Spectral Data and Grotrian Diagrams for Highly Ionized Chromium, Cr v through Cr xxiv

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Wavelengths, energy levels, ionization energies, line classifications, oscillator strengths, and atomic transition probabilities for Cr v to Cr xxiv are tabulated. A short review of the line identifications and wavelength measurements is given for each stage of ionization. Grotrian diagrams are given to provide graphical overviews. The literature has been surveyed through December 1991.

Key words: atomic data; chromium; energy levels; Grotrian diagrams; ions; oscillator strengths; spectra; transition probabilities; wavelengths.

Contents

1. Introduction

This work is part of a series of compilations of spectra of highly ionized atoms of particular interest to the fusion purities from wall materials of fusion machines or are specifically injected into the hot plasmas for diagnostics. A significant amount of new work on these spectra has been published in recent years. We have critically compiled these data in separate monographs for each element, including wavelengths, classifications, intensities, transition probabilities, Grotrian diagrams, and a short review of the literature for each ion. Our published compilations include Ti, V, Fe, Co, Ni, Cu and Mo.[1–7] The present work contains data for Cr V to Cr XXIV.

All relevant papers published through December 1990 were collected and surveyed, and the best measurements, in our judgement, were included in the tables. We consulted the following comprehensive compilations: For wavelength data Kelly[8], for forbidden lines arising within ground configurations of the type ns^2np^k ($n=2$ and 3, $k=1$ to 5) Kaufman and Sugar[9], and a review article by Fawcett[10].

Sugar and Corliss[11] have published a comprehensive critical compilation of energy levels for the iron-group elements K to Ni in all stages of ionization. Their values are adopted for this compilation, except where superseded by more recent data. For the He- and H-sequences, only theoretical results are given since they are considered to be more accurate than the experimental values. The latter are cited in the brief review.

Atomic transition probability calculations in various approximations, including multi-configuration Dirac-Fock, have been reported for allowed and forbidden transitions. Brief reviews of these theoretical data are given in the critical compilation of allowed and forbidden lines by Martin *et al.*[12] We quote their values for the oscillator strengths (f) and transition probabilities (A).

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

We tabulate A-values and gf-values in order to provide a measure of the strength of the lines. When these are not available, we list the rough line intensity estimates provided in the literature. The A-values (or f-values) may be utilized to obtain line intensities from the general relation between the line intensity (I) and transition probability

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

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

$$I_1/I_2 \approx (\lambda_2 A_1 g_{u1}/\lambda_1 A_2 g_{u2}).$$

For some spectra, A-values are available for numerous lines and intensity estimates for still others. In these cases, we give both A-values and intensity estimates in order to provide a rough correlation between them. We caution that intensity estimates in experimental work are usually visual estimates of relative plate blackening. There is generally no correlation between intensity estimates by different authors, or by the same author for widely different wavelength ranges.

We give wavelengths in air above 2000 Å and in vacuum below 2000 Å. For conversion of ionization energies from cm^{-1} to eV, we use the conversion factor 8065.5410 ± 0.0024 cm^{-1}/eV given by Cohen and Taylor[13].

In the following section we give brief comments on each ion, including the accuracy of the wavelength data.

1.1. Acknowledgments

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1.2. References for Introduction

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2. Brief Comments on Each Chromium Ion

Cr V (Ca sequence)

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

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

Ekberg[1] classified 134 lines as $3d4s-3d4p$, $3d4p-3d4d$, $3d4p-3d5s$, and $3d^2-3d4p$ transitions in the range of 433–1837 Å. The observations were made with a vacuum spark. An estimated wavelength uncertainty of ±0.01 Å was reported. The lines at 1042.544 Å, 818.803 Å, and 438.618 Å are blended.

Cr VI (K sequence)

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

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

Alexander *et al.*[2] observed the $3d-nf\,(n=5-10)$ doublets in the range of 144 – 176 Å. Gabriel *et al.*[3] found the $4f\ ^2F^\circ$ term, replacing an earlier value reported by Kruger and Weissberg[4]. Gabriel *et al.*[5] identified the transitions from the levels of $3p^53d^2$ to the ground term in the range of 201 – 227 Å. Feldman and Fraenkel[6] observed 17 lines in the range of 161 – 174 Å, which were subsequently ascribed to the $3p^63d-3p^53d4s$ inner-shell transitions by Cowan[7]. The first observation of the $4p-4d$ transitions was reported by Fawcett[8], who identified the $3p^64p\ ^2P^\circ_{1/2}-3p^64d\ ^2D_{3/2}$ line at 942.75 Å and the $3p^64p\ ^2P^\circ_{3/2}-3p^64d\ ^2D_{5/2}$ line at 957.01 Å. New and more extensive measurements were carried out by Ekberg[9] with a vacuum spark discharge. He identified 95 lines in the range of 144 – 2496 Å classified as transitions among 57 levels of the $3p^6ns\,(n=4-6)$, $np\,(n=3-5)$, $nf(n=4-10)$, $ng(n=6-7)$, $3p^53d^2$, and $3p^53d4s$ configurations. Wavelengths in vacuum are given for all lines, including those above 2000 Å. The reported uncertainties are ±0.004 Å for lines below 385 Å and ±0.01 Å for those above 420 Å. The $3p^63d\ ^2D_{5/2}-3p^53d(^3P^\circ)4s\ ^4P^\circ_{3/2}$ line at 174.17 Å and the $3p^63d\ ^2D_{3/2}-3p^53d(^3D^\circ)4s\ ^2D^\circ_{5/2}$ line at 161.65 Å in Ref. 7 have been deleted because they were not observed by Ekberg.

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

Cr VII (Ar sequence)

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

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

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

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

Cr VIII (Cl sequence)

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

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

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

Gabriel *et al.*[3,5] identified the $3p^5-3p^4(^1D)3d$ lines. Their wavelengths were remeasured by Fawcett and Gabriel[19], who also classified six new lines in the range of 201 – 221 Å. The parent term has been changed from ^1D to ^3P for the upper levels $3p^43d\ ^2P$ and ^2D, as indicated by the calculations of Fe X by Bromage *et al.*[20]

The $3p^5\ ^2P^\circ-3p^44s\ ^2P$ doublet was observed by Weissberg and Kruger[16] in the range of 132 – 135 Å. Edlén[21] reobserved the spectrum from 124 to 136 Å with a vacuum spark and identified not only the additional $^2P^\circ-^2D,^2S$ doublets but also the $^2P^\circ-^4P$ spin-forbidden transitions.

Fawcett *et al.*[22] observed six lines of the $3p^43d-3p^44f$ array with an estimated uncertainty of ±0.02 Å and seven lines of $3p^5-3p^44d$ with an estimated uncertainty of ±0.015 Å in the ranges of 143 – 147 Å and 102 – 107 Å, respectively. The spectrum was observed in a laser-produced plasma.

Cr IX (S sequence)

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

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

Fawcett[8,23] identified the $3s^23p^4-3s3p^5$ array in the range of 363 – 433 Å. Improved measurements with vacuum spark spectra were made by Smitt *et al.*[17] who extended the range of observations to 327 – 433 Å. In addition to the lines previously observed by Fawcett, they reported the $^1S_0-^1P^\circ_1$ line at 418.925 Å and the spin-forbidden $^3P_2-^1P^\circ_1$ line at 327.267 Å. Wavelengths are from Ref. 17. Their uncertainty is estimated to be ±0.008 Å.

Gabriel *et al.*[5] and Fawcett and Gabriel[19] identified three lines each of the $3p^4-3p^33d$ arrays with a vacuum spark. This work was extended by Fawcett[23], who measured a theta-pinch spectrum with an estimated uncertainty of ±0.05 Å in the range of 209 – 224 Å. He identified nine lines. Except for the $^3P_2-(^4S^\circ)\ ^3D^\circ_3$ line at *210.61±0.02 Å remeasured by Davé et al.*[24] *in a tokamak* plasma, Fawcett's results are given.

Eleven lines of $3p^4-3p^34s$ transitions in the range of 117 – 123 Å were identified by Edlén[25] in vacuum spark observations.

Fawcett *et al.*[22] identified seven lines in a laser-produced plasma in the range of 127 – 130 Å as belonging to the $3p^33d-3p^34f$ array and six lines at 96 – 98 Å as $3p^4-3p^34d$. Wavelengths of these transitions were measured with uncertainties estimated to be ±0.02 Å and ±0.015 Å, respectively. Additional identifications were given by Fawcett *et al.*[26]

The magnetic-dipole transition $3p^4\ ^3P_2-{}^1D_2$, identified at 3302.8 Å by Jefferies *et al.*[27] from solar coronal observations, has been dropped because it does not fit the level scheme adopted here within their estimated uncertainty.

Cr X (P sequence)

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

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

Sandlin *et al.*[28] and Feldman and Doschek[29] identified the magnetic-dipole transitions $3p^3\ ^4S^\circ_{3/2}-{}^2P^\circ_{1/2,3/2}$ in the solar corona. The wavelengths of 1564.10 Å and 1489.04 Å are adopted from the latter article.

Fawcett and Peacock[30] and Fawcett[8,23] identified the $3s^23p^3-3s3p^4$ transition array in the range of 333 – 427 Å. Smitt *et al.*[17] extended the range to 333 – 448 Å and found 16 lines, including seven new lines, for this array in a vacuum spark discharge. Their results are given with an estimated uncertainty of ±0.008 Å.

Gabriel *et al.*[3,5] observed the $3p^3\ ^2D^\circ_{5/2}-3p^2(^3P)3d\ ^2F_{7/2}$ transition at 216.72±0.05 Å. In their article, the parent state of the upper term was designated as ^{1}D, instead of ^{3}P. Fawcett *et al.*[31] identified the $3p^3\ ^4S^\circ-3p^2(^3P)3d\ ^4P$ resonance transitions in the range of 223 – 226 Å. With a theta-pinch plasma, Fawcett[23] extended the analysis of the $3p^3-3p^23d$ transitions in the range of 216 – 254 Å. The uncertainty of the wavelengths is estimated to be ±0.05 Å.

