cl X | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 0.456 | |
| 1545.9(2) | 1545.(9) | 3.01 +3 | Se XX | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.83 | DHST |
| | Q 1552.7(4) | 1.17 +1 | S IX | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 0.379 | |
| | 1554.(5) | 3.23 +0 | K VIII | 3s 3p | $^3P_0 - {}^1P_1$ | 0.15 | |
| | Q 1558.(10) | 1.49 +1 | Se XXI | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.88 | |
| | 1559.(14) | 2.11 +3 | Ga XXVI | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 2.45 | |
| 1564.30(2) | 1564.09(17) | 5.89 +1 | Cr X | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.24 | SBT |
| 1566.4(1) | 1565.(5) | 3.38 +3 | Cr XXI | 2s 2p | $^3P_1 - {}^3P_2$ | 1.63 | Su |
| | 1568.7(1.0) | 1.05 +2 | Ca XIII | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 0.73 | |
| | 1572.(10) | 1.53 +3 | Kr XXII | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.99 | |
| | 1573.04(18) | 2.11 +2 | V X | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.23 | |
| 1573.2(5) | 1573.2(1.0) | 2.30 +3 | As XXI | $3s^2$ 3p | $^2P_{1/2} - {}^2P_{3/2}$ | 0.85 | RKSPR |
| | 1574.2(7) | 5.90 +2 | Mn X | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.25 | |
| 1574.82(5) | 1574.60(13) | 5.50 +0 | Ne V | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 0.126 | ST |
| | 1575.183(4) | 1.09 -2 | N IV | 2s 2p | $^3P_0 - {}^1P_1$ | 0.077 | |
| 1572.9(1.0) | 1576.(12) | 1.92 +3 | Y XXIV | $3s^2\ 3p^4$ | $^3P_0 - {}^3P_1$ | 1.18 | RPSKR |
| | 1576.750(4) | 8.33 -3 | N IV | 2s 2p | $^3P_1 - {}^1P_1$ | 0.077 | |
| | 1580.338(4) | 1.35 -2 | N IV | 2s 2p | $^3P_2 - {}^1P_1$ | 0.077 | |
| | 1581.(5) | 2.30 +0 | K VIII | 3s 3p | $^3P_1 - {}^1P_1$ | 0.15 | |
| T 1582.56(1) | 1584.3(1.6) | 2.66 +2 | Ar XIII | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 0.686 | SBT |
| | 1585.5(1.1) | 1.59 +3 | Fe XX | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.58 | |
| 1601.5 | 1600.0(5) | 1.41 +0 | Ne IV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.097 | SBT |
| 1601.7 | 1600.1(5) | 5.90 -1 | Ne IV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.097 | SBT |
| | 1602.(6) | 3.32 +1* | Zn XVI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.55 | |
| | 1603.3(5) | 4.23 +2 | K XIII | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.71 | |
| | 1603.36(8) | 1.22 -2* | Al VII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.241 | |
| 1604.80(4) | 1604.80(5) | 4.26 -1* | Al VII | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.241 | ST |
| T 1600.3(2) | 1606.(10) | 2.03 +3 | As XX | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.81 | RPSKR |
| 1614.51(3) | 1614.5(7) | 3.62 +1 | S XI | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 0.505 | SBT |
| | Q 1619.(11) | 1.49 +0 | As XX | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.81 | |
| | 1633.3(5) | 7.05 +1 | V IX | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.21 | |
| | 1638.(7) | 7.79 +2 | Ga XVII | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.62 | |
| | 1642.(10) | 6.39 +2 | As XIX | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.76 | |
| | 1643.(5) | 3.43 +0 | K VIII | 3s 3p | $^3P_2 - {}^1P_1$ | 0.15 | |
| | 1646.(9) | 3.76 +3 | Ge XXIX | 2s 2p | $^3P_0 - {}^3P_1$ | 3.00 | |
| | 1647.4(1.2) | 6.84 +1 | K XII | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 0.63 | |
| | Q 1651.(7) | 1.78 +1 | Zn XV | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.51 | |
| 1656.3(3) | 1656.29(27) | 4.58 +3 | Cr XVII | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 1.19 | HSCS |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 1659.(12) | 1.84 +3 | Zn XXV | $2s^2\ 2p^2$ | $^3P_1$ - $^3P_2$ | 2.27 | |
| | Q 1659.2(8) | 8.99 +0 | P X | $2s^2\ 2p^2$ | $^1D_2$ - $^1S_0$ | 0.424 | |
| | 1664.0(6) | 4.07 +2 | K XIII | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.71 | |
| 1660.4(2) | 1668.(10) | 1.93 +3 | As XIX | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.76 | RPSKR |
| | 1678.(6) | 3.46 +3 | Mn XX | $2s^2\ 2p^2$ | $^3P_0$ - $^3P_1$ | 1.54 | |
| 1676.9(2) | 1680.(7) | 5.56 +2 | Zn XVII | $3s^2\ 3p^2$ | $^3P_1$ - $^1D_2$ | 0.59 | RPSKR |
| | 1686.3(1.8) | 4.76 +2 | Ar XII | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.618 | |
| | Q 1687.(9) | 1.48 +1 | Ge XIX | $3s^2\ 3p^2$ | $^1D_2$ - $^1S_0$ | 0.73 | |
| 1691.0(3) | 1690.(8) | 1.49 +3 | Cu XXIII | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 1.94 | H |
| | 1693.9(6) | 3.40 +2 | Cr IX | $3s^2\ 3p^4$ | $^3P_1$ - $^1S_0$ | 0.21 | |
| | 1694.1(6) | 3.28 +1 | V IX | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.21 | |
| | 1698.0(2.9) | 1.46 +2 | Cl XII | $2s^2\ 2p^2$ | $^3P_2$ - $^1D_2$ | 0.592 | |
| 1702.8(2) | 1706.(7) | 6.67 +2 | Zn XV | $3s^2\ 3p^4$ | $^3P_2$ - $^1D_2$ | 0.51 | RPSKR |
| | Q 1708.5(1.0) | 1.03 +1 | P VIII | $2s^2\ 2p^4$ | $^1D_2$ - $^1S_0$ | 0.310 | |
| 1714.1(3) | 1714.1(4) | 2.58 +3 | Se XXIII | 3s 3p | $^3P_1$ - $^3P_2$ | 1.00 | DHSC |
| 1715.44(1) | 1715.41(12) | 6.18 +1 | S IX | $2s^2\ 2p^4$ | $^3P_2$ - $^1D_2$ | 0.379 | SBT |
| | 1718.(5) | 1.01 +3 | Cu XV | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.48 | |
| 1719.4(1.7) | 1721.4(1.5) | 3.52 +3 | V XV | $2s^2\ 2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.98 | FBM |
| | 1723.(15) | 3.04 +3 | Br XXII | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 0.96 | |
| | 1724.7(4) | 1.17 +2 | Ti IX | $3s^2\ 3p^2$ | $^3P_1$ - $^1S_0$ | 0.19 | |
| 1727.7(3) | 1726.(12) | 3.76 +3 | Se XIX | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 0.79 | DHSC |
| | 1731.(5) | 1.68 +1* | Cu XV | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.48 | |
| | 1737.3(1.5) | 1.46 +0 | Ar VII | 3s 3p | $^3P_0$ - $^1P_1$ | 0.124 | |
| | 1741.9(2.1) | 4.21 +1 | Ar XI | $2s^2\ 2p^4$ | $^3P_1$ - $^1D_2$ | 0.539 | |
| | Q 1762.(9) | 9.73 +0 | Ga XVIII | $3s^2\ 3p^2$ | $^1D_2$ - $^1S_0$ | 0.66 | |
| | 1762.0(1.6) | 1.05 +0 | Ar VII | 3s 3p | $^3P_1$ - $^1P_1$ | 0.124 | |
| 1776.0(3) | 1777.(9) | 1.57 +3 | Cu XXIV | $2s^2\ 2p^2$ | $^3P_1$ - $^3P_2$ | 2.09 | HSCS |
| 1778.1(1) | 1778.09(10) | 1.59 +3 | Ti XVIII | $2s^2\ 2p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.22 | SFH |
| T 1778.8(2) | 1779.(10) | 5.22 +2 | Ge XVIII | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.69 | DHST |
| 1777.2(3) | 1779.8(1.0) | 3.18 +3 | As XVII | $3s^2\ 3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.67 | RPSKR |
| T 1782.0(2) | 1783.(10) | 1.22 +3 | Ge XVIII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.69 | DHST |
| | 1785.8(9) | 1.68 +1 | P X | $2s^2\ 2p^2$ | $^3P_1$ - $^1D_2$ | 0.424 | |
| | 1787.9(2.0) | 2.40 +2 | Ar XII | $2s^2\ 2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.618 | |
| | 1797.5(6) | 3.90 +1 | Ti VIII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.17 | |
| | Q 1805.(7) | 1.42 +1 | Cu XIV | $3s^2\ 3p^4$ | $^1D_2$ - $^1S_0$ | 0.44 | |
| 1805.94(1) | 1805.94(7) | 2.75 -2* | Mg VI | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.187 | SBT |
| | 1806.49(17) | 4.58 -3* | Mg VI | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.187 | |
| | 1808.(9) | 2.86 +3 | Ga XXVIII | 2s 2p | $^3P_0$ - $^3P_1$ | 2.79 | |
| | 1814.63(5) | 2.76 +0 | Ne III | $2s^2\ 2p^4$ | $^3P_1$ - $^1S_0$ | 0.064 | |
| | 1815.8(1.7) | 1.60 +0 | Ar VII | 3s 3p | $^3P_2$ - $^1P_1$ | 0.124 | |
| 1810.4(3) | 1816.(10) | 1.31 +3 | Ge XIX | $3s^2\ 3p^2$ | $^3P_2$ - $^1D_2$ | 0.73 | H |
| | Q 1822.4(8) | 8.01 +0 | Si IX | $2s^2\ 2p^2$ | $^1D_2$ - $^1S_0$ | 0.351 | |

Table 5. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| 1826.21(2) | 1826.2(9) | 7.69 +1 | S XI | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 0.505 | SBT |
| | 1830.39(24) | 1.89 +2 | V VIII | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.17 | |
| 1832.7(3) | 1832.2(1.0) | 1.46 +3 | Ge XX | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.77 | DHSC |
| | 1836.2(2.2) | 2.41 +2 | Ar XII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.618 | |
| | 1842.(8) | 5.15 +2 | Zn XVI | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2F_{3/2}$ | 0.55 | |
| | 1845.4(7) | 1.75 +1 | Ti VIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.17 | |
| | Q 1846.(9) | 1.46 +1 | Zn XVII | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.59 | |
| | 1852.4(1.8) | 2.54 +1 | Cl X | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 0.456 | |
| 1866.75(1) | 1866.751(17) | 8.27 +0* | Ni XIV | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.43 | SBT |
| | 1871.(15) | 9.27 +2 | Br XXI | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.91 | |
| 1872.0(3) | 1874.(6) | 3.32 +2 | Cu XVI | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.52 | H |
| | 1875.73(7) | 1.51 +0 | F IV | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 0.087 | |
| | 1890.(10) | 7.64 +2 | Ga XVII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.62 | |
| | Q 1895.0(9) | 9.01 +0 | Si VII | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 0.247 | |
| | 1901.41(26) | 6.12 +1 | Sc VIII | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.16 | |
| | 1906.(7) | 4.18 +2 | Cu XIV | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.44 | |
| | 1908.(5) | 1.86 +3 | V XX | $2s\ 2p$ | $^3P_1 - {}^3P_2$ | 1.49 | |
| | 1913.1(8) | 2.49 +2 | Cl XI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.529 | |
| | 1913.7(9) | 2.90 +1 | P VIII | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 0.310 | |
| 1917.3(2) | 1914.98(21) | 1.32 +3 | Ni XXIII | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 2.01 | H |
| 1928.7(3) | 1929.(6) | 1.03 +3 | Ni XXII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 1.89 | H |
| | 1934.(10) | 4.11 +2 | Ga XVII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.62 | |
| | 1939.435(11) | 3.52 -1 | F III | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.063 | |
| | 1939.465(11) | 1.44 -1 | F III | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.063 | |
| | Q 1940.(7) | 1.39 +1 | Cu XVI | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.52 | |
| | 1945.(15) | 1.47 +3 | Sr XXIII | $3s^2\ 3p^4$ | $^3P_0 - {}^3P_1$ | 1.10 | |
| | 1966.1(1.9) | 5.97 +2 | Ni XIV | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.43 | |
| | 1967.(4) | 6.14 -1 | Cl VI | $3s\ 3p$ | $^3P_0 - {}^1P_1$ | 0.097 | |
| | Q 1968.38(4) | 1.16 +1 | Ni XIII | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.38 | |
| | 1974.5(1.1) | 3.86 +1 | P X | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 0.424 | |
| 1984.88(2) | 1984.88(3) | 7.40 +0 | Si IX | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 0.351 | SBT |
| | 1985.(11) | 1.55 +3 | Cu XXII | $2s^2\ 2p^4$ | $^3P_0 - {}^3P_1$ | 1.67 | |
| | 1987.7(6) | 1.36 +1 | S IX | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 0.379 | |
| | 1988.0(8) | 2.05 +1 | Sc VII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.14 | |
| | 1989.(4) | 4.46 -1 | Cl VI | $3s\ 3p$ | $^3P_1 - {}^1P_1$ | 0.097 | |
| | 1989.38(18) | 1.01 +2 | Ti VII | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.14 | |
| | 1990.(5) | 4.69 +2 | Zn XVI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.55 | |
| | 1990.8(8) | 1.31 +2 | Cl XI | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.529 | |
| | 1999.95(4) | 1.22 -3 | C III | $2s\ 2p$ | $^3P_0 - {}^1P_1$ | 0.048 | |
| | 2000.(8)[a] | 2.13 +3 | Zn XXVII | $2s\ 2p$ | $^3P_0 - {}^3P_1$ | 2.60 | |
| | 2000.7(2.8) | 1.63 +3 | As XXII | $3s\ 3p$ | $^3P_1 - {}^3P_2$ | 0.90 | |
| | 2000.90(4) | 1.04 -3 | C III | $2s\ 2p$ | $^3P_1 - {}^1P_1$ | 0.048 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 2003.16(4) | 1.52 -3 | C III | 2s 2p | $^3P_2$ - $^1P_1$ | 0.048 | |
| | 2011.8(8) | 3.96 +0* | Co XIII | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.38 | |
| | 2015.(11) | 7.98 +2 | Mn XIX | $2s^2$ $2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.44 | |
| | Q 2018.(3) | 7.09 +0 | Al VIII | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 0.285 | |
| | 2024.2(8) | 8.93 +0 | Sc VII | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.14 | |
| 2032.6(3) | 2030.(14) | 2.34 +3 | As XVIII | $3s^2$ $3p^4$ | $^3P_2$ - $^3P_1$ | 0.71 | RPSKR |
| | 2031.6(9) | 1.35 +3 | Cl XI | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.529 | |
| | 2035.(4) | 6.93 -1 | Cl VI | 3s 3p | $^3P_2$ - $^1P_1$ | 0.097 | |
| 2042.7(8) | 2042.8(8) | 2.47 +3 | V XVI | $2s^2$ $2p^4$ | $^3P_2$ - $^3P_1$ | 1.06 | FBM |
| 2042.0(3) | 2043.(15) | 1.85 +3 | Se XXI | $3s^2$ $3p^2$ | $^3P_0$ - $^3P_1$ | 0.88 | DHSC |
| | 2046.(10) | 8.33 +2 | Ga XVIII | $3s^2$ $3p^2$ | $^3P_2$ - $^1D_2$ | 0.66 | |
| | Q 2046.5(2.1) | 1.34 +1 | Ni XV | $3s^2$ $3p^2$ | $^1D_2$ - $^1S_0$ | 0.46 | |
| | 2066.9(1.4) | 1.78 -2* | Na V | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.138 | |
| | 2068.(9) | 3.33 +2* | Cu XV | $3s^2$ $3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.48 | |
| | 2068.4(1.4) | 1.73 -3* | Na V | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.138 | |
| 2085.1(1) | 2085.1(1.0) | 1.98 +3 | Ge XVI | $3s^2$ $3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.60 | DHSC |
| 2085.51(5) | 2085.51(3) | 1.94 +2 | Ni XV | $3s^2$ $3p^2$ | $^3P_1$ - $^1D_2$ | 0.46 | SBT |
| 2085.3(2) | 2086.(9) | 2.81 +2 | Cu XV | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.48 | DHST |
| 2090.9(3) | 2090.9(4) | 1.81 +3 | Cr XIX | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 1.40 | HSCS |
| | 2104.(12) | 1.05 +3 | Co XXII | $2s^2$ $2p^2$ | $^3P_1$ - $^3P_2$ | 1.85 | |
| | 2110.97(13) | 3.04 +1 | Ca VII | $3s^2$ $3p^2$ | $^3P_1$ - $^1S_0$ | 0.13 | |
| | 2111.(10) | 3.11 +2 | Zn XVI | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.55 | |
| 2117.1(2) | 2117.12(18) | 1.89 +3 | Ti XIV | $2s^2$ $2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.86 | SFH |
| | Q 2124.9(6) | 7.79 +0 | Al VI | $2s^2$ $2p^4$ | $^1D_2$ - $^1S_0$ | 0.154 | |
| 2125.50(2) | 2125.500(23) | 2.58 +2 | Ni XIII | $3s^2$ $3p^4$ | $^3P_2$ - $^1D_2$ | 0.38 | SBT |
| | Q 2137.9(1.3) | 9.72 +0 | Co XII | $3s^2$ $3p^4$ | $^1D_2$ - $^1S_0$ | 0.34 | |
| 2146.64(4) | 2146.64(5) | 1.28 +1 | Si VII | $2s^2$ $2p^4$ | $^3P_2$ - $^1D_2$ | 0.247 | SBT |
| | 2146.9(1.0) | 9.07 +2 | Ga XIX | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.70 | |
| 2149.26(5) | 2149.31(3) | 1.83 +1 | Si IX | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 0.351 | SBT |
| | 2150.0(1.6) | 7.03 +0 | P VIII | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 0.310 | |
| | 2156.28(24) | 1.25 +2 | S X | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.447 | |
| | Q 2166.(3) | 1.27 +1 | Co XIV | $3s^2$ $3p^2$ | $^1D_2$ - $^1S_0$ | 0.41 | |
| 2169.08(2) | 2169.69(24) | 1.84 +0* | Fe XII | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.33 | SBT |
| | 2178.99(7) | 5.09 +1 | Sc VI | $3s^2$ $3p^4$ | $^3P_1$ - $^1S_0$ | 0.11 | |
| 2184.26(5) | 2184.259(24) | 1.63 +2 | Ni XIV | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.43 | SBT |
| 2190.5(2) | 2190.52(19) | 8.53 +2 | Sc XVII | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.09 | SCCFH |
| | 2211.26(25) | 6.92 +1 | S X | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.447 | |
| | 2214.5(1.0) | 1.00 +1 | Ca VI | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.11 | |
| | 2222.(3) | 3.06 +0 | Al VIII | $2s^2$ $2p^2$ | $^3P_1$ - $^1D_2$ | 0.285 | |
| | 2228.(7) | | Cu XXVI | 2s 2p | $^3P_0$ - $^3P_1$ | 2.41 | |
| | 2242.1(1.0) | 4.28 +0 | Ca VI | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.11 | |
| | 2242.61(4) | 4.93 -1 | F II | $2s^2$ $2p^4$ | $^3P_1$ - $^1S_0$ | 0.035 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 2244.84(26) | 7.20 +1 | S X | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.447 | |
| | 2245.5(1.4) | 3.49 +2 | Co XIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.38 | |
| | 2246.(15) | 5.48 +2 | Se XX | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.83 | |
| | 2247.(14) | 6.75 +2 | Co XXI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 1.74 | |
| | Q 2261.5(6) | 6.16 +0 | Mg VII | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 0.225 | |
| 2285.4(1) | 2264.(30) | 5.01 +2 | Mo XXVIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 1.49 | DHSC |
| | 2265.5(8) | 2.30 -1 | S V | 3s 3p | $^3P_0 - {}^1P_1$ | 0.073 | |
| | 2284.63(18) | 1.68 -1 | S V | 3s 3p | $^3P_1 - {}^1P_1$ | 0.073 | |
| | 2290.2(1.0) | 9.05 +1 | Co XIII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.38 | |
| 2284.6(1) | 2293.(10) | 5.26 +2 | Zn XVII | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.59 | BGBR |
| 2298.0(3) | 2298.0(5) | 8.46 +2 | Fe XXI | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 1.69 | HSCS |
| | Q 2301.3(5) | 1.20 +1 | Fe XIII | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.36 | |
| | 2312.(10) | 2.27 +2 | Cu XV | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.48 | |
| | 2320.9510(16) | 3.27 -1 | O III | $2s^2\ 2p^2$ | $^3P_1 - {}^1S_0$ | 0.055 | |
| | Q 2321.0(2.7) | 8.31 +0 | Fe XI | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.29 | |
| | 2321.6(2.7) | 2.11 +2* | Ni XIV | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.43 | |
| | 2325.1(8) | 2.65 -1 | S V | 3s 3p | $^3P_2 - {}^1P_1$ | 0.073 | |
| | 2331.(4) | 1.09 +2 | Co XIV | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.41 | |
| | 2341.09(27) | 8.33 -1* | Mn XI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.20 | |
| 2344.6(2) | 2344.5(2.3) | 1.01 +3 | Ti XIX | 2s 2p | $^3P_1 - {}^3P_2$ | 1.35 | PSS |
| | 2350.02(18) | 3.37 +0 | Si VII | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 0.247 | |
| 2350.2(3) | 2350.2(4) | 1.01 +3 | Ge XXI | 3s 3p | $^3P_1 - {}^3P_2$ | 0.80 | DHSC |
| | 2365.(3) | 8.13 +0 | Al VIII | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 0.285 | |
| | 2367.52(8) | 1.40 +1 | K VI | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.10 | |
| 2350.8(3) | 2371.(30) | 2.23 +2 | Mo XXVII | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 1.43 | H |
| | 2373.4(1.1) | 1.56 +2 | Co XII | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.34 | |
| | 2386.(30) | 4.39 +2 | Nb XXVII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 1.41 | |
| 2406.9(3) | 2404.(14) | 1.43 +3 | Ge XVII | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.64 | DHSC |
| 2405.68(1) | 2405.1(3) | 4.81 +1 | Fe XII | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.33 | SBT |
| | 2412.9(1) | 2.40 +1 | Ca V | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.08 | |
| | Q 2417.5(3) | 6.59 +0 | Mg V | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 0.141 | |
| | 2418.2(1.2) | 2.65 -3* | Ne IV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.097 | |
| | 2420.9(1.2) | 6.03 -4* | Ne IV | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.097 | |
| | 2421.7(1.2) | 6.11 +1 | P IX | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.372 | |
| | 2428.4(6) | 5.15 +0 | Al VI | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 0.154 | |
| | 2433.(30) | 1.99 +2 | Nb XXVI | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 1.34 | |
| 2438.0(3) | 2440.(16) | 1.10 +3 | As XX | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.81 | RPSKR |
| | 2442.(20) | 7.71 +2 | Rb XXII | $3s^2\ 3p^4$ | $^3P_0 - {}^3P_1$ | 1.02 | |
| | Q 2456.(19) | 1.12 +1 | Mn XII | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.31 | |
| | 2458.2(1.2) | 3.54 +1* | P IX | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.372 | |
| 2456.3(3) | 2459.7(1.0) | 1.21 +3 | Ga XV | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.54 | RPSKR |
| | 2467.(19) | 1.23 +3 | Ni XXV | 2s 2p | $^3P_0 - {}^3P_1$ | 2.30 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 2470.21(2) | 2.38 -2 | O II | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.035 | |
| | 2470.33(2) | 5.95 -2 | O II | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.035 | |
| | 2484.3(1.2) | 3.72 +1* | P IX | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.372 | |
| | 2494.24(12) | 4.56 +0 | K V | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.08 | |
| T 2476. | 2497.(30) | 1.76 +2 | Zr XXV | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 1.26 | DHSC |
| | 2509.2(7) | 1.17 +0 | Mg VII | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 0.225 | |
| | 2514.45(13) | 1.90 +0 | K V | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.08 | |
| | Q 2516.5(2.7) | 7.24 +0 | Mn X | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.25 | |
| 2549.8(2) | 2529.(30) | 3.80 +2 | Zr XXVI | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 1.32 | DHST |
| 2532.0(1) | 2531.5(1.0) | 5.53 +2 | Zn XVIII | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.63 | BGBR |