The $3p^23d-3p^24f$ and $3p^3-3p^24s$ transitions in the ranges of 115 – 117 Å and 106 – 114 Å were identified by Fawcett *et al.*[22] in a laser-produced plasma and measured with an estimated uncertainty of ±0.015 Å.

Cr XI (Si sequence)

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

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

Jefferies *et al.*[27] and Svensson[32] ascribed the line at 3996.8±0.4 Å (in air) measured by Jefferies[33] in the solar corona to the magnetic-dipole transition $3s^23p^2\ ^3P_2-{}^1D_2$. Jefferies *et al.* also proposed the $^3P_1-{}^1D_2$ transition for the line at 3167.0 Å, but this line has not been adopted here because it does not fit with the present level scheme. A new line at 3178 Å was proposed for this transition by Magnant-Crifo[34] in the solar coronal spectrum. Sandlin *et al.*[28] identified a coronal line at 1440.01 Å as the $^3P_1-{}^1S_0$ transition.

Fawcett[8,23] interpreted the $3s^23p^2-3s3p^3$ transition array in the range of 285 – 431 Å. Improved wavelengths with an estimated uncertainty of ±0.008 Å were given by Smitt *et al.*[17] for 14 lines, including the spin-forbidden transition $^3P_2-{}^1D^\circ_2$ at 339.446 Å, using a vacuum spark discharge. Recently, two additional $^3P_{2,1}-{}^5S^\circ_2$ spin-forbidden transitions at 600.7± 0.4 Å and 78.0±0.8 Å were identified by Träbert *et al.*[35] in a beam-foil spectrum. The $^1S_0-{}^1P^\circ_1$ line reported at 334.95 Å in Ref. 8 has been omitted because of its disagreement with the new level scheme.

Fawcett[23] provided classifications of twelve lines of the $3p^2-3p3d$ array in the range of 226 – 256 Å in a theta-pinch plasma. The uncertainty of the wavelengths is estimated to be ±0.05 Å. The $3p3d-3p4f$, $3p^2-3p4s$ and $3p^2-3p4d$ transitions in the ranges of ~105 Å, 98 – 101 Å and ~82 Å, respectively, were identified by Fawcett *et al.*[22] in a laser-produced plasma. The uncertainty estimate for their wavelengths is ±0.015 Å. We have adopted their results only for the $3p^2-3p4s$ transitions. For the others, Kastner *et al.*[36] provided more complete identifications than Fawcett *et al.* They also identified the transitions $3s3p^3\ ^1D^\circ_2-3s^23p4f\ ^3G_3$ and $^1F_3$ at 100.09 Å and 99.13 Å.

Cr XII (Al sequence)

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

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

Jefferies *et al.*[27] ascribed the line at 8153.8 Å (in air) measured by Jefferies[33] in the solar corona to the magnetic-dipole transition $3s^23p\ ^2P^\circ_{1/2}-{}^2P^\circ_{3/2}$.

Träbert *et al.*[35] observed the $3s^23p\ ^2P^\circ-3s3p^2\ ^4P$ spin-forbidden transitions in beam-foil spectra, with estimated uncertainties ranging from 0.4 Å to 0.8 Å.

Gabriel *et al.*[5] and Fawcett *et al.*[31] identified the $3s^23p\ ^2P^\circ-3s^23d\ ^2D$ doublet. The $3s^23p-3s3p^2$ array was given by Fawcett and Peacock.[30] These were followed by Fawcett[8,23] who added the $3s3p^2\ ^4P-3p^3\ ^4S^\circ$, the $3s^23p\ ^2P^\circ-3s3p^2\ ^2S$, and the $3s^23p\ ^2P^\circ_{1/2}-3s3p^2\ ^2P_{3/2}$ lines. These results were revised and extended by Litzén and Redfors[37] and Redfors and Litzén[38] in observations of laser-produced plasmas in the range of 220 – 471 Å. They reported 46 transitions among the levels of in the $3s^23p$, $3s3p^2$, $3s^23d$, $3p^3$, and $3s3p3d$ configurations. Wavelengths were measured with an estimated uncertainty of ±0.02 Å. We adopt their results together with their energy level values. The line at 412.46 Å identified by Fawcett[23] as the $3s^23p\ ^2P^\circ_{3/2}-3s3p^2\ ^2D_{3/2}$ transition has been omitted, because it was not confirmed by Redfors and Litzén.

The $3p\ ^2P^\circ-4d\ ^2D$ doublet was identified by Edlén[39] at ~76 Å. Fawcett *et al.*[40] identified the $3d\ ^2D-4f\ ^2F^\circ$ doublet and the $3s3p3d\ ^4F^\circ-3s3p4f\ ^4G$ and $3s3p^2\ ^4P-3s3p4s\ ^4P^\circ$ quartets in the range of 90 – 101 Å.

Cr XIII (Mg sequence)

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

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

Classifications of the $n=3-3$ transitions were made in a series of articles of Fawcett *et al.*[31], Fawcett and Peacock[30], Fawcett[8], and Fawcett *et al.*[22] for the transitions among the levels of the $3s^2$, $3s3p$, $3s3d$, $3p^2$, and $3p3d$ configurations. Litzén and Redfors[41] reobserved the spectrum in the range of 228 – 635 Å in a laser-produced plasma and identified 42 lines, including 20 lines of the earlier work. Wavelengths were measured with an estimated uncertainty of ±0.02 Å. Their wavelengths and energy levels are adopted. However, the $3s3d\ ^1D_2-3p3d\ ^1D_2^\circ$ line at 634.78 Å differs by about 0.05 Å from the predicted wavelength. We have revised the upper $3p3d\ ^1D_2^\circ$ level to 819 961 cm^{-1}. The $3p^2\ ^3P_0-3p3d\ ^3D_1^\circ$ line at 269.47 Å is perturbed. The $3s^2\ ^1S_0-3s3p\ ^3P_1^\circ$ transition at 482.17±0.02 Å and the $^1S_0-{}^1P_1^\circ$ transition at 328.267±0.004 Å were observed in a tokamak plasma by Peacock *et al.*[42] Their measurements are the most accurate for these lines.

The $3p3d-3d^2$ transitions were identified by Levashov and Churilov,[43] Redfors[44] and more completely by Churilov *et al.*[45] whose observations in the range of 252 – 353 Å with a laser-produced plasma have an uncertainty of ±0.02 Å. Wavelengths of Redfors given to the third decimal place are adopted except for a blended $3p3d\ ^3F_4^\circ-3d^2\ ^3F_4$ line at 269.446 Å. For this line, we have adopted 269.411 Å from Ref. 45. The designations of the lower $3p3d\ ^3P_1^\circ$ and $^3D_1^\circ$ levels in Ref. 45 have been interchanged, according to the level scheme of Litzén and Redfors.[41] Futhermore, 25 cm^{-1} is added to the $3d^2\ ^3P_{1,2}$ levels to improve agreement with the observed wavelengths. The line at 305.87 Å is blended and tentatively identified as the $3p3d\ ^3D_2^\circ-3d^2\ ^3F_3$ transition.

Edlén[39] first identified the triplet system of the $3s3p-3s4s$, $3s3p-3snd$ ($n=4,5$), and $3s3d-3snf$ ($n=4,5$) transitions in the range of 53 – 92 Å, together with the $3s^2\ ^1S-3s4p\ ^1P^\circ$ resonance line at 66.983 Å. Singlet levels were identified by Fawcett *et al.*[40] for the $3s3d-3s4f$ transition at 97.25±0.01 Å and by Fawcett *et al.*[22] for the $3s3p-3s4d$ and $3p^2-3s4f$ transitions at 76.17±0.015 Å and 82.79±0.015 Å. Fawcett *et al.*[40] also provided ten lines of the $3p3d-3p4f$ transitions in the range of 90 – 97 Å. Identifications of the $3s3d-3snf$ ($n=6,7$), $3p^2-3p4s$, $3s3p-3sns$ ($n=4-6$), $3s3p-3snd$ ($n=5,6$), $3p^2-3p4d$, $3s^2-3snp$ ($n=5-7$), and $3s3p-3p4p$ transitions in the range of 40 – 92 Å are taken from Fawcett *et al.*[26]

Cr XIV (Na sequence)

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

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

Fawcett *et al.*[31] and Fawcett and Peacock[30] identified five lines of the $3s-3p$ and $3p-3d$ transitons in the ranges of 389 – 412 Å and 289 – 302 Å, respectively, in a laser-produced plasma. These $n=3-3$ lines were remeasured in Refs. 46, 22, 47, 18, 42 and 48. An isoelectronic comparison of the measured wavelengths, including the $3d-4f$ doublet, with Dirac-Fock calculations was made by Reader *et al.*[49] for Ar^{7+} to Xe^{43+}, and least squares adjusted wavelengths were derived. The overall uncertainty estimate is ±0.007 Å. We give these results. Levels of the $2p^63p$, $2p^63d$, and $2p^64f$ configurations have been derived from these wavelengths.

Jupén *et al.*[50] ascribed the line at 281.67±0.05 Å, measured by Buchet-Poulizac *et al.*[48] in a beam-foil spectrum, to the core-excited $2p^53s3p\ ^4D_{7/2}-2p^53s3d\ ^4F_{9/2}$ transition.

The $4f\ ^2F^\circ-5g\ ^2G$ and $4d\ ^2D-5f\ ^2F^\circ$ doublets at ~205 Å and ~187 Å were identified by Lawson and Peacock.[51] Their observations were made in a laser-produced plasma with an estimated uncertainty of ±0.06 Å. The $4d\ ^2D_{5/2}-5f\ ^2F_{7/2}^\circ$ line at 187.30 Å is blended.

Edlén[52] identified the transitions $3s-np$ ($n=4,5$), $3p-4s$, $3p-nd$ ($n=4,5$), and $3d-nf$ ($n=4-6$) in vacuum spark discharges. Except for the $3s-4p$ and $3p-4d$ transitions his results are quoted. The $3d-4p$ lines at ~101 Å were identified by Fawcett *et al.*[40]

Identifications along Rydberg series have been taken from Fawcett *et al.*[26] for the $3d-nf$ ($n=9,10$) and $3p-nd$ ($n=10,11$) transitions and from Cohen and Behring[47] for the $3s-np$ ($n=4,6-9$), $3p-ns$ ($n=5-7$), $3p-nd$ ($n=4,6-9$), $3d-5p$ and $3d-nf$ ($n=6-8$) transitions.