| | 2534.1(5) | 3.67 -1* | Cr X | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.24 | |
| | 2538.3(3) | 2.42 +1 | Mn XI | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.29 | |
| | 2539.96(5) | 1.59 +2 | Ni XIV | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.43 | |
| 2544.8(1) | 2544.54(19) | 1.30 +3 | Ti XV | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 0.94 | SFH |
| T 2539.7(3) | 2555.(12) | 3.28 +2 | Cu XVI | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.52 | DHSC |
| | 2559.(19) | 6.43 +2 | Mn XX | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 1.54 | |
| | 2565.(30) | 3.52 +1 | Y XXIV | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 1.18 | |
| 2565.93(6) | 2566.7(5) | 2.00 +2 | Fe XII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.33 | SBT |
| | Q 2568.9(1.9) | 5.27 +0 | Na VI | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 0.172 | |
| 2578.77(1) | 2578.84(14) | 4.57 +1 | Fe XIII | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.36 | SBT |
| | 2598.0(1.9) | 1.33 +2* | Co XIII | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.38 | |
| | 2601.0(7) | 1.48 +0 | Al VI | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 0.154 | |
| 2606.4(3) | 2606.4(3) | 3.80 +2 | Cr XVIII | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 1.30 | DH |
| | 2629.1(8) | 3.36 +0 | Mg VII | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 0.225 | |
| | 2633.6(1.4) | 9.19 +2 | V XVIII | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 1.26 | |
| | Q 2634.(7) | 1.03 +1 | Cr XI | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.27 | |
| | 2636.(25) | 1.36 +2 | Sr XXIII | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 1.10 | |
| 2637.2(2) | 2637.18(21) | 9.78 +2 | Sc XIII | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.76 | SCCFH |
| | 2640.(25) | 8.82 +2 | Mo XXXI | $3s\ 3p$ | $^3P_0 - {}^3P_1$ | 1.80 | |
| 2648.71(2) | 2648.67(7) | 9.23 +1 | Fe XI | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.29 | SBT |
| 2665.1(3) | 2665.2(3.0) | 4.17 +2 | Fe XX | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 1.58 | SH(78) |
| | 2682.154(10) | 7.33 -2 | P IV | $3s\ 3p$ | $^3P_0 - {}^1P_1$ | 0.051 | |
| | 2691.04(19) | 5.89 +0 | Ar V | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.075 | |
| | 2694.4(5) | 1.14 +1 | Cr X | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.24 | |
| | 2698.696(10) | 5.40 -2 | P IV | $3s\ 3p$ | $^3P_1 - {}^1P_1$ | 0.051 | |
| 2717.8(3) | 2700.(30) | 7.87 +0 | Y XXV | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 1.24 | RPSKR |
| | 2710.(25) | 1.18 +2 | Rb XXII | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 1.02 | |
| | 2711.07(10) | 1.05 +1 | K IV | $3s^2\ 3p^4$ | $^3P_1 - {}^1S_0$ | 0.06 | |
| | 2722.4(4) | 2.83 +1 | Si VIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.304 | |
| | 2724.(20) | 3.15 +2 | As XIX | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.76 | |
| | 2733.280(11) | 8.66 -2 | P IV | $3s\ 3p$ | $^3P_2 - {}^1P_1$ | 0.051 | |
| | Q 2733.6(1.5) | 6.41 +0 | Cr IX | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.21 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 2737.(4) | 4.37 +2 | Ca XVI | $2s^2\ 2p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.97 | |
| | 2741.2(4) | 1.69 +1* | Si VIII | $2s^2\ 2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.304 | |
| | 2752.6(1.6) | 1.57 -1* | V IX | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.21 | |
| | 2763.1(4) | 1.79 +1* | Si VIII | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.304 | |
| | 2772.35(4) | 8.52 -5 | B II | 2s 2p | $^3P_0$ - $^1P_1$ | 0.048 | |
| | 2772.78(4) | 2.01 -1 | B II | 2s 2p | $^3P_1$ - $^1P_1$ | 0.048 | |
| | 2774.01(4) | 1.07 -4 | B II | 2s 2p | $^3P_2$ - $^1P_1$ | 0.048 | |
| | 2780.(6) | 6.13 +2 | Ga XX | 3s 3p | $^3P_1$ - $^3P_2$ | 0.70 | |
| | 2782.7(3) | 1.86 +0 | Mg V | $2s^2\ 2p^4$ | $^3P_2$ - $^1D_2$ | 0.141 | |
| | 2788.(25) | 1.02 +2 | Kr XXI | $3s^2\ 3p^4$ | $^3P_1$ - $^1D_2$ | 0.94 | |
| | 2791.7(2.2) | 1.10 +2* | Co XIII | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.38 | |
| | Q 2803.74(18) | 5.43 +0 | Na IV | $2s^2\ 2p^4$ | $^1D_2$ - $^1S_0$ | 0.099 | |
| | 2809.(22) | 8.48 +2 | Co XXIV | 2s 2p | $^3P_0$ - $^3P_1$ | 2.12 | |
| 2818.2(3) | 2817.7(3) | 5.72 +2 | Ni XXI | $2s^2\ 2p^4$ | $^3P_0$ - $^3P_1$ | 1.76 | HSCS |
| | 2818.01(6) | 2.05 +2 | Ni XV | $3s^2\ 3p^2$ | $^3P_2$ - $^1D_2$ | 0.46 | |
| 2841.1(2) | 2834.(40) | 2.91 +2 | Mo XXIX | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 1.49 | DHSC |
| | Q 2836.7(6) | 9.45 +0 | V X | $3s^2\ 3p^2$ | $^1D_2$ - $^1S_0$ | 0.23 | |
| | 2839.(25) | 7.16 +2 | Nb XXX | 3s 3p | $^3P_0$ - $^3P_1$ | 1.70 | |
| | 2853.654(24) | 1.88 +0 | Ar IV | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.060 | |
| | 2860.(12) | 3.35 +1 | Mn XII | $3s^2\ 3p^2$ | $^3P_1$ - $^1D_2$ | 0.31 | |
| | 2868.(15) | 8.54 +2 | Ga XVI | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 0.58 | |
| | 2868.15(5) | 7.60 -1 | Ar IV | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.060 | |
| | 2871.(30) | 8.68 +1 | Br XX | $3s^2\ 3p^4$ | $^3P_1$ - $^1D_2$ | 0.86 | |
| | 2872.7(1.9) | 4.06 -1 | Na VI | $2s^2\ 2p^2$ | $^3P_1$ - $^1D_2$ | 0.172 | |
| | 2880.3(1.7) | 4.98 +0 | V IX | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.21 | |
| 2885.4(3) | 2885.4(1.2) | 4.69 +2 | Cr XIX | $2s^2\ 2p^2$ | $^3P_1$ - $^3P_2$ | 1.40 | HSCS |
| | 2898.(30) | 2.69 +2 | Sr XXIV | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 1.16 | |
| | 2902.8(6) | 8.13 +1* | Fe XII | $3s^2\ 3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.33 | |
| 2907.9(3) | 2907.82(24) | 5.29 +2 | Sc XVIII | 2s 2p | $^3P_1$ - $^3P_2$ | 1.21 | SH(82) |
| 2922.3(1) | 2922.5(1.0) | 7.20 +2 | Zn XIV | $3s^2\ 3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.47 | BGBR |
| | 2925.9(6) | 1.13 +2 | Mn XI | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.29 | |
| | 2928.0(4) | 5.85 -1 | Mg V | $2s^2\ 2p^4$ | $^3P_1$ - $^1D_2$ | 0.141 | |
| | 2929.70(4) | 3.63 -4* | F III | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.063 | |
| | 2932.78(4) | 1.63 -4* | F III | $2s^2\ 2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.063 | |
| 2933.7(2) | 2938.(18) | 6.39 +2 | Ge XIX | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 0.73 | DHSC |
| | 2956.0(2.6) | 5.33 +1 | Mn X | $3s^2\ 3p^4$ | $^3P_2$ - $^1D_2$ | 0.25 | |
| T 2935.8(3) | 2958.(20) | 7.31 +1 | Se XIX | $3s^2\ 3p^4$ | $^3P_1$ - $^1D_2$ | 0.79 | DHSC |
| | 2958.(40) | 2.63 +2 | Nb XXVIII | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 1.50 | |
| | 2971.9(1.8) | 1.27 +0 | Na VI | $2s^2\ 2p^2$ | $^3P_2$ - $^1D_2$ | 0.172 | |
| 2972.288(1) | 2972.2864(13) | 6.68 -2 | O I | $2s^2\ 2p^4$ | $^3P_1$ - $^1S_0$ | 0.014 | E(65) |
| | Q 2972.8(5) | 4.39 +0 | Ne V | $2s^2\ 2p^2$ | $^1D_2$ - $^1S_0$ | 0.126 | |
| | Q 2978.1(6) | 5.61 +0 | V VIII | $3s^2\ 3p^4$ | $^1D_2$ - $^1S_0$ | 0.17 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 3006.1(1.8) | 6.62 -2* | Ti VIII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.17 | |
| 3007.6(3) | 3007.6(1.0) | 3.30 +2 | Cu XVII | $3s^2\ 3p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.55 | HSCS |
| | 3051.(20) | 6.07 +1 | As XVIII | $3s^2\ 3p^4$ | $^3P_1$ - $^1D_2$ | 0.71 | |
| | 3062.838(13) | 3.40 -2 | N II | $2s^2\ 2p^2$ | $^3P_1$ - $^1S_0$ | 0.030 | |
| | 3067.(30) | 5.73 +2 | Zr XXIX | $3s\ 3p$ | $^3P_0$ - $^3P_1$ | 1.60 | |
| | 3070.7(3) | 7.22 +0 | Al VII | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.241 | |
| | Q 3071.8(1.3) | 8.58 +0 | Ti IX | $3s^2\ 3p^2$ | $^1D_2$ - $^1S_0$ | 0.19 | |
| 3072.0(4) | 3072.0(7) | 7.21 +1* | Fe XII | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.33 | J |
| | 3076.0(4) | 1.27 +1* | Al VII | $2s^2\ 2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.241 | |
| 3100.5(3) | 3094.(40) | 2.37 +2 | Zr XXVII | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 1.41 | DHSC |
| | 3096.0(3) | 8.12 +0* | Al VII | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.241 | |
| | 3105.6(1.9) | 2.00 +0 | Ti VIII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.17 | |
| 3109.08(30) | 3109.14(5) | 4.09 +0 | Ar III | $3s^2\ 3p^4$ | $^3P_1$ - $^1S_0$ | 0.041 | B(60) |
| | 3110.(7) | 1.24 +2 | Co XIV | $3s^2\ 3p^2$ | $^3P_2$ - $^1D_2$ | 0.41 | |
| | 3118.55(8) | 2.19 +0 | Cl IV | $3s^2\ 3p^2$ | $^3P_1$ - $^1S_0$ | 0.053 | |
| | 3134.(30) | 3.81 +2 | Kr XXI | $3s^2\ 3p^4$ | $^3P_0$ - $^3P_1$ | 0.94 | |
| T 3131.3(3) | 3150.(20) | 4.97 +1 | Ge XVII | $3s^2\ 3p^4$ | $^3P_1$ - $^1D_2$ | 0.64 | DHSC |
| | 3152.(30) | 2.17 +2 | Rb XXIII | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 1.07 | |
| 3178. | 3177.9(7) | 1.77 +1 | Cr XI | $3s^2\ 3p^2$ | $^3P_1$ - $^1D_2$ | 0.27 | M |
| 3206.1(3) | 3206.36(21) | 6.55 +2 | Sc XIV | $2s^2\ 2p^4$ | $^3P_2$ - $^3P_1$ | 0.83 | SCCFH |
| | 3230.(16) | 5.70 +2 | Fe XXIII | $2s\ 2p$ | $^3P_0$ - $^3P_1$ | 1.96 | |
| | 3240.6(7) | 4.73 +1* | Mn XI | $3s^2\ 3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.29 | |
| 3241.68(10) | 3241.63(15) | 5.75 -1 | Na IV | $2s^2\ 2p^4$ | $^3P_2$ - $^1D_2$ | 0.099 | B(60) |
| 3254.8(1.0) | 3250.(40) | 2.44 +2 | Y XXVI | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 1.32 | RPSKR |
| | 3258.(20) | 4.00 +1 | Ga XVI | $3s^2\ 3p^4$ | $^3P_1$ - $^1D_2$ | 0.58 | |
| | 3259.(30) | 2.35 +2 | Mn XIX | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 1.44 | |
| | Q 3259.5(6) | 4.92 +0 | Ti VII | $3s^2\ 3p^4$ | $^1D_2$ - $^1S_0$ | 0.14 | |
| | 3301.1(5) | 2.99 +1 | Cr IX | $3s^2\ 3p^4$ | $^3P_2$ - $^1D_2$ | 0.21 | |
| 3296.2(2) | 3304.0(3) | 3.67 +2 | Zn XIX | $3s\ 3p$ | $^3P_1$ - $^3P_2$ | 0.70 | BGBR |
| | 3305.9(2.2) | 2.78 -2* | Sc VII | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.14 | |
| | 3307.(3) | 3.24 +2 | V XVIII | $2s^2\ 2p^2$ | $^3P_1$ - $^3P_2$ | 1.26 | |
| | 3314.727(16) | 1.85 -2 | Si III | $3s\ 3p$ | $^3P_0$ - $^1P_1$ | 0.033 | |
| | 3326.4(8) | 6.22 +1 | Cr X | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.24 | |
| 3327.5(4) | 3327.8(6) | 4.87 +2 | Ca XII | $2s^2\ 2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.66 | J |
| | 3328.921(16) | 1.37 -2 | Si III | $3s\ 3p$ | $^3P_1$ - $^1P_1$ | 0.033 | |
| | 3330.(30) | 4.52 +2 | Y XXVIII | $3s\ 3p$ | $^3P_0$ - $^3P_1$ | 1.50 | |
| | 3340.(20) | 1.75 +2 | Ge XVIII | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.69 | |
| 3342.5(3) | Q 3342.42(17) | 4.28 +0 | Ne III | $2s^2\ 2p^4$ | $^1D_2$ - $^1S_0$ | 0.064 | B(60) |
| 3342.9(3) | 3342.80(20) | 6.91 -1 | Cl III | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.040 | B(60) |
| 3345.84(2) | 3345.83(16) | 1.24 -1 | Ne V | $2s^2\ 2p^2$ | $^3P_1$ - $^1D_2$ | 0.126 | B(55) |
| | Q 3350.5(8) | 7.70 +0 | Sc VIII | $3s^2\ 3p^2$ | $^1D_2$ - $^1S_0$ | 0.16 | |
| 3353.33(10) | 3353.17(22) | 1.22 -1 | Cl III | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.040 | B(60) |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 3358.189(16) | 2.22 -2 | Si III | 3s 3p | $^3P_2$ - $^1P_1$ | 0.033 | |
| 3362.20(10) | 3362.24(16) | 2.03 -1 | Na IV | $2s^2$ $2p^4$ | $^3P_1$ - $^1D_2$ | 0.099 | B(60) |
| 3370.8(2) | 3370.80(23) | 4.44 +2 | Ti XVII | $2s^2$ $2p^2$ | $^3P_0$ - $^3P_1$ | 1.13 | SFH |
| | 3374.(15) | 3.15 +1 | Zn XV | $3s^2$ $3p^4$ | $^3P_1$ - $^1D_2$ | 0.51 | |
| | 3381.7(2.3) | 7.32 -1 | Sc VII | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.14 | |
| | 3381.9(8) | 4.89 +1* | Mn XI | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.29 | |
| 3388.5(4) | 3388.05(23) | 5.75 +1 | Fe XIII | $3s^2$ $3p^2$ | $^3P_2$ - $^1D_2$ | 0.36 | J |
| | 3418.(40) | 1.89 +2 | Sr XXV | $3s^2$ $3p^2$ | $^3P_1$ - $^3P_2$ | 1.22 | |
| 3425.87(2) | 3425.87(17) | 4.36 -1 | Ne V | $2s^2$ $2p^2$ | $^3P_2$ - $^1D_2$ | 0.126 | B(55) |
| | 3438.(3) | 1.71 +2 | V XVII | $2s^2$ $2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.17 | |
| | 3446.(30) | 1.72 +2 | Kr XXII | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.99 | |
| | 3448.(4) | 2.19 +2 | K XV | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.86 | |
| 3450.4(2) | 3449.(20) | 4.98 +2 | Zn XV | $3s^2$ $3p^4$ | $^3P_2$ - $^3P_1$ | 0.51 | BGBR |
| 3466.4970(6) | 3466.497(1) | 6.18 -3 | N I | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{3/2}$ | 0.015 | E(66) |
| 3466.5434(12) | 3466.543(1) | 2.46 -3 | N I | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2P_{1/2}$ | 0.015 | E(66) |
| | 3486.7(6) | 3.33 +0* | Mg VI | $2s^2$ $2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.187 | |
| | 3488.7(3) | 5.06 +0* | Mg VI | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.187 | |
| 3500.4(3) | 3500.4(1.0) | 4.19 +2 | Cu XIII | $3s^2$ $3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.41 | HSCS |
| | 3502.(20) | 2.43 +2 | Cu XIV | $3s^2$ $3p^4$ | $^3P_1$ - $^1D_2$ | 0.44 | |
| | 3502.0(3) | 3.48 +0* | Mg VI | $2s^2$ $2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.187 | |
| | 3528.9(9) | 9.10 +0 | V X | $3s^2$ $3p^2$ | $^3P_1$ - $^1D_2$ | 0.23 | |
| | Q 3532.17(25) | 3.52 +0 | F IV | $2s^2$ $2p^2$ | $^1D_2$ - $^1S_0$ | 0.087 | |
| | 3566.(20) | 3.62 +2 | Ga XVIII | $3s^2$ $3p^2$ | $^3P_0$ - $^3P_1$ | 0.66 | |
| | Q 3592.01(18) | 4.31 +0 | Sc VI | $3s^2$ $3p^4$ | $^1D_2$ - $^1S_0$ | 0.11 | |
| 3601.1(4) | 3600.0(2.6) | 1.93 +2 | Ni XVI | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.50 | J |
| | 3608.2(9) | 2.86 +1* | Cr X | $3s^2$ $3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.24 | |
| | 3611.(40) | 1.67 +2 | Rb XXIV | $3s^2$ $3p^2$ | $^3P_1$ - $^3P_2$ | 1.13 | |
| | 3630.(30) | 3.52 +2 | Sr XXVII | 3s 3p | $^3P_0$ - $^3P_1$ | 1.40 | |
| | 3636.50(9) | 1.84 +1 | Ni XIII | $3s^2$ $3p^4$ | $^3P_1$ - $^1D_2$ | 0.38 | |
| | 3637.(4) | 2.70 +2 | Ca XVII | 2s 2p | $^3P_1$ - $^3P_2$ | 1.16 | |
| | 3669.1(2.7) | 1.17 -2* | Ca VI | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.11 | |
| | 3677.855(8) | 1.37 +0 | Cl II | $3s^2$ $3p^4$ | $^3P_1$ - $^1S_0$ | 0.024 | |
| 3685.5(4) | 3682.(19) | 4.48 +1 | Mn XII | $3s^2$ $3p^2$ | $^3P_2$ - $^1D_2$ | 0.31 | J |
| 3688.2(2.5) | Q 3686.6(4) | 6.81 +0 | Ca VII | $3s^2$ $3p^2$ | $^1D_2$ - $^1S_0$ | 0.13 | |
| | 3692.8(7) | 1.62 +1 | V VIII | $3s^2$ $3p^4$ | $^3P_2$ - $^1D_2$ | 0.17 | |
| 3721.69(10) | 3721.68(10) | 6.83 -1 | S III | $3s^2$ $3p^2$ | $^3P_1$ - $^1S_0$ | 0.035 | B(60) |
| | 3725.4(2.8) | 2.43 -1* | Ca VI | $3s^2$ $3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.11 | |
| | 3725.8(1.0) | 2.82 +1* | Cr X | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.24 | |
| 3726.04(2) | 3726.03(2) | 1.69 -4* | O II | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.035 | B(55) |
| 3728.80(2) | 3728.82(3) | 5.01 -5* | O II | $2s^2$ $2p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.035 | B(55) |
| | 3756.(36) | 3.73 +2 | Mn XXII | 2s 2p | $^3P_0$ - $^3P_1$ | 1.79 | |
| | 3770.2(1.0) | 3.34 +1 | V IX | $3s^2$ $3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.21 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| 3801.2 | 3801.(4) | 1.34 +1 | Co XII | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.34 | P |
| | 3825.(40) | 1.30 +2 | Br XXI | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.91 | |
| 3840.9(3) | 3832.(40) | 1.46 +2 | Kr XXIII | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 1.05 | RPSKR |
| 3834.4(2) | 3834.4(4) | 2.15 +2 | Ti XVII | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 1.13 | SFH |
| 3868.76(2) | 3868.752(15) | 1.39 -1 | Ne III | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 0.064 | B(55) |
| | 3930.3(2.2) | 4.52 -1 | Ti IX | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.19 | |
| 3941.6(3) | 3941.6(2.2) | 2.16 +2 | Cu XVIII | 3s 3p | $^3P_1 - {}^3P_2$ | 0.60 | DHSC |
| 3967.47(2) | 3967.46(4) | 5.95 -2 | Ne III | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 0.064 | B(55) |
| | 3975.(40) | 2.70 +2 | Rb XXVI | 3s 3p | $^3P_0 - {}^3P_1$ | 1.30 | |
| 3986.8(4) | 3986.80(22) | 9.44 +0 | Fe XI | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.29 | J |
| 3996.8(4) | 3996.6(1.1) | 2.60 +1 | Cr XI | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.27 | J |
| 3997.37(10) | 3997.37(9) | 3.17 -2 | F IV | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 0.087 | B(60) |
| | Q 3997.88(23) | 3.73 +0 | Ca V | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.08 | |
| | 4010.9(2.3) | 1.40 +0* | Na V | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.138 | |
| | 4014.1(1.1) | 1.64 +1* | V IX | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.21 | |
| | 4016.7(2.3) | 1.91 +0* | Na V | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.138 | |
| | 4022.7(2.3) | 1.43 +0* | Na V | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.138 | |
| 4038.6(3) | 4039.(7) | 1.27 +2 | Cr XVIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 1.30 | DH |
| 4060.22(10) | 4060.21(9) | 1.39 -1 | F IV | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 0.087 | B(60) |
| 4068.60(2) | 4068.60(3) | 2.20 -1 | S II | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.023 | B(55) |
| 4076.35(2) | 4076.35(3) | 7.44 -2 | S II | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.023 | B(55) |
| | 4087.(40) | 1.26 +2 | Br XXII | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.96 | |
| 4087.1(4) | 4087.2(5) | 3.19 +2 | Ca XIII | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 0.73 | J |
| | Q 4100.40(24) | 5.92 +0 | K VI | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.10 | |
| | 4110.7(1.2) | 1.66 +1* | V IX | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.21 | |
| 4122.63(10) | 4122.6(3) | 4.96 -3* | K V | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.08 | B(55) |
| | 4130.(50) | 1.74 +2 | Br XX | $3s^2\ 3p^4$ | $^3P_0 - {}^3P_1$ | 0.86 | |
| | 4143.1(7) | 8.46 +0 | Ti VII | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.14 | |
| | 4150.(30) | 9.37 +1 | Ga XVII | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.62 | |
| | Q 4157.75(12) | 2.10 +0 | F II | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 0.035 | |
| 4163.30(10) | 4163.3(3) | 8.06 -2* | K V | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.08 | B(55) |
| 4183.4(3) | 4181.(20) | 2.83 +2 | Cu XIV | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.44 | RPSKR |
| | 4200.(5) | 6.42 +0 | Mn X | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.25 | |
| 4231.2(4) | 4230.9(1.8) | 2.37 +2 | Ni XII | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.35 | J |
| T 4256.4 | 4249.(4) | 2.34 +2 | K XI | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.56 | P |
| | 4249.(50) | 1.75 +2 | Co XX | $2s^2\ 2p^4$ | $^3P_0 - {}^3P_1$ | 1.60 | |
| | 4264.4(5) | 1.77 +1* | Ti VIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.17 | |
| 4276.0(3) | 4305.(40) | 9.47 +1 | Se XX | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.83 | DHSC |
| | 4330.(40) | 2.38 +2 | Cr XXI | 2s 2p | $^3P_0 - {}^3P_1$ | 1.63 | |
| | 4330.0(1.3) | 1.47 +1 | V X | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.23 | |
| 4350.6 | 4352.(10) | 1.09 +2 | Co XV | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.44 | P |
| 4354.3(4) | 4354.4(4) | 2.08 +2 | Sc XVI | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 1.01 | SCCFH |

Table 3. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|---|
| 4363.19(2) | Q | 4363.209(8) | 2.65 +0 | O III | $2s^2\ 2p^2$ | $^1D_2$ - $^1S_0$ | 0.055 | B(55) |
| 4355.0(3) | | 4365.(25) | 2.00 +2 | Zn XVII | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 0.59 | RPSKR |
| | | 4376.(50) | 2.04 +2 | Kr XXV | 3s 3p | $^3P_0$ - $^3P_1$ | 1.22 | |
| 4396.5(3)[b] | | 4383.(50) | 1.07 +2 | Se XXI | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 0.88 | DHSC |
| | | 4393.4(1.4) | 2.15 +0 | Sc VIII | $3s^2\ 3p^2$ | $^3P_1$ - $^1D_2$ | 0.16 | |
| 4412.4(2) | | 4416.(4) | 1.04 +2 | Ar XIV | $2s^2\ 2p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.756 | D |
| | | 4450.5(1.4) | 4.19 +0 | Cr IX | $3s^2\ 3p^4$ | $^3P_1$ - $^1D_2$ | 0.21 | |
| | | 4451.311(14) | 3.07 -3 | Al II | 3s 3p | $^3P_0$ - $^1P_1$ | 0.019 | |
| | | 4463.409(14) | 2.31 -3 | Al II | 3s 3p | $^3P_1$ - $^1P_1$ | 0.019 | |
| | | 4467.6(6) | 9.10 +0* | Ti VIII | $3s^2\ 3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.17 | |
| | | 4488.233(14) | 3.74 -3 | Al II | 3s 3p | $^3P_2$ - $^1P_1$ | 0.019 | |
| 4510.93(10) | Q | 4510.92(29) | 3.18 +0 | K IV | $3s^2\ 3p^4$ | $^1D_2$ - $^1S_0$ | 0.06 | B(60) |
| 4530.3(4) | | 4530.4(5) | 1.34 +2 | Sc XVI | $2s^2\ 2p^2$ | $^3P_1$ - $^3P_2$ | 1.01 | SCCFH |
| | | 4544.4(6) | 9.44 +0* | Ti VIII | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.17 | |