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

Cr XV (Ne sequence)

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

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

Edlén and Tyrén[54] and Tyrén[55] identified the $2p^6-2p^53s$, $3d$ resonance lines in the range of 18.5 – 21.2 Å with a vacuum spark. Tyrén's wavelengths are quoted here. These lines were reobserved by Klapisch *et al.*[56] in a tokamak plasma and by McKenzie and Landecker[57] in the solar corona, both of whom also found the electric quadrupole line $2p^6\ ^1S_0-2p^53s\ (^3/_2,^1/_2)_2^\circ$. Its wavelength of 21.213 Å is from Ref. 56. Below 17 Å Tyrén identified the $2s^22p^6-2s2p^63p$ and $2p^6-2p^54d$ transitions. Swartz *et al.*[58] identified the $2p^6-2p^5nd$ ($n=5,6$) transitions with a vacuum spark. The lines at 15.788 Å and 15.509 Å in Ref. 58 are omitted because the upper $2p^54s\ (^3/_2,^1/_2)_1^\circ$ and $(^1/_2,^1/_2)_1^\circ$ levels disagree with those of Jupén *et al.* determined in an isoelectronic study.[59]

The $3s-3p$ and $3p-3d$ arrays were observed by Jupén and Litzén[60,61] in laser-produced plasmas and by Buchet-Poulizac *et al.*[48] and Buchet *et al.*[62] in beam-foil spectra. Wavelengths in the range of 240 – 471 Å are taken mainly from Litzén[61] but also from Poulizac *et al.*[48] and Buchet *et al.*[62] The estimated uncertainty of the wavelengths varies from ±0.02 Å to ±0.1 Å. The doubly classified line at 405.035 Å in Ref. 61 and two lines at 298.11 Å and 240.2 Å in Ref. 62 are compiled. The line at 453.40 Å in Ref. 62 is omitted, because it shows a large deviation of 1.65 Å from the predicted wavelength, 451.75 Å.

Kastner[63] identified a coronal line at 1696.26 Å as the $2p^53s$ $(^3/_2,^1/_2)^\circ_1 - (^1/_2,^1/_2)^\circ_0$ transition. However, it is inconsistent with the levels of Jupén *et al.*[59]

Finkenthal *et al.*[64] identified five lines in the range of 97–111 Å as the $2s^22p^53s-2s2p^63s$ transitions. Wavelengths were observed in a tokamak plasma with an uncertainty estimated to be ±0.02 Å. Three lines at 111.27 Å, 103.51 Å, and 102.18 Å of the $^1P^\circ_1$, $^3P^\circ_{1,2}-{}^3S_1$ transitions are omitted, because the upper $^3S_1$ level values obtained from these lines are inconsistent.

The $3p-4d$ transitions were first identified by Kastner *et al.*[65] and also by Fawcett *et al.*[66], together with the $3s-4p$ and $3d-4f$ transitions. More complete and improved measurements were reported by Jupén *et al.*[59] from a laser-produced plasma. They found 54 lines, including of the $3p-4s$ transitions, in the range of 57–79 Å, which are quoted here. The estimated wavelength uncertainty varies from ±0.005 to ±0.01 Å. We note that the wavelengths of 74.029 Å and 63.016 Å in Ref. 59 have been changed to 74.209 Å and 63.061 Å, because they appear to be misprints. We have adopted the energy levels of Jupén *et al.* in the $2s^22p^53l$ and $2s^22p^54l$ configurations, except for the predicted $2s^22p^5\,(^2P_{1/2,3/2})4f$ $^2[^5/_2]_2$ levels.

Cr XVI (F sequence)

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

Ionization energy 8 850 000 cm^{-1} (1097 eV)

Hinnov *et al.*[67], Peacock *et al.*[42] and Finkenthal *et al.*[68] observed the magnetic-dipole $2s^22p^5$ $^2P^\circ_{3/2}-{}^2P^\circ_{1/2}$ transition in tokamak discharges. The most accurate wavelength of 1410.60±0.02 Å is given by Peacock *et al.*

The $2s^22p^5$ $^2P^\circ-2s2p^6$ ^2S doublet was observed by Fawcett,[69] Doschek *et al.*[70] and Lawson and Peacock *et al.*[51] in laser-produced plasmas, by Breton *et al.*[71] and Davé *et al.*[24] in tokamak plasmas, and by Buchet-Poulizac *et al.*[48] in a beam-foil spectrum. Wavelength values of 115.33 Å and 106.62 Å with an estimated uncertainty of ±0.03 Å are taken from Ref. 51.

Feldman *et al.*[72] reported observations with a low-inductance vacuum spark, in which the transitions $2s2p^6-2s2p^53s$, $2p^5-2p^43s$ and $2p^5-2p^43d$ in the range of 17–20 Å were identified, revising and extending the earlier work of Cohen *et al.*[73] We give the Feldman *et al.* results with an uncertainty estimate of ±0.01 Å. Four lines at 17.81 Å, 17.86 Å, 17.46 Å and 17.38 Å, belonging to the $2p^5-2p^43d$ array, in Ref. 73 have been excluded, because these lines were not confirmed by Feldman *et al.* Remeasurement of the $2p^5-2p^43s$, $3d$ transitions in the solar corona was made by McKenzie and Landecker,[57] whose wavelengths agree with those in Ref. 72 within 0.006 Å.

Spector *et al.*[74] identified the forbidden transition $2p^5$ $^2P^\circ_{3/2} - 2p^4(^1D)4d$ $^2F_{5/2}$ at 13.528±0.005 Å in a laser-produced plasma. This line has been omitted because it is an isolated unconfirmed identification.

Cr XVII (O sequence)

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

Ionization energy 9 560 000 cm^{-1} (1185 eV)

Four magnetic-dipole transitions within the ground configuration were identified in tokamak discharges. We adopted the following identifications: the $^3P_2-{}^3P_1$ and $^3P_1-{}^1S_0$ lines at 1656.3±0.2 Å and 493.8±0.3 Å of Hinnov *et al.*[67], the $^3P_1-{}^1D_2$ line at 1340.7±0.4 Å of Finkenthal *et al.*[68] and the $^3P_2-{}^1D_2$ line at 740.75±0.03 Å of Peacock *et al.*[42]

The $2s^22p^4-2s2p^5$ array was observed by Fawcett,[69] Doschek *et al.*[70] and Lawson and Peacock[51] in laser-produced plasmas, by Breton *et al.*[71] and Davé *et al.*[24] in tokamak plasmas, and by Buchet-Poulizac *et al.*[48] in a beam-foil spectrum. The measurements of Lawson and Peacock in the range of 94–148 Å are the most comprehensive and their wavelengths are adopted here. The estimated uncertainty of the wavelengths is ±0.03 Å. They also found the $2s2p^5$ $^1P^\circ_1 - 2p^6$ $^1S_0$ transition at 129.78 Å, identified first by Doschek *et al.*[75], and the $^3P^\circ_1 - {}^1S_0$ transition at 97.20 Å.

The $2p^4-2p^33s$ array at ~18 Å was identified by Doschek *et al.*[76] Wavelengths with an uncertainty estimated to be ±0.01 Å were measured in laser-produced plasmas. Some lines are doubly classified.

The $2p^4-2p^33d$ array at ~16 Å was observed by Fawcett and Hayes[77] in a laser-produced plasma with a wavelength uncertainty of ±0.01 Å. Eight lines were classified.

Spector *et al.*[74] identified the $2p^4$ $^1D_2-3p^3(^2D^\circ)4d$ $^1D^\circ_2$, $^3F^\circ_3$ transitions at 12.909±0.005 Å and 12.779±0.005 Å in a laser-produced plasma.

Cr XVIII (N sequence)

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

Ionization energy 10 480 000 cm^{-1} (1185 eV)

Hinnov *et al.*[67] and Denne and Hinnov[78] identified seven magnetic-dipole transitions within the ground configuration in the range of 378–4039 Å in tokamak plasmas.

Fawcett[69] first identified the $2s^22p^3\ ^2D^\circ-2s2p^4\ ^2D$, ^2P doublets in a laser-produced plasma. Extended analyses were carried out by Doschek *et al.*[70] and Feldman *et al.*[79] New measurements of this array were made by Breton *et al.*[71] and Davé *et al.*[24] in tokamak plasmas, by Lawson and Peacock[51] in a laser-produced plasma, and by Buchet-Poulizac *et al.*[48] in a beam-foil spectrum. Wavelengths are from the comprehensive measurements of Lawson and Peacock, who identified 20 lines in the range of 90 – 150 Å, including the spin-forbidden transitions from the $^2D_{3/2}$, $^2S_{1/2}$ and $^2P_{3/2}$ terms to the ground $^4S^\circ_{3/2}$. The estimated uncertainty of the wavelengths is ±0.03 Å.

Lawson and Peacock[51] also identified seven lines in the range of 93 – 157 Å of the $2s2p^4-2p^5$ array, including the $^2D-{}^2P^\circ$ doublet in the earlier works of Fawcett and Hayes[77] and Doschek *et al.*[75] Fawcett and Hayes[77] and McKenzie and Landecker[57] identified the $2p^3-2p^23d$ transitions at 15.60 Å in a laser-produced plasma and at 15.519±0.01 Å in the solar corona, respectively.

Cr XIX (C sequence)

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

Ionization energy 11 260 000 cm^{-1} (1396 eV)

The magnetic-dipole transitions within the ground configuration were observed in tokamak plasmas by Hinnov and Suckewer,[80] Hinnov *et al.*[67], Denne and Hinnov,[78] and Finkenthal *et al.*[68] Wavelengths adopted here are taken from Ref. 67 for the transitions $^3P_{1,(0)}-{}^3P_{2,(1)}$ at 2885.4 Å (in air) and 2090.9 Å (in air), the $^3P_1-{}^1S_0$ at 398.4 Å, and from Ref. 78 for the $^3P_{2,1}-{}^1D_2$ lines at 979.1 Å and 731.1 Å.