| 4589.2606(5) | | 4589.2606(14) | 3.5 -1 | S I | $3s^2\ 3p^4$ | $^3P_1$ - $^1S_0$ | 0.010 | E(78) |
| 4621.57(10) | | 4621.570(5) | 2.60 -3 | C I | $2s^2\ 2p^2$ | $^3P_1$ - $^1S_0$ | 0.011 | P |
| 4625.54(10) | Q | 4625.34(14) | 5.18 +0 | Ar V | $3s^2\ 3p^2$ | $^1D_2$ - $^1S_0$ | 0.075 | B(55) |
| | | 4635.(15) | 1.31 +2 | K XVI | 2s 2p | $^3P_1$ - $^3P_2$ | 0.97 | |
| 4635.6(3) | | 4639.(5) | 7.19 +1 | Ti XVI | $2s^2\ 2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 1.04 | H |
| | | 4669.25(6) | 1.62 -1 | P II | $3s^2\ 3p^2$ | $^3P_1$ - $^1S_0$ | 0.019 | |
| | | 4673.12(22) | 4.19 +0 | Sc VI | $3s^2\ 3p^4$ | $^3P_2$ - $^1D_2$ | 0.11 | |
| | | 4700.(3) | 8.05 +0 | Ti IX | $3s^2\ 3p^2$ | $^3P_2$ - $^1D_2$ | 0.19 | |
| 4711.33(2) | | 4711.339(11) | 2.07 -3* | Ar IV | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{5/2}$ | 0.060 | B(55) |
| 4714.25(4) | | 4714.22(6) | 6.19 -1* | Ne IV | $2s^2\ 2p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.097 | B(55) |
| 4724.15(4) | | 4724.17(6) | 6.41 -1* | Ne IV | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.097 | B(55) |
| 4725.62(4) | | 4725.60(6) | 5.92 -1* | Ne IV | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2P_{1/2}$ | 0.097 | B(55) |
| | | 4730.(50) | 8.91 +1 | As XX | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 0.81 | |
| 4740.20(2) | | 4740.199(11) | 1.72 -2* | Ar IV | $3s^2\ 3p^3$ | $^4S_{3/2}$ - $^2D_{3/2}$ | 0.060 | B(55) |
| | | 4746.1(1.6) | 2.60 +0 | V VIII | $3s^2\ 3p^4$ | $^3P_1$ - $^1D_2$ | 0.17 | |
| T 4744. | | 4756.(10) | 1.23 +2 | Ni XVII | 3s 3p | $^3P_1$ - $^3P_2$ | 0.57 | P |
| | | 4789.45(12) | 3.83 -2 | F II | $2s^2\ 2p^4$ | $^3P_2$ - $^1D_2$ | 0.035 | |
| | | 4820.6(7) | 8.96 +0* | Sc VII | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2P_{3/2}$ | 0.14 | |
| | | 4844.(60) | 1.51 +2 | Br XXIV | 3s 3p | $^3P_0$ - $^3P_1$ | 1.10 | |
| | | 4856.061(13) | 9.58 -7 | Be I | 2s 2p | $^3P_0$ - $^1P_1$ | 0.009 | |
| | | 4856.212(10) | 9.19 -3 | Be I | 2s 2p | $^3P_1$ - $^1P_1$ | 0.009 | |
| | | 4856.766(13) | 1.19 -6 | Be I | 2s 2p | $^3P_2$ - $^1P_1$ | 0.009 | |
| | | 4868.99(17) | 1.21 -2 | F II | $2s^2\ 2p^4$ | $^3P_1$ - $^1D_2$ | 0.035 | |
| | | 4920.(60) | 6.56 +1 | As XIX | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.76 | |
| 4939.48(20) | | 4939.6(7) | 9.74 -1 | Ca VII | $3s^2\ 3p^2$ | $^3P_1$ - $^1D_2$ | 0.13 | T |
| 4958.93(2) | | 4958.910(7) | 6.37 -3 | O III | $2s^2\ 2p^2$ | $^3P_1$ - $^1D_2$ | 0.055 | B(55) |
| | | 4983.4(7) | 4.91 +0* | Sc VII | $3s^2\ 3p^3$ | $^2D_{5/2}$ - $^2P_{3/2}$ | 0.14 | |
| 5006.86(2) | | 5006.843(8) | 4.67 -2 | O III | $2s^2\ 2p^2$ | $^3P_2$ - $^1D_2$ | 0.055 | B(55) |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 5042.8(7) | 5.15 +0* | Sc VII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.14 | |
| | 5101.7(1.2) | 1.54 +0 | Ti VII | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.14 | |
| 5115.8(4) | 5115.81(10) | 1.57 +2 | Ni XIII | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.38 | J |
| | 5121.7(1.9) | 4.25 +0 | Sc VIII | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.16 | |
| | 5127.(40) | 1.46 +2 | V XX | 2s 2p | $^3P_0 - {}^3P_1$ | 1.49 | |
| 5170.3(3) | 5150.(50) | 7.24 +1 | Ge XIX | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.73 | DHSC |
| T 5188.5 | 5168.(13) | 1.30 +2 | Co XI | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.31 | P |
| | 5172.(8) | 6.21 +1 | V XVII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 1.17 | |
| 5191.82(10) | Q 5191.79(14) | 2.59 +0 | Ar III | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.041 | B(55) |
| 5197.94(10) | 5197.901(14) | 1.62 -5* | N I | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.015 | B(55) |
| 5200.41(10) | 5200.257(14) | 6.92 -6* | N I | $2s^2\ 2p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.015 | B(55) |
| | 5224.(30) | 4.83 +1 | Zn XVI | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.55 | |
| | 5274.(4) | 1.50 +2 | K XII | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 0.63 | |
| 5302.86(6) | 5302.9(6) | 6.02 +1 | Fe XIV | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.39 | E |
| 5309.18(10) | 5309.11(28) | 1.95 +0 | Ca V | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.08 | B(55) |
| 5323.29(10) | Q 5323.3(3) | 4.14 +0 | Cl IV | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.053 | B(55) |
| | 5332.416(11) | 1.08 -1 | P I | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{3/2}$ | 0.010 | |
| | 5339.621(11) | 4.26 -2 | P I | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2P_{1/2}$ | 0.010 | |
| 5375.8(3) | 5393.(30) | 1.07 +2 | Cu XVI | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.52 | DHSC |
| | 5397.(60) | 1.10 +2 | Se XXIII | 3s 3p | $^3P_0 - {}^3P_1$ | 1.00 | |
| 5446.0 | 5443.9(8) | 7.90 +1 | Ca XV | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 0.89 | P |
| 5460.7 | 5460.7(8) | 4.31 +0* | Ca VI | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.11 | T |
| 5517.66(10) | 5517.71(6) | 8.07 -4* | Cl III | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.040 | B(55) |
| 5533.4(4) | 5533.39(21) | 1.06 +2 | Ar X | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.479 | J |
| 5537.6(3) | 5537.88(6) | 3.44 -3* | Cl III | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.040 | B(55) |
| | 5539.6(4) | 8.49 -1 | Sc VI | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.11 | |
| 5577.34(10) | Q 5577.338(4) | 1.34 +0 | O I | $2s^2\ 2p^4$ | $^1D_2 - {}^1S_0$ | 0.014 | P |
| 5586.3 | 5586.3(9) | 2.58 +0* | Ca VI | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.11 | T |
| | 5602.4(4) | 4.13 -1 | K VI | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.10 | |
| 5618.58(20) | 5618.8(9) | 2.15 +0 | Ca VII | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.13 | T |
| T 5645.0(3)[b] | 5620.(80) | 7.22 +1 | Se XIX | $3s^2\ 3p^4$ | $^3P_0 - {}^3P_1$ | 0.79 | DHSC |
| | 5631.7(9) | 2.70 +0* | Ca VI | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.11 | |
| | 5650.(60) | 5.74 +1 | Ga XVIII | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.66 | |
| 5693.6(4) | 5693.5(6) | 9.40 +1 | Ca XV | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 0.89 | J |
| | 5721.20(19) | 3.05 -1* | F III | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.063 | |
| T 5702.4(2) | 5730.(60) | 4.28 +1 | Ge XVIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.69 | DHST |
| | 5732.95(19) | 2.08 -1* | F III | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.063 | |
| | 5733.21(19) | 2.74 -1* | F III | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.063 | |
| 5744. | 5746.(19) | 7.01 +1 | Co XVI | 3s 3p | $^3P_1 - {}^3P_2$ | 0.51 | P |
| | 5746.(20) | 4.73 +1 | Cl XIII | $2s^2\ 2p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.657 | |
| 5754.57(4) | Q 5754.64(5) | 1.08 +0 | N II | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 0.030 | B(55) |
| T 5926. | 5944.(25) | 6.20 +1 | Ar XV | 2s 2p | $^3P_1 - {}^3P_2$ | 0.855 | P |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 6055.(70) | 7.84 +1 | As XXII | $3s\ 3p$ | $^3P_0 - {}^3P_1$ | 0.90 | |
| 6086.92(10) | 6086.4(5) | 4.35 -1 | Ca V | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.08 | B(55) |
| | 6092.(16) | 8.71 +1 | Ti XIX | $2s\ 2p$ | $^3P_0 - {}^3P_1$ | 1.35 | |
| 6101.83(10) | 6101.8(4) | 8.38 -1 | K IV | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.06 | B(55) |
| Q | 6161.835(21) | 2.06 +0 | Cl II | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.024 | |
| | 6221.9(1.1) | 1.97 +0* | K V | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.08 | |
| | 6228.6(5) | 1.03 +0 | K VI | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.10 | |
| | 6266.(50) | 4.40 +1 | Zn XVII | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.59 | |
| 6300.304(2) | 6300.304(6) | 5.11 -3 | O I | $2s^2\ 2p^4$ | $^3P_2 - {}^1D_2$ | 0.014 | E(65) |
| 6312.06(4) Q | 6312.1(4) | 3.22 +0 | S III | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.035 | B(55) |
| | 6315.1(1.1) | 1.34 +0* | K V | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.08 | |
| | 6319.(8) | 8.42 +1 | Co XII | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.34 | |
| | 6349.2(1.1) | 1.37 +0* | K V | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.08 | |
| 6363.776(2) | 6363.776(6) | 1.65 -3 | O I | $2s^2\ 2p^4$ | $^3P_1 - {}^1D_2$ | 0.014 | E(65) |
| 6374.6(4) | 6374.53(4) | 6.94 +1 | Fe X | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.26 | J |
| | 6404.(9) | 2.82 +1 | Sc XV | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.93 | |
| 6435.10(10) | 6435.1(1.0) | 1.61 -1 | Ar V | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.075 | B(55) |
| | 6526.781(3) | 3.55 -2 | Si I | $3s^2\ 3p^2$ | $^3P_1 - {}^1S_0$ | 0.008 | |
| 6536.3(4) | 6536.3(4) | 3.22 +1 | Mn XIII | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.34 | J |
| 6548.06(4) | 6548.03(5) | 1.04 -3 | N II | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 0.030 | B(55) |
| 6583.39(7) | 6583.41(5) | 3.02 -3 | N II | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 0.030 | B(55) |
| | 6669.(11) | 4.37 +1 | K XIV | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 0.79 | |
| | 6683.(40) | 2.37 +1 | Cu XV | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.48 | |
| 6701.7(4) | 6701.68(22) | 5.65 +1 | Ni XV | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.46 | J |
| 6716.47(2) | 6716.467(23) | 2.65 -4* | S II | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.023 | TMR |
| 6730.85(2) | 6730.847(23) | 5.37 -4* | S II | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.023 | TMR |
| | 6790.(80) | 2.65 +1 | Ga XVII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.62 | |
| | 6795.0(7) | 2.03 -1 | K IV | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.06 | |
| | 6806.(10) | 2.80 +1 | Ti XVI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 1.04 | |
| | 6840.(60) | 5.46 +1 | Ge XXI | $3s\ 3p$ | $^3P_0 - {}^3P_1$ | 0.80 | |
| T 6917. | 6931.(24) | 6.63 +1 | Ar XI | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 0.539 | P |
| 7005.67(10) | 7005.7(1.2) | 4.70 -1 | Ar V | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.075 | B(55) |
| | 7030.(50) | 3.25 +1 | Cu XVI | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.52 | |
| | 7045.(20) | 4.03 +1 | Fe XIX | $2s^2\ 2p^4$ | $^3P_0 - {}^3P_1$ | 1.47 | |
| 7058.6(4) | 7060.(10) | 3.74 +1 | Fe XV | $3s\ 3p$ | $^3P_1 - {}^3P_2$ | 0.46 | J |
| 7135.80(4) | 7135.78(10) | 3.24 -1 | Ar III | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.041 | B(55) |
| 7170.62(10) | 7170.47(16) | 8.40 -1* | Ar IV | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.060 | B(55) |
| 7237.26(30) | 7237.54(16) | 7.08 -1* | Ar IV | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.060 | B(55) |
| 7262.76(30) | 7262.7(3) | 6.96 -1* | Ar IV | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.060 | B(55) |
| | 7319.(11) | 5.01 +1 | Sc XVIII | $2s\ 2p$ | $^3P_0 - {}^3P_1$ | 1.21 | |
| 7319.92(10) | 7319.92(20) | 1.15 -1* | O II | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.035 | B(55) |
| 7330.19(10) | 7329.63(20) | 1.01 -1* | O II | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.035 | B(55) |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 7330.70(20) | 6.14 -2* | O II | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.035 | |
| | 7334.(11) | 4.55 +1 | Cl IX | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.400 | |
| 7530.54(10) | 7529.9(4) | 5.57 -2 | Cl IV | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.053 | B(55) |
| | 7554.(11) | 4.06 +1 | K XIV | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 0.79 | |
| | 7573.179(8) | 1.95 -4 | Mg I | 3s 3p | $^3P_0 - {}^1P_1$ | 0.008 | |
| | 7584.704(8) | 1.46 -4 | Mg I | 3s 3p | $^3P_1 - {}^1P_1$ | 0.008 | |
| | 7608.206(8) | 2.40 -4 | Mg I | 3s 3p | $^3P_2 - {}^1P_1$ | 0.008 | |
| 7611.0(4) | 7611.2(6) | 2.04 +1 | S XII | $2s^2\ 2p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.565 | J |
| 7725.0461(7) | Q 7725.046(4) | 1.53 +0 | S I | $3s^2\ 3p^4$ | $^1D_2 - {}^1S_0$ | 0.010 | E(78) |
| 7751.06(10) | 7751.12(11) | 8.44 -2 | Ar III | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.041 | B(55) |
| | 7756.(40) | 2.80 +1 | Cl XIV | 2s 2p | $^3P_1 - {}^3P_2$ | 0.750 | |
| | 7800.(100) | 3.70 +1 | Ga XX | 3s 3p | $^3P_0 - {}^3P_1$ | 0.70 | |
| | Q 7875.99(17) | 2.24 +0 | P II | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.019 | |
| 7891.8(4) | 7891.8(6) | 4.37 +1 | Fe XI | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.29 | J |
| | 7968.5(1.3) | 3.55 +1 | Mn IX | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.22 | |
| | 7990.(100) | 2.63 +1 | As XVIII | $3s^2\ 3p^4$ | $^3P_0 - {}^3P_1$ | 0.71 | |
| 8024.1(4) | 8024.1(5) | 2.27 +1 | Ni XV | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.46 | J |
| 8045.63(10) | 8046.1(5) | 2.08 -1 | Cl IV | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.053 | B(55) |
| 8153.8(4) | 8153.7(7) | 1.66 +1 | Cr XII | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.30 | J |
| | 8206.(100) | 1.54 +1 | Zn XVI | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.55 | |
| | 8303.(40) | 2.29 +1 | Ar XIII | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 0.686 | |
| | 8310.(34) | 2.99 +1 | Co XIV | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.41 | |
| | 8433.65(12) | 3.39 -1* | Cl III | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.040 | |
| | 8480.85(12) | 3.87 -1* | Cl III | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.040 | |
| | 8500.00(13) | 3.60 -1* | Cl III | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.040 | |
| | 8578.697(29) | 1.07 -1 | Cl II | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.024 | |
| | 8690.(40) | 1.11 +1 | Ni XIV | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.43 | |
| 8727.18(10) | Q 8727.141(22) | 5.01 -1 | C I | $2s^2\ 2p^2$ | $^1D_2 - {}^1S_0$ | 0.011 | Sw |
| | 8770.(110) | 1.97 +1 | Mn XIV | 3s 3p | $^3P_1 - {}^3P_2$ | 0.40 | |
| | 8787.54(3) | 1.96 -4* | P I | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{5/2}$ | 0.010 | |
| | 8799.61(3) | 2.97 -4* | P I | $3s^2\ 3p^3$ | $^4S_{3/2} - {}^2D_{3/2}$ | 0.010 | |
| | 8950.(22) | 2.77 +1 | Ca XVII | 2s 2p | $^3P_0 - {}^3P_1$ | 1.16 | |
| | 8952.(150) | 2.46 +1 | Zn XIX | 3s 3p | $^3P_0 - {}^3P_1$ | 0.70 | |
| | 9068.9(7) | 1.62 -2 | S III | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.035 | |
| | 9122.(18) | 1.01 +1 | Ca XIV | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.82 | |
| | 9123.60(5) | 2.98 -2 | Cl II | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.024 | |
| | 9223.(18) | 2.83 +1 | Cl X | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 0.456 | |
| | 9291.(18) | 1.13 +1 | Sc XV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.93 | |
| | 9300.(60) | 1.50 +1 | Co XIV | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.41 | |
| | 9531.0(7) | 9.40 -2 | S III | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.035 | |
| | 9824.109(22) | 7.79 -5 | C I | $2s^2\ 2p^2$ | $^3P_1 - {}^1D_2$ | 0.011 | |
| 9850.28(10) | 9850.243(22) | 2.30 -4 | C I | $2s^2\ 2p^2$ | $^3P_2 - {}^1D_2$ | 0.011 | Sw |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| T 9911.(1) | 9911.8(1.0) | 1.84 +1 | S VIII | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.329 | J |
| | 9978.(4) | 2.18 +1 | Mn X | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.25 | |
| | 10106.4(2.0) | 1.74 +1 | Cr VIII | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.18 | |
| | 10130.(100) | 8.43 +0 | Cu XV | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.48 | |
| | 10159.(40) | 1.68 +1 | Ar XIII | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 0.686 | |
| | 10264.(30) | 1.20 +1 | S XIII | 2s 2p | $^3P_1 - {}^3P_2$ | 0.652 | |
| | 10286.66(22) | 1.32 -1* | S II | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.023 | |
| | 10308.(3) | 8.20 +0 | P XI | $2s^2\ 2p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.479 | |
| | 10311.(5) | 8.19 +0 | V XI | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.26 | |
| | 10320.42(22) | 2.22 -1* | S II | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.023 | |
| | 10336.33(22) | 1.95 -1* | S II | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.023 | |
| 10397.74(10) | 10397.74(5) | 5.48 -2* | N I | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.015 | P |
| | 10407.17(5) | 2.47 -2* | N I | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.015 | |
| | 10407.59(6) | 4.71 -2* | N I | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.015 | |
| | 10436.(120) | 1.59 +1 | Cu XVIII | 3s 3p | $^3P_0 - {}^3P_1$ | 0.60 | |
| | 10672.(24) | 1.09 +1 | Cl XII | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 0.592 | |
| 10746.8(4) | 10746.9(5) | 1.40 +1 | Fe XIII | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.36 | J |
| 10797.9(4) | 10797.9(7) | 9.87 +0 | Fe XIII | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.36 | J |
| 10821.177(5) | 10821.176(6) | 2.75 -2 | S I | $3s^2\ 3p^4$ | $^3P_2 - {}^1D_2$ | 0.010 | E(78) |
| | 10878.(120) | 1.03 +1 | Cr XIII | 3s 3p | $^3P_1 - {}^3P_2$ | 0.35 | |
| 10991.42(10) | Q 10991.413(9) | 7.96 -1 | Si I | $3s^2\ 3p^2$ | $^1D_2 - {}^1S_0$ | 0.008 | P |
| | 11110.(90) | 1.45 +1 | K XVI | 2s 2p | $^3P_0 - {}^3P_1$ | 0.97 | |
| | 11305.854(9) | 8.0 -3 | S I | $3s^2\ 3p^4$ | $^3P_1 - {}^1D_2$ | 0.010 | |
| | 11468.2(4) | 3.62 -3 | P II | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.019 | |
| | 11478.(40) | 4.98 +0 | Co XIII | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.38 | |
| | 11882.8(4) | 5.13 -2 | P II | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.019 | |
| | 12060.(200) | 7.99 +0 | Ge XVII | $3s^2\ 3p^4$ | $^3P_0 - {}^3P_1$ | 0.64 | |
| | 12150.(60) | 1.00 +1 | Ni XVII | 3s 3p | $^3P_0 - {}^3P_1$ | 0.57 | |
| | 12520.(20) | 1.14 +1 | S IX | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 0.379 | |
| | 12783.(8) | 1.04 +1 | Cr IX | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.21 | |
| | 12815.0(1.2) | 4.27 +0 | Ni XIV | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.43 | |
| | 12817.(230) | 6.03 +0 | Mn XII | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.31 | |
| | 13038.(3) | 8.11 +0 | V VII | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.15 | |
| | 13070.(40) | 4.19 +0 | Ca XIV | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.82 | |
| | 13254.(7) | 3.86 +0 | Ti X | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.22 | |
| | 13450.(40) | 3.25 +0 | K XIII | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.71 | |
| | 13533.61(10) | 7.45 -2* | P I | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{3/2}$ | 0.010 | |
| | 13562.27(10) | 1.13 -1* | P I | $3s^2\ 3p^3$ | $^2D_{5/2} - {}^2P_{3/2}$ | 0.010 | |
| | 13580.12(10) | 1.01 -1* | P I | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2P_{1/2}$ | 0.010 | |
| | 13745.(6) | 6.92 +0 | P VII | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.264 | |
| | 13774.(40) | 6.78 +0 | Cl XII | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 0.592 | |
| | 13885.(190) | 6.52 +0 | Mn XII | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.31 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 13904.(140) | 7.34 +0 | Ar XV | $2s\ 2p$ | $^3P_0 - {}^3P_1$ | 0.855 | |
| | 13924.(50) | 4.94 +0 | S XI | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 0.505 | |
| | 13951.(40) | 4.75 +0 | P XII | $2s\ 2p$ | $^3P_1 - {}^3P_2$ | 0.561 | |
| | 13963.(280) | 4.82 +0 | V XII | $3s\ 3p$ | $^3P_1 - {}^3P_2$ | 0.31 | |
| | 14200.(600) | 5.15 +0 | Mn XVIII | $2s^2\ 2p^4$ | $^3P_0 - {}^3P_1$ | 1.32 | |
| | 14300.(120) | 6.17 +0 | Co XVI | $3s\ 3p$ | $^3P_0 - {}^3P_1$ | 0.51 | |
| 14305.(4) | 14301.(4) | 3.07 +0 | Si X | $2s^2\ 2p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.401 | MNM |
| | 15514.(17) | 3.46 +0 | Cr XI | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.27 | |
| | 15606.(17) | 2.04 +0 | Fe XII | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.33 | |
| | 16068.297(18) | 9.75 -4 | Si I | $3s^2\ 3p^2$ | $^3P_1 - {}^1D_2$ | 0.008 | |
| | 16454.531(19) | 2.71 -3 | Si I | $3s^2\ 3p^2$ | $^3P_2 - {}^1D_2$ | 0.008 | |
| | 16550.(70) | 2.04 +0 | Co XIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.38 | |
| | 16640.(14) | 4.76 +0 | V VIII | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.17 | |
| | 17150.(30) | 3.56 +0 | Ti VI | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.12 | |
| | 17350.(80) | 4.28 +0 | P VIII | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 0.310 | |