Feldman *et al.*[79] and Fawcett and Hayes[77] identified the $2s^22p^2-2s2p^3$ array in a laser-produced plasma. Breton *et al.*[71] reobserved these transitions in a tokamak plasma. Fawcett and Hayes also reported the $2s2p^3\ ^3D-2p^4\ ^3P$ triplet. Tabulated wavelengths are taken from the more extensive observations of Lawson and Peacock,[51] who gave identifications for 39 lines due to the $2s^22p^2-2s2p^3$ and $2s2p^3-2p^4$ transitions in the range of 95 – 202 Å. The uncertainties of the wavelengths are estimated to be ±0.03 Å below 180 Å and ±0.06 Å above. Some lines were recently reobserved by Buchet-Poulizac *et al.*[48] in beam-foil spectra and by Davé *et al.*[24] in a tokamak plasma. The $2s2p^3\ ^5S^\circ_2-2p^4\ ^3P_2$ transition at 95.62Å has been omitted because the lower $^5S^\circ_2$ level position obtained with this line was found to be inconsistent with the predicted value by Edlén.[81]

TFR group *et al.*[82] identified four lines of the inner-shell transitions $1s^22s^22p^2-1s2s^22p^3$ at ~2.2 Å with a tokamak.

Cr XX (B sequence)

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

Ionization energy 12 070 000 cm^{-1} (1496 eV)

The magnetic-dipole transition $^2P^\circ_{1/2}-{}^2P^\circ_{3/2}$ within the ground configuration was observed in a tokamak plasma by Hinnov and Suckewer,[80] Hinnov *et al.*[67] and Finkenthal *et al.*[68] The wavelength of 1205.9±0.3 Å is from Ref. 67.

The $2s^22p-2s2p^2$ array was identified by Doschek *et al.*[83] and Fawcett and Hayes[77] in laser-produced plasmas and more fully by Breton *et al.*[71] in a tokamak plasma. Extensive measurements of both the $2s^22p-2s2p^2$ and the $2s2p^2-2p^3$ arrays were made with a laser-produced plasma by Lawson and Peacock,[51] who classified 28 lines in the range of 116 – 272 Å. Their results are adopted here. The uncertainties of the wavelengths are estimated to be ±0.03 Å below 180 Å and ±0.06 Å above. Recent reobservations of the $2s^22p-2s2p^2$ array in a tokamak plasma are reported by Davé *et al.*[24] The designation of the two levels $2s2p^2\ ^2P_{1/2}$ and $^2S_{1/2}$ has been interchanged, according to the suggestion by Edlén[84], and the percentage compositions given by Sugar and Corliss.[85]

The $2s^22p-2s^24l(l=s,d)$ transitions at ~11 Å were identified by Spector *et al.*[74] in a laser-produced plasma with an estimated uncertainty of ±0.005 Å. They also identified two lines due to the $2s2p^2-2s2p3d$ transitions. Burkhalter *et al.*[86] extended the identifications to 24 lines in the range of 14.0 – 14.7 Å with a similar light source. We give the latter wavelengths with an estimated uncertainty of ±0.003 Å.

TFR group *et al.*[82] observed four lines of the inner-shell transitions $1s^22s^22p-1s2s^22p^2$ at ~2.2 Å.

Cr XXI (Be sequence)

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

Ionization energy 13 180 000 cm^{-1} (1643 eV)

The $2s^2\ ^1S_0-2s2p\ ^3P^\circ_1$ transition was observed in the solar corona by Widing,[87] Sandlin *et al.*,[88] and Dere.[18] We give Dere's wavelength of 293.15±0.03Å. The resonance transition $2s^2\ ^1S_0-2s2p\ ^1P^\circ_1$ was observed by Breton *et al.*[71] and by Hinnov[89] in tokamak plasmas, and by Lawson and Peacock[51] in a laser-produced plasma. The wavelength of 149.89±0.02 Å was taken from Breton *et al.* Energy levels have been revised using these two wavelengths. Lawson and Peacock also identified the $2s2p-2p^2$ transitions, including the intercombination line $^3P^\circ_2-{}^1D_2$, in the range of 154 – 260 Å. The uncertainties of the wavelengths are estimated to be ±0.03 Å below 180 Å and ±0.06 Å above 180 Å. The $n=2-3$ transitions array in the range of 13 – 14 Å were first identified by Fawcett and Hayes[77] and more extensively by Boiko *et al.*[90] and Boiko *et al.*[91] in laser-produced plasmas. Some of the lines are given as unresolved blends. The estimated uncertainty of the wavelengths is ±0.003 Å. New measurements were made by Spector *et al.*[74] and Burkhalter *et al.*[86], in general agreement with Boiko *et al.* It should be noted that the designation of the $2s^2\ ^1S_0-2s3p\ ^1P^\circ_1$ line at 13.123 Å from Ref. 91 has been changed to $2s^2\ ^1S_0-2s3p\ ^3P^\circ_1$, according to Kim *et al.*[92]

TFR group *et al.*[82] identified the inner-shell transitions $1s^2 2s 2p - 1s 2s 2p^2$ and $1s^2 2s^2 - 1s 2s^2 2p$ in the range of 2.20–2.22 Å.

Cr XXII (Li sequence)

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

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

The $2s$-$2p$ resonance transitions were measured by Widing and Purcell,[93] Sandlin *et al.*[88] and Dere[18] from solar coronal observations. They were also measured by Lawson and Peacock[51] in a laser-produced plasma, by Grandin *et al.*[94] in a beam-foil spectrum, and by Hinnov,[89] Davé *et al.*,[24] Knize *et al.*[95] and Hinnov *et al.*[96] in tokamak plasmas. We give the wavelengths 279.729 ± 0.02 Å and 223.010 ± 0.02 Å for the $2s\ {}^2S_{1/2} - 2p\ {}^2P_{1/2,3/2}$ lines from the measurements of Hinnov *et al.* Levels of the $2p\ {}^2P^\circ$ configuration are derived from these values.

The first identification of the $n = 2-3$ doublets was made with a low-inductance vacuum spark by Goldsmith *et al.*[97], from which the $2p\ {}^2P^\circ_{3/2,1/2} - 3s\ {}^2S_{1/2}$ transitions at 13.549 ± 0.005 Å and 13.393 ± 0.005 Å are quoted here. Measurements in a laser-produced plasma in the range of 9.4–13.3 Å with an estimated uncertainty of ± 0.003 Å by Aglitskii *et al.*[98] provided the $2s-3p$, $2p-3d$, $2p-4d$ and $2s-4p$ doublets. The $2p\ {}^2P^\circ_{3/2} - 4d\ {}^2D_{3/2}$ transition identified with a blended line at 9.865 Å has been omitted.

The $1s^2 2p - 1s 2p^2$ and $1s^2 2s - 1s 2s 2p$ inner-shell transitions were observed at ~2.2 Å in tokamak discharges by TFR Group *et al.*[82] and by Bryzgunov *et al.*[99] Apicella *et al.*[100] remeasured the $1s^2 2s\ {}^2S_{1/2} - 1s 2s 2p\ {}^2P^\circ_{1/2}$ line as well as the $1s^2 nl - 1s 2pnl\ (nl = 3s, 3p, 3d, 4p)$ transitions. Except for the $1s^2 3p\ {}^2P^\circ_{3/2} - 1s 2p 3p\ {}^2D_{5/2}$ line, they are given as the aggregates of emission lines. Wavelengths are taken from Refs. 100 and 82.

Cr XXIII (He sequence)

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

Ionization energy 60 344 000 cm^{-1} (7481.4 eV)

TFR group *et al.*[82] identified the parity-forbidden transition $1s^2\ {}^1S_0 - 1s 2s\ {}^3S_1$ at 2.2035 Å, the spin-forbidden and electric-dipole-forbidden transitions $1s^2\ {}^1S_0 - 1s 2p\ {}^3P^\circ_{1,2}$ at 2.1927 Å and 2.1886 Å, and the $1s^2\ {}^1S_0 - 1s 2p\ {}^1P^\circ_1$ line at 2.1818 Å. For this line the more accurate wavelength of 2.18193 ± 0.00015 Å was obtained with a tokamak plasma by Beiersdorfer *et al.*[101], who also identified the $1s^2\ {}^1S_0 - 1snp\ {}^1P^\circ_1$ ($n = 4,5$) transitions at 1.76342 Å and 1.72357 Å. Other measurements of these lines in Refs. 102, 100, 99, 103, and 104 are less accurate. Grandin *et al.*[94] observed the $1s 2s\ {}^3S_1 - 1s 2p\ {}^3P^\circ_2$ transition at 325.36 ± 0.5 Å in a beam-foil spectrum.

Calculated energy levels of the configurations $1snl$ with $n = 2-3$ and $l = s, p$, and d have been taken from Drake.[105,106] For the levels with $n = 4-5$, calculations of Vainshtein and Safronova[107] have been tabulated after adjusting them by about 1300 cm^{-1} to the ground state binding energy obtained by Drake. This value is the arithmetic mean value of the difference between the levels given by Drake and by Vainshtein and Safronova for $3s$, $3p$, and $3d$. Wavelengths are calculated from the energy levels by the Ritz combination principle. We adopt an uncertainty of 5 parts in 10^5, representing the difference between the calculated values of Drake and those determined experimentally by Beiersdorfer *et al.*

Cr XXIV (H sequence)

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

Ionization energy 63 675 900 cm^{-1} (7894.87 eV)

No observations of this spectrum have been reported. We have tabulated the wavelengths calculated from the theoretical energy levels of Johnson and Soff[108] for the $n = 2$ shell. The estimated level uncertainty is ± 10 cm^{-1}. Their energy differences are in close agreement with those of Mohr.[109] The levels for $n = 3-5$ have been calculated by Erickson.[110] We use his values for the binding energies subtracted from the binding energy of the ground state obtained by Johnson and Soff. Our estimate of the error in the value of $3s$ is ± 30cm^{-1}, assuming the Lamb shift scales as $1/n^3$.

Transition probabilities and oscillator strengths were obtained by scaling the data tabulated for hydrogen spectra by Wiese *et al.*[111] The scaling was performed for the line strengths S, which for a hydrogen-like ion of nuclear charge Z are reduced according to $S_Z = Z^{-2} S_H$, so that

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

The f and A values were then obtained from the usual numerical conversion formulas, given for example in Ref. 112. For these conversions the very accurate wavelengths listed in the first column of the Cr XXIV table were used, in which relativistic and quantum electrodynamic (QED) effects on the energies were taken into account. Relativistic effects in the line strengths are only of the order of 1–3% for Cr XXIV, according to the work by Younger and Weiss,[113] and have been neglected.

3. Explanation of Tables of Spectroscopic Data

Cr V, Cr XXIV, etc.

According to spectroscopic convention, Cr I indicates the first spectrum, i.e., the spectrum of the neutral atom; Cr II denotes the second spectrum, belonging to the singly ionized atom; and so on.

H sequence, C sequence, etc.
: Indicates that the respective Cr ion has the same number of electrons as neutral hydrogen, neutral carbon, etc.

IP
: Principal ionization energy of the tabulated ions in cm^{-1} (eV).

λ(Å)
: Wavelength of listed spectral lines in Angstrom units (10^{-8}cm).

C,T,P
: Superscripts to the right of a wavelength value have the following meanings:

^{C} wavelength calculated from energy level data using the Ritz combination principle.
^{T} tentative line classification.
^{P} wavelength predicted along an isoelectronic sequence.

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

Energy Levels
: Level values (in cm^{-1}) for lower (first) and upper (second) level of the transition. A symbol "?" after the level value indicates level was derived from a tentatively classified line. Theoretical levels are given in square brackets.

Int
: Approximate intensity of a spectral line, generally visually estimated from the blackness (or density) of the line on photographic plates. Intensities are omitted when *gf*-values are known for most of the lines. The symbol "bl" following the intensity means a blend of lines.

gf
: This column lists the product of the statistical weight of lower level and the absorption oscillator strength or *f*-value for electric dipole transitions. 1.23−1 means 1.23×10^{-1}. *f*-values are not given for magnetic-dipole (M1) transitions.

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

Acc
: Accuracy estimate for the oscillator strength and transition probability data, taken from the NIST reference tables on atomic transition probabilities (see, e.g. the introduction of Ref. 92 for detailed explanation). The accuracy is indicated by the following letter symbols, which are identical with the notation used in the NIST reference book:

A for uncertainties within 3%
B for uncertainties within 10%
C for uncertainties within 25%
D for uncertainties within 50%
E for uncertainties greater than 50%

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

° reference from which the adopted wavelength value is taken.
* reference containing the adopted oscillator strength and/or the transition probability.
$^{\Delta}$ reference from which the estimated intensity is taken.

4. Spectroscopic Data for Cr V through Cr XXIV

Cr V (Ca sequence)

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
8299.02^{C}	$3d^2$	$^3F_4$	$3d^2$	$^1D_2$	1 141.7	13 188.0		E2	3.4−4	E	112*
7884.39^{C}		$_3$		$_2$	508.2	13 188.0		M1	1.0−1	E	112*
7580.56^{C}		$_2$		$_2$	0	13 188.0		M1	5.7−2	E	112*
6709.87^{C}	$3d^2$	$^3F_4$	$3d^2$	$^3P_2$	1 141.7	16 041.0		E2	3.1−2	E	112*
6590.83^{C}		$_3$		$_1$	508.2	15 676.6		E2	3.1−2	E	112*
6453.24^{C}		$_2$		$_0$	0	15 491.8		E2	5.1−2	E	112*
6436.21^{C}		$_3$		$_2$	508.2	16 041.0		M1	3.4−3	E	112*
6377.17^{C}		$_2$		$_1$	0	15 676.6		M1	1.0−4	E	112*
6232.30^{C}		$_2$		$_2$	0	16 041.0		M1	8.4−4	E	112*
4788.51^{C}	$3d^2$	$^3F_4$	$3d^2$	$^1G_4$	1 141.7	22 019.2		M1	7.2−2	E	112*
4647.48^{C}		$_3$		$_4$	508.2	22 019.2		M1	4.7−2	E	112*
4540.22^{C}		$_2$		$_4$	0	22 019.2		E2	8.9−5	E	112*
2847.73^{C}	$3d^2$	$^3P_2$	$3d^2$	$^1S_0$	16 041.0	51 146.4		E2	2.1−1	E	112*
2818.47^{C}		$_1$		$_0$	15 676.6	51 146.4		M1	1.1−0	E	112*
2633.68^{C}	$3d^2$	$^1D_2$	$3d^2$	$^1S_0$	13 188.0	51 146.4		E2	9.8−0	E	112*
1955.17^{C}	$3d^2$	$^3F_2$	$3d^2$	$^1S_0$	0	51 146.4		E2	2.5−2	E	112*
1837.442	$3d4s$	$^1D_2$	$3d4p$	$^1D^o_2$	171 698.1	226 119.8	15	1.1	4.3+8	D	1°,112*
1728.497	$3d4s$	$^1D_2$	$3d4p$	$^3F^o_2$	171 698.1	229 551.7	5				1
1705.968		$_2$		$_3$	171 698.1	230 316.3	2				1
1705.629	$3d4s$	$^3D_2$	$3d4p$	$^1D^o_2$	167 491.0	226 119.8	4				1
1655.639	$3d4s$	$^3D_3$	$3d4p$	$^3D^o_2$	168 089.5	228 489.1	4	3.4−1	1.6+8	D	1°,112*
1652.595		$_2$		$_1$	167 491.0	228 001.8	4	3.1−1	2.5+8	D	1°,112*
1644.053		$_1$		$_1$	167 176.4	228 001.8	6	6.0−1	5.0+8	D	1°,112*
1639.403		$_2$		$_2$	167 491.0	228 489.1	7	1.0	4.9+8	D	1°,112*
1638.495		$_3$		$_3$	168 089.5	229 120.8	8	1.9	6.8+8	D	1°,112*
1630.989		$_1$		$_2$	167 176.4	228 489.1	5				1
1622.607		$_2$		$_3$	167 491.0	229 120.8	3	2.0−1	7.4+7	D	1°,112*
1611.330	$3d4s$	$^3D_2$	$3d4p$	$^3F^o_2$	167 491.0	229 551.7	3	4.5−2	2.3+7	D	1°,112*
1607.035		$_3$		$_3$	168 089.5	230 316.3	3	2.2−1	8.3+7	D	1°,112*
1603.191		$_1$		$_2$	167 176.4	229 551.7	12	1.3	7.0+8	D	1°,112*
1591.721		$_2$		$_3$	167 491.0	230 316.3	13	1.9	7.3+8	D	1°,112*
1579.696		$_3$		$_4$	168 089.5	231 392.9	15	2.9	8.6+8	D	1°,112*
1519.030	$3d4s$	$^1D_2$	$3d4p$	$^1F^o_3$	171 698.1	237 529.5	13	2.3	9.5+8	D	1°,112*
1497.966	$3d4s$	$^3D_3$	$3d4p$	$^3P^o_2$	168 089.5	234 846.4	12	1.3	7.5+8	D	1°,112*
1489.711		$_2$		$_1$	167 491.0	234 618.4	10	6.5−1	6.6+8	D	1°,112*
1484.666		$_2$		$_2$	167 491.0	234 846.4	7	3.7−1	2.2+8	D	1°,112*
1482.757		$_1$		$_1$	167 176.4	234 618.4	7	3.6−1	3.5+8	D	1°,112*
1481.651		$_1$		$_0$	167 176.4	234 668.5	7	3.3−1	1.0+9	D	1°,112*
1477.769		$_1$		$_2$	167 176.4	234 846.4	1				1
1465.861	$3d4s$	$^1D_2$	$3d4p$	$^1P^o_1$	171 698.1	239 917.5	12	1.0	1.1+9	D	1°,112*
1263.501	$3d4p$	$^1F^o_3$	$3d4d$	$^1F_3$	237 529.5	316 674.9	10				1
1259.986	$3d4p$	$^1P^o_1$	$3d4d$	$^1P_1$	239 917.5	319 284.0	7				1
1210.499	$3d4p$	$^1P^o_1$	$3d4d$	$^3S_1$	239 917.5	322 528.1	7				1