| | 17353.(12) | 1.72 +0 | Sc IX | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.18 | |
| | 17390.(60) | 3.58 +0 | Fe XV | $3s\ 3p$ | $^3P_0 - {}^3P_1$ | 0.46 | |
| | 17700.(220) | 3.52 +0 | Cl XIV | $2s\ 2p$ | $^3P_0 - {}^3P_1$ | 0.750 | |
| | 17710.(40) | 2.43 +0 | Ti XI | $3s\ 3p$ | $^3P_1 - {}^3P_2$ | 0.27 | |
| | 18059.(16) | 2.98 +0 | Cr XI | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.27 | |
| | 18680.(100) | 2.05 +0 | P X | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 0.424 | |
| | 19080.(30) | 1.88 +0 | V X | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.23 | |
| | 19200.(70) | 2.51 +0 | S XI | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 0.505 | |
| | 19320.(50) | 1.80 +0 | Si XI | $2s\ 2p$ | $^3P_1 - {}^3P_2$ | 0.476 | |
| | 19380.(80) | 1.32 +0 | K XIII | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.71 | |
| 19590.(70) | 19641.(11) | 2.37 +0 | Si VI | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.205 | GJ |
| | 2.00(7) μm | 1.82 +0 | Ga XVI | $3s^2\ 3p^4$ | $^3P_0 - {}^3P_1$ | 0.58 | |
| 2.040(7) | 2.044(4) μm | 1.05 +0 | Al IX | $2s^2\ 2p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.330 | GJ |
| | 2.066(24) μm | 9.24 -1 | Ar XII | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.618 | |
| | 2.09(6) μm | 2.03 +0 | Mn XIV | $3s\ 3p$ | $^3P_0 - {}^3P_1$ | 0.40 | |
| | 2.170(3) μm | 7.80 -1 | Mn XI | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.29 | |
| | 2.2050(10) μm | 2.06 +0 | Ti VII | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.14 | |
| | 2.217(3) μm | 8.68 -1 | Fe XII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.33 | |
| | 2.258(15) μm | 4.46 +0 | Ca XIII | $2s^2\ 2p^4$ | $^3P_1 - {}^3P_0$ | 0.73 | |
| | 2.3112(4) μm | 1.46 +0 | Sc V | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.09 | |
| 2.32(2) | 2.3205(11) μm | 7.20 -1 | Ca VIII | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.15 | GJ |
| | 2.321(4) μm | 1.09 +0 | Sc X | $3s\ 3p$ | $^3P_1 - {}^3P_2$ | 0.23 | |
| | 2.336(15) μm | 1.58 +0 | S XIII | $2s\ 2p$ | $^3P_0 - {}^3P_1$ | 0.652 | |
| | 2.351(12) μm | 4.01 +0 | K XII | $2s^2\ 2p^4$ | $^3P_1 - {}^3P_0$ | 0.63 | |
| | 2.392(3) μm | 1.29 +0 | V X | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.23 | |
| | 2.396(12) μm | 3.66 +0 | Sc XIV | $2s^2\ 2p^4$ | $^3P_1 - {}^3P_0$ | 0.83 | |
| | 2.401(8) μm | 9.55 -1 | Ti IX | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.19 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| 2.474(7) | 2.4807(18)μm | 1.47 +0 | Si VII | $2s^2\ 2p^4$ | $^3P_2$ - $^3P_1$ | 0.247 | GJ |
| | 2.54(6) μm | 1.13 +0 | Cr XIII | 3s 3p | $^3P_0$ - $^3P_1$ | 0.35 | |
| | 2.5839(5) μm | 7.79 -1 | Si IX | $2s^2\ 2p^2$ | $^3P_1$ - $^3P_2$ | 0.351 | |
| | 2.60(5) μm | 3.00 +0 | Ar XI | $2s^2\ 2p^4$ | $^3P_1$ - $^3P_0$ | 0.539 | |
| | 2.708(21) μm | 8.99 -1 | P X | $2s^2\ 2p^2$ | $^3P_0$ - $^3P_1$ | 0.424 | |
| | 2.753(20) μm | 6.16 -1 | Al X | 2s 2p | $^3P_1$ - $^3P_2$ | 0.399 | |
| 2.879(14) | 2.9045(17)μm | 7.34 -1 | Al V | $2s^2\ 2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.154 | GJ |
| | 2.97(6) μm | 3.77 -1 | Ar XII | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.618 | |
| | 2.9877(9) μm | 8.29 -1 | Sc VI | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 0.11 | |
| | 3.013(6) μm | 3.54 -1 | Mn XI | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.29 | |
| 3.0275(20) | 3.0275(20)μm | 3.24 -1 | Mg VIII | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.266 | MNM |
| | 3.051(20) μm | 1.87 +0 | Cl X | $2s^2\ 2p^4$ | $^3P_1$ - $^3P_0$ | 0.456 | |
| | 3.088(13) μm | 4.54 -1 | Ca IX | 3s 3p | $^3P_1$ - $^3P_2$ | 0.19 | |
| | 3.090(7) μm | 4.51 -1 | Sc VIII | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 0.16 | |
| | 3.103(7) μm | 2.74 -1 | Cr X | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.24 | |
| | 3.112(22) μm | 6.80 -1 | P XII | 2s 2p | $^3P_0$ - $^3P_1$ | 0.561 | |
| | 3.1899(10)μm | 2.77 -1 | K VII | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.12 | |
| | 3.205(10) μm | 5.39 -1 | Ti IX | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 0.19 | |
| 3.18(3) | 3.2061(10)μm | 5.46 -1 | Ca IV | $3s^2\ 3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.07 | GJ |
| | 3.24(15) μm | 5.67 -1 | V XII | 3s 3p | $^3P_0$ - $^3P_1$ | 0.31 | |
| | 3.263(23) μm | 2.40 -1 | Cl XI | $2s^2\ 2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.529 | |
| | 3.270(22) μm | 1.41 +0 | Ti XV | $2s^2\ 2p^4$ | $^3P_1$ - $^3P_0$ | 0.94 | |
| 3.661(14) | 3.6593(19)μm | 4.58 -1 | Al VI | $2s^2\ 2p^4$ | $^3P_2$ - $^3P_1$ | 0.154 | GJ |
| 3.72(2) | 3.689(3) μm | 2.68 -1 | Al VIII | $2s^2\ 2p^2$ | $^3P_1$ - $^3P_2$ | 0.285 | GJ |
| | 3.75(3) μm | 1.01 +0 | S IX | $2s^2\ 2p^4$ | $^3P_1$ - $^3P_0$ | 0.379 | |
| | 3.896(21) μm | 3.00 -1 | Ti XI | 3s 3p | $^3P_0$ - $^3P_1$ | 0.27 | |
| 3.92(2) | 3.928(11) μm | 2.95 -1 | Si IX | $2s^2\ 2p^2$ | $^3P_0$ - $^3P_1$ | 0.351 | GJ |
| | 4.0(2) μm | 2.39 -1 | Zn XV | $3s^2\ 3p^4$ | $^3P_0$ - $^3P_1$ | 0.51 | |
| | 4.06(4) μm | 1.91 -1 | Mg IX | 2s 2p | $^3P_1$ - $^3P_2$ | 0.328 | |
| | 4.086(5) μm | 1.96 -1 | Ca VII | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 0.13 | |
| | 4.1574(17)μm | 3.09 -1 | Ca V | $3s^2\ 3p^4$ | $^3P_2$ - $^3P_1$ | 0.08 | |
| | 4.213(13) μm | 1.79 -1 | K VIII | 3s 3p | $^3P_1$ - $^3P_2$ | 0.15 | |
| | 4.260(13) μm | 1.28 -1 | Cr X | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.24 | |
| | 4.27(3) μm | 2.59 -1 | Si XI | 2s 2p | $^3P_0$ - $^3P_1$ | 0.476 | |
| | 4.3(4) μm | 1.93 -1 | Cr XVII | $2s^2\ 2p^4$ | $^3P_0$ - $^3P_1$ | 1.19 | |
| | 4.400(10) μm | 2.09 -1 | Sc VIII | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 0.16 | |
| | 4.487(4) μm | 1.99 -1 | Mg IV | $2s^2\ 2p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.109 | |
| | 4.527(5) μm | 9.69 -2 | Ar VI | $3s^2$ 3p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.091 | |
| | 4.552(15) μm | 8.87 -2 | V IX | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.21 | |
| | 4.6153(21)μm | 1.83 -1 | K III | $3s^2\ 3p^5$ | $^2P_{3/2}$ - $^2P_{1/2}$ | 0.05 | |
| | 4.675(22) μm | 8.80 -2 | Na VII | $2s^2$ 2p | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.209 | |
| | 4.85(8) μm | 4.70 -1 | P VIII | $2s^2\ 2p^4$ | $^3P_1$ - $^3P_0$ | 0.310 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 4.91(5) μm | 8.53 -2 | Cl XI | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.529 | |
| | 4.984(18) μm | 1.40 -1 | Sc X | 3s 3p | $^3P_0 - {}^3P_1$ | 0.23 | |
| | 5.467(21) μm | 5.22 -2 | S X | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.447 | |
| | 5.50(3) μm | 8.09 -2 | Mg VII | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 0.225 | |
| | 5.575(4) μm | 7.74 -2 | K VI | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.10 | |
| 5.60(2) | 5.608(9) μm | 1.27 -1 | Mg V | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 0.141 | RSW |
| | 5.624(18) μm | 2.90 -1 | Mn X | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.25 | |
| | 5.787(24) μm | 2.73 -1 | Cr IX | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.21 | |
| | 5.85(10) μm | 8.96 -2 | Al VIII | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 0.285 | |
| | 5.95(5) μm | 6.41 -2 | Ar VII | 3s 3p | $^3P_1 - {}^3P_2$ | 0.124 | |
| | 5.983(4) μm | 1.04 -1 | K IV | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.06 | |
| | 6.06(12) μm | 9.19 -2 | Al X | 2s 2p | $^3P_0 - {}^3P_1$ | 0.399 | |
| | 6.082(19) μm | 2.23 -1 | Fe XI | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.29 | |
| | 6.154(8) μm | 7.67 -2 | Ca VII | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.13 | |
| | 6.207(27) μm | 4.23 -2 | V IX | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.21 | |
| | 6.23(3) μm | 5.27 -2 | Na VIII | 2s 2p | $^3P_1 - {}^3P_2$ | 0.264 | |
| | 6.362(29) μm | 2.08 -1 | V VIII | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.17 | |
| | 6.515(18) μm | 1.94 -1 | Si VII | $2s^2\ 2p^4$ | $^3P_1 - {}^3P_0$ | 0.247 | |
| | 6.67(6) μm | 6.16 -2 | Ca IX | 3s 3p | $^3P_0 - {}^3P_1$ | 0.19 | |
| | 6.704(9) μm | 2.98 -2 | Cl V | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.068 | |
| | 6.923(14) μm | 2.57 -2 | Ti VIII | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.17 | |
| 6.985274(3) | 6.985274(3) μm | 5.28 -2 | Ar II | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.028 | YKH |
| | 7.319(5) μm | 4.59 -2 | Na III | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.072 | |
| | 7.386(15) μm | 1.34 -1 | Ti VII | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.14 | |
| | 7.642(6) μm | 2.01 -2 | Ne VI | $2s^2\ 2p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.158 | |
| | 7.904(22) μm | 2.72 -2 | Ar V | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.075 | |
| | 8.00(18) μm | 9.59 -2 | Co XII | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.34 | |
| | 8.58(5) μm | 2.10 -2 | Cl VI | 3s 3p | $^3P_1 - {}^3P_2$ | 0.097 | |
| | 8.61(9) μm | 2.11 -2 | Na VI | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 0.172 | |
| | 8.676(11) μm | 1.58 -2 | S X | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.447 | |
| | 8.823(8) μm | 2.61 -2 | K VI | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.10 | |
| | 8.87(17) μm | 2.94 -2 | Mg IX | 2s 2p | $^3P_0 - {}^3P_1$ | 0.328 | |
| | 8.99(6) μm | 2.52 -2 | K VIII | 3s 3p | $^3P_0 - {}^3P_1$ | 0.15 | |
| 8.9910(1) | 8.9907(12) μm | 3.06 -2 | Ar III | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.041 | L |
| | 9.001(11) μm | 7.49 -2 | Sc VI | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.11 | |
| | 9.03(9) μm | 2.44 -2 | Mg VII | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 0.225 | |
| | 9.039(12) μm | 3.04 -2 | Na IV | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 0.099 | |
| | 9.116(6) μm | 7.10 -2 | Al VI | $2s^2\ 2p^4$ | $^3P_1 - {}^3P_0$ | 0.154 | |
| | 9.382(25) μm | 1.24 -2 | Ti VIII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.17 | |
| | 9.62(26) μm | 9.74 -3 | P IX | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.372 | |
| | 9.78(26) μm | 5.10 -2 | V XVI | $2s^2\ 2p^4$ | $^3P_1 - {}^3P_0$ | 1.06 | |
| | 10.06(7) μm | 1.25 -2 | Ne VII | 2s 2p | $^3P_1 - {}^3P_2$ | 0.207 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| 10.5105(1) | 10.5141(22) μm | 7.73 -3 | S IV | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.047 | L |