Cr v (Ca sequence) — Continued

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
1204.126	3*d*4*p*	$^3P^o_2$	3*d*4*d*	$^3D_1$	234 846.4	317 893.8	4				1
1201.556		0		1	234 668.5	317 893.8	5				1
1200.834		1		1	234 618.4	317 893.8	4				1
1196.042		1		2	234 618.4	318 227.6	9				1
1193.950		2		3	234 846.4	318 601.7	10				1
1146.668	3*d*4*p*	$^3F^o_4$	3*d*4*d*	$^3D_3$	231 392.9	318 601.7	3				1
1140.489	3*d*4*p*	$^3P^o_2$	3*d*4*d*	$^3S_1$	234 846.4	322 528.1	6				1
1138.177		0		1	234 668.5	322 528.1	2				1
1137.529		1		1	234 618.4	322 528.1	6				1
1134.768	3*d*4*p*	$^3F^o_4$	3*d*4*d*	$^3G_4$	231 392.9	319 516.8	3	3.4−1	2.0+8	D	1°,112*
1127.631		4		5	231 392.9	320 074.4	12	7.2	3.5+9	D	1°,112*
1126.090		3		3	230 316.3	319 119.1	2	8.4−1	6.1+8	D	1°,112*
1121.066		3		4	230 316.3	319 516.8	12	3.6	2.1+9	D	1°,112*
1116.478		2		3	229 551.7	319 119.1	10				1
1122.255	3*d*4*p*	$^3D^o_3$	3*d*4*d*	$^3D_2$	229 120.8	318 227.6	1				1
1118.518		2		1	228 489.1	317 893.8	1				1
1117.559		3		3	229 120.8	318 601.7	9				1
1114.350		2		2	228 489.1	318 227.6	8				1
1112.452		1		1	228 001.8	317 893.8	7				1
1109.731		2		3	228 489.1	318 601.7	1				1
1108.322		1		2	228 001.8	318 227.6	1				1
1118.157	3*d*4*p*	$^1P^o_1$	3*d*4*d*	$^1D_2$	239 917.5	329 350.3	7				1
1106.250	3*d*4*p*	$^3D^o_3$	3*d*4*d*	$^3G_4$	229 120.8	319 516.8	2	2.0	1.2+9	D	1°,112*
1103.390		2		3	228 489.1	319 119.1	3	3.1−1	2.4+8	D	1°,112*
1104.296	3*d*4*p*	$^1D^o_2$	3*d*4*d*	$^1F_3$	226 119.8	316 674.9	6				1
1089.079	3*d*4*p*	$^1F^o_3$	3*d*4*d*	$^1D_2$	237 529.5	329 350.3	1				1
1073.367	3*d*4*p*	$^1D^o_2$	3*d*4*d*	$^1P_1$	226 119.8	319 284.0	2				1
1062.933	3*d*4*p*	$^3F^o_4$	3*d*4*d*	$^3F_3$	231 392.9	325 472.5	0				1
1058.298		4		4	231 392.9	325 884.2	5				1
1054.991		3		2	230 316.3	325 104.1	0				1
1050.901		3		3	230 316.3	325 472.5	4				1
1046.542		2		2	229 551.7	325 104.1	2				1
1046.364		3		4	230 316.3	325 884.2	3				1
1042.544		2		3	229 551.7	325 472.5	3				1
1060.651	3*d*4*p*	$^1F^o_3$	3*d*4*d*	$^1G_4$	237 529.5	331 811.2	8				1
1048.236	3*d*4*p*	$^3P^o_2$	3*d*4*d*	$^3P_1$	234 846.4	330 245.1	2				1
1047.494		1		0	234 618.4	330 084.8	1				1
1046.294		0		1	234 668.5	330 245.1	2				1
1045.733		1		1	234 618.4	330 245.1	1				1
1045.044		2		2	234 846.4	330 536.8	7				1
1042.544		1		2	234 618.4	330 536.8	3				1
1035.037	3*d*4*p*	$^3D^o_2$	3*d*4*d*	$^3F_2$	228 489.1	325 104.1	1				1
1033.452		3		4	229 120.8	325 884.2	5				1
1031.105		2		3	228 489.1	325 472.5	5				1
1029.842		1		2	228 001.8	325 104.1	4				1
1002.024	3*d*4*p*	$^3F^o_2$	3*d*4*d*	$^1D_2$	229 551.7	329 350.3	0				1
997.709	3*d*4*p*	$^3D^o_3$	3*d*4*d*	$^1D_2$	229 120.8	329 350.3	0				1

Cr v (Ca sequence) – Continued

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
986.035	$3d4p$	${}^3D^o_3$	$3d4d$	${}^3P_2$	229 120.8	330 536.8	5				1
982.736		2		1	228 489.1	330 245.1	4				1
979.934		2		2	228 489.1	330 536.8	0				1
979.590		1		0	228 001.8	330 084.8	0				1
978.064		1		1	228 001.8	330 245.1	0				1
968.703	$3d4p$	${}^1D^o_2$	$3d4d$	${}^1D_2$	226 119.8	329 350.3	7				1
859.516[C]	$3d^2$	${}^1S_0$	$3d4s$	${}^3D_2$	51 146.4	167 491.0		E2	2.4+0	E	112*
842.195	$3d4p$	${}^1P^o_1$	$3d5s$	${}^1D_2$	239 917.5	358 653.8	2				1
837.157	$3d4p$	${}^1F^o_3$	$3d5s$	${}^3D_2$	237 529.5	356 981.3	0				1
832.309		3		3	237 529.5	357 675.9	0				1
829.520[C]	$3d^2$	${}^1S_0$	$3d4s$	${}^1D_2$	51 146.4	171 698.1		E2	3.8+2	E	112*
825.600	$3d4p$	${}^1F^o_3$	$3d5s$	${}^1D_2$	237 529.5	358 653.8	7				1
819.153	$3d4p$	${}^3P^o_0$	$3d5s$	${}^3D_1$	234 668.5	356 744.8	0				1
818.803		1		1	234 618.4	356 744.8	0				1
818.803		2		2	234 846.4	356 981.3	0				1
817.246		1		2	234 618.4	356 981.3	1				1
814.148		2		3	234 846.4	357 675.9	3				1
791.872	$3d4p$	${}^3F^o_4$	$3d5s$	${}^3D_3$	231 392.9	357 675.9	6				1
789.492		3		2	230 316.3	356 981.3	5				1
786.210		2		1	229 551.7	356 744.8	3				1
780.428		2		3	229 551.7	357 675.9	1				1
779.209	$3d4p$	${}^3F^o_3$	$3d5s$	${}^1D_2$	230 316.3	358 653.8	0				1
778.253	$3d4p$	${}^3D^o_2$	$3d5s$	${}^3D_2$	228 489.1	356 981.3	3				1
777.873		3		3	229 120.8	357 675.9	6				1
776.743		1		1	228 001.8	356 744.8	1				1
775.308		1		2	228 001.8	356 981.3	0				1
774.079		2		3	228 489.1	357 675.9	0				1
768.251	$3d4p$	${}^3D^o_2$	$3d5s$	${}^1D_2$	228 489.1	358 653.8	0				1
764.151	$3d4p$	${}^1D^o_2$	$3d5s$	${}^3D_2$	226 119.8	356 981.3	0				1
754.521	$3d4p$	${}^1D^o_2$	$3d5s$	${}^1D_2$	226 119.8	358 653.8	5				1
687.418[C]	$3d^2$	${}^1G_4$	$3d4s$	${}^3D_2$	22 019.2	167 491.0		E2	8.9+1	E	112*
684.602[C]		4		3	22 019.2	168 089.5		E2	1.2+0	E	112
668.097[C]	$3d^2$	${}^1G_4$	$3d4s$	${}^1D_2$	22 019.2	171 698.1		E2	9.6+3	E	112*
661.658[C]	$3d^2$	${}^3P_2$	$3d4s$	${}^3D_1$	16 041.0	167 176.4		E2	8.1+2	E	112*
660.284[C]		2		2	16 041.0	167 491.0		E2	1.8+3	E	112*
660.067[C]		1		1	15 676.6	167 176.4		E2	2.6+3	E	112*
658.699[C]		1		2	15 676.6	167 491.0		E2	2.9+2	E	112*
657.898[C]		0		2	15 491.8	167 491.0		E2	1.2+3	E	112*
657.685[C]		2		3	16 041.0	168 089.5		E2	2.3+3	E	112*
656.112[C]		1		3	15 676.6	168 089.5		E2	1.2+3	E	112*
649.400[C]	$3d^2$	${}^1D_2$	$3d4s$	${}^3D_1$	13 188.0	167 176.4		E2	6.1+1	E	112*
648.076[C]		2		2	13 188.0	167 491.0		E2	2.0+2	E	112*
645.572[C]		2		3	13 188.0	168 089.5		E2	7.7+1	E	112*
642.438[C]	$3d^2$	${}^3P_2$	$3d4s$	${}^1D_2$	16 041.0	171 698.1		E2	3.4+2	E	112*
640.937[C]		1		2	15 676.6	171 698.1		E2	4.0+0	E	112*
640.179[C]		0		2	15 491.8	171 698.1		E2	1.0+1	E	112*
630.875[C]	$3d^2$	${}^1D_2$	$3d4s$	${}^1D_2$	13 188.0	171 698.1		E2	6.8+3	E	112*

Cr v (Ca sequence) – Continued

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
601.145[C]	$3d^2$	$^3F_4$	$3d4s$	$^3D_2$	1 141.7	167 491.0		E2	2.7+3	E	112*
599.994[C]		$_3$		$_1$	508.2	167 176.4		E2	4.3+3	E	112*
598.990[C]		$_4$		$_3$	1 141.7	168 089.5		E2	1.0+4	E	112*
598.864[C]		$_3$		$_2$	508.2	167 491.0		E2	6.5+3	E	112*
598.171[C]		$_2$		$_1$	0	167 176.4		E2	8.8+3	E	112*
597.047[C]		$_2$		$_2$	0	167 491.0		E2	3.8+3	E	112*
596.725[C]		$_3$		$_3$	508.2	168 089.5		E2	2.9+3	E	112*
594.921[C]		$_2$		$_3$	0	168 089.5		E2	2.7+10	E	112*
586.316[C]	$3d^2$	$^3F_4$	$3d4s$	$^1D_2$	1 141.7	171 698.1		E2	1.6+1	E	112*
584.147[C]		$_3$		$_2$	508.2	171 698.1		E2	8.8+1	E	112*
582.418[C]		$_2$		$_2$	0	171 698.1		E2	1.1+1	E	112*
529.742	$3d^2$	$^1S_0$	$3d4p$	$^1P^\circ_1$	51 146.4	239 917.5	6				1
470.976	$3d^2$	$^3P_1$	$3d4p$	$^3D^\circ_1$	15 676.6	228 001.8	1				1
470.697		$_2$		$_2$	16 041.0	228 489.1	2				1
470.567		$_0$		$_1$	15 491.8	228 001.8	3	4.9−2	4.9+8	D	1°,112*
469.893		$_1$		$_2$	15 676.6	228 489.1	4	8.1−2	4.9+8	D	1°,112*
469.311		$_2$		$_3$	16 041.0	229 120.8	5	9.0−2	3.9+8	D	1°,112*
469.634	$3d^2$	$^1D_2$	$3d4p$	$^1D^\circ_2$	13 188.0	226 119.8	7	3.8−1	2.3+9	D	1°,112*
464.015	$3d^2$	$^1G_4$	$3d4p$	$^1F^\circ_3$	22 019.2	237 529.5	10	8.1−1	3.6+9	D	1°,112*
457.504	$3d^2$	$^3P_2$	$3d4p$	$^3P^\circ_1$	16 041.0	234 618.4	4	1.1−1	1.2+9	D	1°,112*
457.028		$_2$		$_2$	16 041.0	234 846.4	6	4.2−1	2.7+9	D	1°,112*
456.743		$_1$		$_1$	15 676.6	234 618.4	3	8.7−2	9.2+8	D	1°,112*
456.637		$_1$		$_0$	15 676.6	234 668.5	4	1.0−1	3.3+9	D	1°,112*
456.357		$_0$		$_1$	15 491.8	234 618.4	4	8.9−2	9.5+8	D	1°,112*
456.272		$_1$		$_2$	15 676.6	234 846.4	5	1.0−1	6.7+8	D	1°,112*
451.607	$3d^2$	$^1D_2$	$3d4p$	$^3P^\circ_1$	13 188.0	234 618.4	1				1
451.141		$_2$		$_2$	13 188.0	234 846.4	1				1
446.672	$3d^2$	$^3P_2$	$3d4p$	$^1P^\circ_1$	16 041.0	239 917.5	1				1
445.751	$3d^2$	$^1D_2$	$3d4p$	$^1F^\circ_3$	13 188.0	237 529.5	2	3.9−2	1.9+8	D	1°,112*
442.243	$3d^2$	$^3F_2$	$3d4p$	$^1D^\circ_2$	0	226 119.8	2				1
441.056	$3d^2$	$^1D_2$	$3d4p$	$^1P^\circ_1$	13 188.0	239 917.5	5	2.0−1	2.3+9	D	1°,112*
438.618	$3d^2$	$^3F_4$	$3d4p$	$^3D^\circ_3$	1 141.7	229 120.8	10				1
438.618		$_3$		$_2$	508.2	228 489.1	10				1
438.618		$_2$		$_1$	0	228 001.8	10				1
437.655		$_2$		$_2$	0	228 489.1	3	1.9−1	1.3+9	D	1°,112*
437.420		$_3$		$_3$	508.2	229 120.8	4	2.7−1	1.4+9	D	1°,112*
436.601	$3d^2$	$^3F_3$	$3d4p$	$^3F^\circ_2$	508.2	229 551.7	4	3.0−1	2.1+9	D	1°,112*
436.351		$_4$		$_3$	1 141.7	230 316.3	4	4.8−1	2.4+9	D	1°,112*
435.636		$_2$		$_2$	0	229 551.7	5	4.0−2	2.8+8	D	1°,112*
435.149		$_3$		$_3$	508.2	230 316.3	5	5.7−2	2.9+8	D	1°,112*
434.306		$_4$		$_4$	1 141.7	231 392.9	7	3.8−1	1.5+9	D	1°,112*
434.180		$_2$		$_3$	0	230 316.3	1				1
433.119		$_3$		$_4$	508.2	231 392.9	2				1

Cr VI (K sequence)

λ (Å)	Classification		Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
2495.708	$3p^6(^1S)4d$ $^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)$ $^2F^o_{7/2}$	402 888.6	442 945.4	5				9
2176.648	$3p^6(^1S)5p$ $^2P^o_{3/2}$	$3p^6(^1S)5d$ $^2D_{5/2}$	488 561.9	534 489.7	8				9
2136.433	1/2	3/2	487 589.5	534 381.7	6				9
2044.777	$3p^6(^1S)5g$ $^2G_{9/2}$	$3p^6(^1S)6h$ $^2H^o_{9/2}$	572 274.4	621 162.9	9				9
2044.777	9/2	11/2	572 274.4	621 162.9	9				9
2044.777	7/2	9/2	572 272.3	621 162.9	9				9
1933.955	$3p^6(^1S)5f$ $^2F^o_{7/2}$	$3p^6(^1S)6g$ $^2G_{9/2}$	568 993.0	620 700.5	3				9
1932.783	5/2	7/2	568 957.4	620 696.3	2				9
1924.089	$3p^6(^1S)4f$ $^2F^o_{7/2}$	$3p^6(^1S)5d$ $^2D_{5/2}$	482 517.1	534 489.7	5				9
1907.462	5/2	3/2	481 956.0	534 381.7	4				9
1455.282	$3p^6(^1S)4s$ $^2S_{1/2}$	$3p^6(^1S)4p$ $^2P^o_{1/2}$	227 857.9	296 573.2	15				9
1417.659	1/2	3/2	227 857.9	298 396.7	16				9
1360.504	$3p^6(^1S)5p$ $^2P^o_{3/2}$	$3p^6(^1S)6s$ $^2S_{1/2}$	488 561.9	562 064.1	5				9
1342.741	1/2	1/2	487 589.5	562 064.1	4				9
1281.439	$3p^6(^1S)5g$ $^2G_{9/2}$	$3p^6(^1S)7h$ $^2H^o_{9/2}$	572 274.4	650 310.8	5				9
1281.439	9/2	11/2	572 274.4	650 310.8	5				9
1281.439	7/2	9/2	572 272.3	650 310.8	5				9
1264.746	$3p^6(^1S)4d$ $^2D_{5/2}$	$3p^6(^1S)4f$ $^2F^o_{5/2}$	402 888.6	481 956.0	4				9
1261.128	3/2	5/2	402 661.7	481 956.0	7				9
1255.832	5/2	7/2	402 888.6	482 517.1	8				9
1177.469	$3p^6(^1S)4d$ $^2D_{3/2}$	$3p^6(^1S)5p$ $^2P^o_{1/2}$	402 661.7	487 589.5	5				9
1167.222	5/2	3/2	402 888.6	488 561.9	6				9
1164.146	3/2	3/2	402 661.7	488 561.9	2				9
1114.114	$3p^6(^1S)4f$ $^2F^o_{7/2}$	$3p^6(^1S)5g$ $^2G_{9/2}$	482 517.1	572 274.4	8				9
1107.225	5/2	7/2	481 956.0	572 272.3	7				9
1103.926	$3p^6(^1S)4d$ $^2D_{3/2}$	$3p^5(^2P^o)3d^2(^3P)$ $^2P^o_{1/2}$	402 661.7	493 247.1	2				9
1086.681	5/2	3/2	402 888.6	494 911.2	2				9
959.093	$3p^6(^1S)4p$ $^2P^o_{3/2}$	$3p^6(^1S)4d$ $^2D_{3/2}$	298 396.7	402 661.7	10				9
957.009	3/2	5/2	298 396.7	402 888.6	14				9°,8
942.610	1/2	3/2	296 573.2	402 661.7	13				9°,8
773.223	$3p^5(^2P^o)3d^2(^3F)$ $^2F^o_{7/2}$	$3p^6(^1S)5g$ $^2G_{9/2}$	442 945.4	572 274.4	3				9
756.786	5/2	7/2	440 135.2	572 272.3	2				9
723.675	$3p^6(^1S)4f$ $^2F^o_{7/2}$	$3p^6(^1S)6g$ $^2G_{9/2}$	482 517.1	620 700.5	1				9
720.771	5/2	7/2	481 956.0	620 696.3	1				9
614.028	$3p^6(^1S)4p$ $^2P^o_{3/2}$	$3p^6(^1S)5s$ $^2S_{1/2}$	298 396.7	461 253.0	4				9
607.239	1/2	1/2	296 573.2	461 253.0	3				9
602.011	$3p^6(^1S)4d$ $^2D_{5/2}$	$3p^6(^1S)5f$ $^2F^o_{7/2}$	402 888.6	568 993.0	0				9
562.572	$3p^5(^2P^o)3d^2(^3F)$ $^2F^o_{7/2}$	$3p^6(^1S)6g$ $^2G_{9/2}$	442 945.4	620 700.5	0				9
423.559	$3p^6(^1S)4p$ $^2P^o_{3/2}$	$3p^6(^1S)5d$ $^2D_{5/2}$	298 396.7	534 489.7	00				9
420.499	1/2	3/2	296 573.2	534 381.7	00				9
385.015	$3p^6(^1S)4s$ $^2S_{1/2}$	$3p^6(^1S)5p$ $^2P^o_{1/2}$	227 857.9	487 589.5	0				9
383.575	1/2	3/2	227 857.9	488 561.9	0				9
337.185	$3p^6(^1S)3d$ $^2D_{3/2}$	$3p^6(^1S)4p$ $^2P^o_{1/2}$	0	296 573.2	12				9
336.184	5/2	3/2	940	298 396.7	14				9
335.123	3/2	3/2	0	298 396.7	7				9