| | 10.94(3) μm | 6.61 -3 | Sc VII | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.14 | |
| 11.333347(15) | 11.333347(15) μm | 1.24 -2 | Cl I | $3s^2\ 3p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.013 | DJM |
| | 11.482(19) μm | 3.62 -2 | Ca V | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.08 | |
| | 11.741(7) μm | 8.32 -3 | Cl IV | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.053 | |
| | 12.42(22) μm | 9.36 -3 | Ar VII | 3s 3p | $^3P_0 - {}^3P_1$ | 0.124 | |
| 12.81355(2) | 12.8134(4) μm | 8.55 -3 | Ne II | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.041 | YKH |
| | 13.07(7) μm | 8.03 -3 | Ar V | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.075 | |
| | 13.12(26) μm | 5.49 -3 | S V | 3s 3p | $^3P_1 - {}^3P_2$ | 0.073 | |
| | 13.432(9) μm | 3.71 -3 | F V | $2s^2\ 2p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.114 | |
| | 13.54(5) μm | 2.17 -2 | Mg V | $2s^2\ 2p^4$ | $^3P_1 - {}^3P_0$ | 0.141 | |
| | 13.66(13) μm | 8.27 -3 | Na VIII | 2s 2p | $^3P_0 - {}^3P_1$ | 0.264 | |
| | 13.9(4) μm | 5.80 -3 | Cu XIV | $3s^2\ 3p^4$ | $^3P_0 - {}^3P_1$ | 0.44 | |
| | 14.3(3) μm | 6.14 -3 | Na VI | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 0.172 | |
| | 14.32(3) μm | 4.59 -3 | Ne V | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 0.126 | |
| | 14.3678(8) μm | 7.50 -3 | Cl II | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.024 | |
| | 14.76(6) μm | 2.99 -3 | Sc VII | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.14 | |
| | 15.39(3) μm | 1.51 -2 | K IV | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.06 | |
| | 15.555(5) μm | 5.97 -3 | Ne III | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 0.064 | |
| | 16.34(11) μm | 2.39 -3 | P IX | $2s^2\ 2p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.372 | |
| | 17.36(21) μm | 2.39 -3 | F VI | 2s 2p | $^3P_1 - {}^3P_2$ | 0.157 | |
| | 17.885(5) μm | 1.57 -3 | P III | $3s^2\ 3p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.030 | |
| | 17.99(9) μm | 1.50 -3 | Ca VI | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.11 | |
| | 18.08(23) μm | 3.16 -3 | Cl VI | 3s 3p | $^3P_0 - {}^3P_1$ | 0.097 | |
| | 18.45(24) μm | 1.40 -3 | Si VIII | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.304 | |
| 18.7129(4) | 18.7129(5) μm | 2.06 -3 | S III | $3s^2\ 3p^2$ | $^3P_1 - {}^3P_2$ | 0.035 | BBAMC |
| | 19.3(4) μm | 5.90 -3 | Ni XIII | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.38 | |
| | 20.354(21) μm | 2.13 -3 | Cl IV | $3s^2\ 3p^2$ | $^3P_0 - {}^3P_1$ | 0.053 | |
| | 21.29(6) μm | 5.58 -3 | Na IV | $2s^2\ 2p^4$ | $^3P_1 - {}^3P_0$ | 0.099 | |
| | 21.336(6) μm | 1.38 -3 | P IV | 3s 3p | $^3P_1 - {}^3P_2$ | 0.051 | |
| | 21.842(6) μm | 5.31 -3 | Ar III | $3s^2\ 3p^4$ | $^3P_1 - {}^3P_0$ | 0.041 | |
| | 22.0(3) μm | 1.99 -3 | Ne VII | 2s 2p | $^3P_0 - {}^3P_1$ | 0.207 | FMH |
| 24.28(2) | 24.21(19) μm | 1.27 -3 | Ne V | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 0.126 | |
| | 24.30(17) μm | 7.34 -4 | Ca VI | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.11 | |
| 24.7475(15) | 24.740(12) μm | 1.19 -3 | F I | $2s^2\ 2p^5$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.017 | SK |
| | 25.2490(3) μm | 1.40 -3 | S I | $3s^2\ 3p^4$ | $^3P_2 - {}^3P_1$ | 0.010 | |
| | 25.83(4) μm | 7.82 -4 | F IV | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 0.087 | |
| 25.87(2) | 25.913(13) μm | 5.17 -4 | O IV | $2s^2\ 2p$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.077 | FMH |
| | 27.1(1.1) μm | 9.16 -4 | S V | 3s 3p | $^3P_0 - {}^3P_1$ | 0.073 | |
| | 29.33(4) μm | 8.91 -4 | F II | $2s^2\ 2p^4$ | $^3P_2 - {}^3P_1$ | 0.035 | |
| | 31.1(3) μm | 2.94 -4 | K V | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.08 | |
| | 32.61(8) μm | 3.55 -4 | O V | 2s 2p | $^3P_1 - {}^3P_2$ | 0.114 | |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|
| | 32.87(3) μm | 3.80 -4 | P II | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 0.019 | |
| | 33.281(8) μm | 1.50 -3 | Cl II | $3s^2\ 3p^4$ | $^3P_1$ - $^3P_0$ | 0.024 | |
| 33.47(2) | 33.47(2) μm | 4.78 -4 | S III | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 0.035 | HBGSH |
| | 34.8141(18) μm | 2.13 -4 | Si II | $3s^2\ 3p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.016 | |
| 36.02(1) | 36.02(4) μm | 1.15 -3 | Ne III | $2s^2\ 2p^4$ | $^3P_1$ - $^3P_0$ | 0.064 | SHG |
| | 37.6(6) μm | 1.67 -4 | Al VII | $2s^2\ 2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.241 | |
| | 38.207(21) μm | 2.41 -4 | Si III | 3s 3p | $^3P_1$ - $^3P_2$ | 0.033 | |
| | 38.5(1.0) μm | 3.87 -4 | F VI | 2s 2p | $^3P_0$ - $^3P_1$ | 0.157 | |
| | 39.62(11) μm | 1.70 -4 | Si VIII | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.304 | |
| | 42.2(5) μm | 1.41 -4 | K V | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.08 | |
| | 43.77(3) μm | 2.18 -4 | P IV | 3s 3p | $^3P_0$ - $^3P_1$ | 0.051 | |
| | 44.07(21) μm | 2.10 -4 | F IV | $2s^2\ 2p^2$ | $^3P_0$ - $^3P_1$ | 0.087 | |
| 51.8145(5) | 51.815(1) μm | 9.69 -5 | O III | $2s^2\ 2p^2$ | $^3P_1$ - $^3P_2$ | 0.055 | MSFJK |
| | 56.311(5) μm | 3.02 -4 | S I | $3s^2\ 3p^4$ | $^3P_1$ - $^3P_0$ | 0.010 | |
| | 56.47(21) μm | 4.94 -5 | Ar IV | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.060 | |
| 57.330(3) | 57.343(3) μm | 4.77 -5 | N III | $2s^2\ 2p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.047 | MSFJK |
| | 60.64(7) μm | 8.05 -5 | P II | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 0.019 | |
| 63.18371(3) | 63.185(6) μm | 8.91 -5 | O I | $2s^2\ 2p^4$ | $^3P_2$ - $^3P_1$ | 0.014 | E-pr |
| | 67.2(3) μm | 1.78 -4 | F II | $2s^2\ 2p^4$ | $^3P_1$ - $^3P_0$ | 0.035 | |
| | 68.473(3) μm | 4.20 -5 | Si I | $3s^2\ 3p^2$ | $^3P_1$ - $^3P_2$ | 0.008 | |
| | 69.44(7) μm | 3.63 -5 | N IV | 2s 2p | $^3P_1$ - $^3P_2$ | 0.077 | |
| | 73.5(4) μm | 5.81 -5 | O V | 2s 2p | $^3P_0$ - $^3P_1$ | 0.114 | |
| | 77.41(4) μm | 2.30 -5 | Ar IV | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.060 | |
| | 77.77(9) μm | 3.86 -5 | Si III | 3s 3p | $^3P_0$ - $^3P_1$ | 0.033 | |
| | 80.72(5) μm | 2.54 -5 | Al II | 3s 3p | $^3P_1$ - $^3P_2$ | 0.019 | |
| 88.356(2) | 88.3564(22) μm | 2.61 -5 | O III | $2s^2\ 2p^2$ | $^3P_0$ - $^3P_1$ | 0.055 | MSFJK |
| | 89.237(8) μm | 1.25 -5 | Al I | $3s^2\ 3p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.006 | |
| | 92.3(1.2) μm | 1.13 -5 | Mg VI | $2s^2\ 2p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.187 | |
| | 108.07(21) μm | 7.08 -6 | Cl III | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.040 | |
| 121.88887(12) | 121.88887(21) μm | 7.47 -6 | N II | $2s^2\ 2p^2$ | $^3P_1$ - $^3P_2$ | 0.030 | CS |
| 129.68173(4) | 129.676(16) μm | 8.25 -6 | Si I | $3s^2\ 3p^2$ | $^3P_0$ - $^3P_1$ | 0.008 | IEBL |
| 145.52548(8) | 145.53(13) μm | 1.75 -5 | O I | $2s^2\ 2p^4$ | $^3P_1$ - $^3P_0$ | 0.014 | DHLS |
| | 151.6(4) μm | 3.08 -6 | Cl III | $3s^2\ 3p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.040 | |
| 157.74084(21) | 157.74084(21) μm | 2.29 -6 | C II | $2s^2\ 2p$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.024 | CBS |
| | 158.5(4) μm | 6.00 -6 | N IV | 2s 2p | $^3P_0$ - $^3P_1$ | 0.077 | |
| | 164.26(20) μm | 4.10 -6 | Al II | 3s 3p | $^3P_0$ - $^3P_1$ | 0.019 | |
| | 177.4(9) μm | 2.10 -6 | C III | 2s 2p | $^3P_1$ - $^3P_2$ | 0.048 | |
| | 179.(11) μm | 1.86 -6 | Al VII | $2s^2\ 2p^3$ | $^2D_{3/2}$ - $^2D_{5/2}$ | 0.241 | |
| | 205.5(4) μm | 2.07 -6 | N II | $2s^2\ 2p^2$ | $^3P_0$ - $^3P_1$ | 0.030 | |
| | 214.1(1.3) μm | 9.13 -7 | S II | $3s^2\ 3p^3$ | $^2P_{1/2}$ - $^2P_{3/2}$ | 0.023 | |
| | 223.7(1.4) μm | 1.44 -6 | Ne IV | $2s^2\ 2p^3$ | $^2D_{5/2}$ - $^2D_{3/2}$ | 0.097 | |
| 245.6157(7) | 245.62(9) μm | 9.00 -7 | Mg I | 3s 3p | $^3P_1$ - $^3P_2$ | 0.008 | ILME |

Table 40. Wavelengths and transition probabilities ordered by wavelength - Continued

| Wavelength Observed | Wavelength Calculated | | A ($s^{-1}$) | Spectrum | Config. | Classification | I.E. (keV) | Ref. (Obs. λ) |
|---|---|---|---|---|---|---|---|---|
| | 270.(100) | μm | 4.55 -7 | Na V | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.138 | |
| | 278.(110) | μm | 7.50 -7 | Na V | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2D_{3/2}$ | 0.138 | |
| | 279.(6) | μm | 7.45 -7 | F III | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2D_{3/2}$ | 0.063 | |
| | 314.5(7) | μm | 3.46 -7 | S II | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.023 | |
| 370.4140(15) | 370.37(19) | μm | 2.65 -7 | C I | $2s^2\ 2p^2$ | $^3P_1 - {}^3P_2$ | 0.011 | SE(80) |
| | 395.3(9) | μm | 1.45 -7 | P I | $3s^2\ 3p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.010 | |
| | 422.(4) | μm | 3.00 -7 | C III | 2s 2p | $^3P_0 - {}^3P_1$ | 0.048 | |
| | 497.3(1.7) | μm | 1.25 -7 | O II | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2D_{3/2}$ | 0.035 | |
| 498.592792(3) | 498.5(4) | μm | 1.00 -7 | Mg I | 3s 3p | $^3P_0 - {}^3P_1$ | 0.008 | BDGRG |
| | 595.(190) | μm | 7.63 -8 | Mg VI | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2D_{3/2}$ | 0.187 | |
| 609.1333(8) | 609.4(4) | μm | 7.95 -8 | C I | $2s^2\ 2p^2$ | $^3P_0 - {}^3P_1$ | 0.011 | SE(80) |
| | 625.(17) | μm | 5.52 -8 | B II | 2s 2p | $^3P_1 - {}^3P_2$ | 0.048 | |
| | 640.6(2.3) | μm | 4.10 -8 | P I | $3s^2\ 3p^3$ | $^2D_{3/2} - {}^2D_{5/2}$ | 0.010 | |
| | 655.6(7) | μm | 3.19 -8 | B I | $2s^2$ 2p | $^2P_{1/2} - {}^2P_{3/2}$ | 0.008 | |
| | 1.148(9) | mm | 1.07 -8 | N I | $2s^2\ 2p^3$ | $^2D_{5/2} - {}^2D_{3/2}$ | 0.015 | |
| | 1.56(7) | mm | 2.36 -9 | Ne IV | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.097 | |
| | 1.79(14) | mm | 3.14 -9 | B II | 2s 2p | $^3P_0 - {}^3P_1$ | 0.048 | |
| | 4.25(8) | mm | 1.76 -10 | Be I | 2s 2p | $^3P_1 - {}^3P_2$ | 0.009 | |
| | 5.00(6) | mm | 4.39 -12 | O II | $2s^2\ 2p^3$ | $^2P_{3/2} - {}^2P_{1/2}$ | 0.035 | |
| | 12.(7) | mm | 5.20 -12 | F III | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.063 | |
| | 15.6(1.0) | mm | 4.74 -12 | Be I | 2s 2p | $^3P_0 - {}^3P_1$ | 0.009 | |
| | 25.9(8) | mm | 5.17 -13 | N I | $2s^2\ 2p^3$ | $^2P_{1/2} - {}^2P_{3/2}$ | 0.015 | |

[a]This is a wavelength in vacuum.

[b]Alternate wavelengths for these transitions were given by reference BGBR. They are 4424.1(2) and 5593.9(6) Å for Se XXI and Se XIX, respectively.