Cr VI (K sequence) — Continued

λ (Å)	Classification		Energy Levels (cm⁻¹)		Int.	*gf*	*A* (s⁻¹)	Acc.	References
280.879	$3p^6(^1S)3d$ $^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1G)$ $^2F^o_{5/2}$	940	356 962	2	2.8−3	4.0+7	D	9°,112*
280.143	3/2	5/2	0	356 962	4	4.0−2	5.7+8	D−	9°,112*
279.154	5/2	7/2	940	359 165	5	5.8−2	6.2+8	D−	9°,112*
269.776	$3p^6(^1S)3d$ $^2D_{5/2}$	$3p^5(^2P^o)3d^2(^1D)$ $^2F^o_{7/2}$	940	371 618	10	2.3−1	2.7+9	D−	9°,112*
264.732	5/2	5/2	940	378 677	2	1.1−2	1.8+8	E	9°,112*
264.078	3/2	5/2	0	378 677	9	1.6−1	2.6+9	D−	9°,112*
227.689	$3p^6(^1S)3d$ $^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)$ $^2F^o_{5/2}$	940	440 135.2	5	2.2−1	4.6+9	E	9°,112*
227.202	3/2	5/2	0	440 135.2	11	3.1	6.6+10	D−	9°,112*,5
226.241	5/2	7/2	940	442 945.4	12	4.4	7.2+10	D−	9°,112*,5
207.892	$3p^6(^1S)3d$ $^2D_{5/2}$	$3p^6(^1S)4f$ $^2F^o_{5/2}$	940	481 956.0	6				9
207.651	5/2	7/2	940	482 517.1	12				9°,5
207.489	3/2	5/2	0	481 956.0	11				9°,5
205.084	$3p^6(^1S)3d$ $^2D_{5/2}$	$3p^6(^1S)5p$ $^2P^o_{3/2}$	940	488 561.9	12				9
205.084	3/2	1/2	0	487 589.5	12				9
204.682	3/2	3/2	0	488 561.9	6				9
202.739	$3p^6(^1S)3d$ $^2D_{3/2}$	$3p^5(^2P^o)3d^2(^3P)$ $^2P^o_{1/2}$	0	493 247.1	10	1.4	1.2+11	D−	9°,112*
202.442	5/2	3/2	940	494 911.2	11	2.6	1.0+11	D−	9°,112*
202.057	3/2	3/2	0	494 911.2	6	2.8−1	1.2+10	E	9°,112*
201.606	$3p^6(^1S)3d$ $^2D_{5/2}$	$3p^5(^2P^o)3d^2(^3F)$ $^2D^o_{5/2}$	940	496 958	12	9.6	2.6+11	D−	9°,112*,3,5
201.388	5/2	3/2	940	497 495	8	6.6−1	2.7+10	E	9°,112*,3,5
201.224	3/2	5/2	0	496 958	9	6.8−1	1.8+10	E	9°,112*,3,5
201.007	3/2	3/2	0	497 495	11	6.0	2.5+11	D−	9°,112*,3,5
176.037	$3p^6(^1S)3d$ $^2D_{5/2}$	$3p^6(^1S)5f$ $^2F^o_{7/2}$	940	568 993.0	8				9°,2
175.756	3/2	5/2	0	568 957.4	7				9°,2
174.175	$3p^6(^1S)3d$ $^2D_{3/2}$	$3p^6(^1S)6p$ $^2P^o_{1/2}$	0	574 135	2				9
173.973	5/2	3/2	940	575 742	1				9
172.841	$3p^6(^1S)3d$ $^2D_{3/2}$	$3p^53d(^3P^o)4s$ $^2P^o_{1/2}$	0	578 566	4	1.0−1	1.2+10	D	9°,112*,7,6
172.487	5/2	3/2	940	580 697	5	1.9−1	1.1+10	D	9°,112*,7,6
172.204	3/2	3/2	0	580 697	1	2.8−2	1.6+9	E	9°,112*,7,6
171.400	$3p^6(^1S)3d$ $^2D_{5/2}$	$3p^53d(^3F^o)4s$ $^4F^o_{7/2}$	940	584 371	3				9°,7,6
170.569	3/2	5/2	0	586 273	2				9°,7,6
169.435	$3p^6(^1S)3d$ $^2D_{5/2}$	$3p^53d(^3F^o)4s$ $^2F^o_{7/2}$	940	591 137	7	5.6−1	1.6+10	D	9°,112*,7,6
168.355	5/2	5/2	940	594 926	1	2.7−2	1.1+9	E	9°,112*,7,6
168.088	3/2	5/2	0	594 926	6	5.2−1	2.0+10	D	9°,112*,7,6
164.833	$3p^6(^1S)3d$ $^2D_{5/2}$	$3p^53d(^3D^o)4s$ $^4D^o_{7/2}$	940	607 615	2				9°,7,6
164.564	5/2	5/2	940	608 631	2				9°,7,6
164.301	3/2	5/2	0	608 631	0				9°,7,6
164.159	3/2	3/2	0	609 166	1				9°,7,6
163.801	$3p^6(^1S)3d$ $^2D_{3/2}$	$3p^53d(^1D^o)4s$ $^2D^o_{5/2}$	0	610 497	2				9
163.514	3/2	3/2	0	611 568	2				9
163.014	$3p^6(^1S)3d$ $^2D_{5/2}$	$3p^53d(^1F^o)4s$ $^2F^o_{5/2}$	940	614 385	4				9
162.764	3/2	5/2	0	614 385	2				9
162.565	5/2	7/2	940	616 079	6	2.6−1	8.3+9	D	9°,112*
161.930	$3p^6(^1S)3d$ $^2D_{5/2}$	$3p^53d(^3D^o)4s$ $^2D^o_{3/2}$	940	618 491	0	4.7−2	3.0+9	E	9°,112*,7,6
161.687	5/2	5/2	940	619 419	5	4.0−1	1.7+10	D	9°,112*,7,6
161.687	3/2	3/2	0	618 491	5	2.2−1	1.4+10	D	9°,112*,7,6
161.908	$3p^6(^1S)3d$ $^2D_{5/2}$	$3p^6(^1S)6f$ $^2F^o_{5/2}$	940	618 583	2				9
161.836	5/2	7/2	940	618 849	5				9°,2
161.659	3/2	5/2	0	618 583	5				9°,2

Cr VI (K sequence) — Continued

λ (Å)	Classification		Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
154.418	$3p^6(^1S)3d$ $^2D_{5/2}$	$3p^6(^1S)7f$ $^2F^o_{7/2}$	940	648 533	4				9°,2
154.197	$_{3/2}$	$_{5/2}$	0	648 521	3				9°,2
149.918	$3p^6(^1S)3d$ $^2D_{5/2}$	$3p^6(^1S)8f$ $^2F^o_{7/2}$	940	667 973	2				9°,2
149.706	$_{3/2}$	$_{5/2}$	0	667 973	1				9°,2
146.980	$3p^6(^1S)3d$ $^2D_{5/2}$	$3p^6(^1S)9f$ $^2F^o_{7/2}$	940	681 307	1				9°,2
146.776	$_{3/2}$	$_{5/2}$	0	681 307	0				9°,2
144.961	$3p^6(^1S)3d$ $^2D_{5/2}$	$3p^6(^1S)10f$ $^2F^o_{7/2}$	940	690 781	0				9°,2
144.81	$_{3/2}$	$_{5/2}$	0	690 781	1				2

Cr VII (Ar sequence)

λ (Å)	Classification		Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1448.457	$3s^23p^5(^2P^o_{1/2})4s$ $^2[1/2]^o_1$	$3s^23p^54p$ $^3P_2$	682 610.2	751 649.3	3				14
1426.644	$3s^23p^5(^2P^o_{1/2})4s$ $^2[1/2]^o_0$	$3s^23p^54p$ $^3D_1$	678 534.7	748 629.3	7				14
1393.366	$3s^23p^5(^2P^o_{1/2})4s$ $^2[1/2]^o_1$	$3s^23p^54p$ $^1P_1$	682 610.2	754 378.9	5				14
1319.885	$3s^23p^5(^2P^o_{1/2})4s$ $^2[1/2]^o_1$	$3s^23p^54p$ $^1D_2$	682 610.2	758 374.4	7				14
1312.307	$3s^23p^5(^2P^o_{3/2})4s$ $^2[3/2]^o_1$	$3s^23p^54p$ $^3D_1$	672 427.7	748 629.3	7				14
1307.606	$_2$	$_2$	668 858.6	745 328.9	6				14
1302.551	$_2$	$_3$	668 858.6	745 631.1	9				14
1207.866	$3s^23p^5(^2P^o_{3/2})4s$ $^2[3/2]^o_2$	$3s^23p^54p$ $^3P_2$	668 858.6	751 649.3	7				14
1181.920	$_1$	$_0$	672 427.7	757 035.8	3				14
1198.481	$3s^23p^5(^2P^o_{1/2})4d$ $^2[3/2]^o_2$	$3s^23p^5(^2P^o_{1/2})4f$ $^2[5/2]_3$	873 565.5	957 004.6	2				14
1193.492	$3s^23p^5(^2P^o_{3/2})4d$ $^2[5/2]^o_3$	$3s^23p^5(^2P^o_{3/2})4f$ $^2[7/2]_4$	865 155.8	948 943.9	4				14
1193.492	$_2$	$_3$	864 129.5	947 917.4	4				14
1190.867	$3s^23p^5(^2P^o_{3/2})4d$ $^2[7/2]^o_4$	$3s^23p^5(^2P^o_{3/2})4f$ $^2[9/2]_5$	860 444.3	944 416.8	2				14
1186.561	$_3$	$_4$	861 198.4	945 475.7	1				14
1189.640	$3s^23p^5(^2P^o_{1/2})4d$ $^2[5/2]^o_3$	$3s^23p^5(^2P^o_{1/2})4f$ $^2[7/2]_4$	873 146.1	957 205.1	1				14
1170.143	$3s^23p^5(^2P^o_{3/2})4d$ $^2[3/2]^o_2$	$3s^23p^5(^2P^o_{3/2})4f$ $^2[5/2]_3$	859 407.1	944 866.7	1				14
1163.947	$3s^23p^5(^2P^o_{3/2})4d$ $^2[1/2]^o_1$	$3s^23p^5(^2P^o_{3/2})4f$ $^2[3/2]_2$	857 234.5	943 149.1	0				14
1163.516	$3s^23p^5(^2P^o_{3/2})4s$ $^2[3/2]^o_1$	$3s^23p^54p$ $^1D_2$	672 427.7	758 374.4	1				14
936.492	$3s^23p^54p$ $^1D_2$	$3s^23p^5(^2P^o_{3/2})4d$ $^2[5/2]^o_3$	758 374.4	865 155.8	0				14
926.520	$3s^23p^54p$ $^3P_1$	$3s^23p^5(^2P^o_{3/2})4d$ $^2[3/2]^o_1$	758 572.1	866 502.8	2				14
881.012	$3s^23p^54p$ $^3P_2$	$3s^23p^5(^2P^o_{3/2})4d$ $^2[5/2]^o_3$	751 649.3	865 155.8	4				14
871.296	$3s^23p^54p$ $^1D_2$	$3s^23p^5(^2P^o_{1/2})4d$ $^2[5/2]^o_3$	758 374.4	873 146.1	5				14
870.980	$3s^23p^54p$ $^3D_3$	$3s^23p^5(^2P^o_{3/2})4d$ $^2[7/2]^o_4$	745 631.1	860 444.3	7				14
863.043	$_2$	$_3$	745 328.9	861 198.4	6				14
869.615	$3s^23p^54p$ $^3P_1$	$3s^23p^5(^2P^o_{1/2})4d$ $^2[3/2]^o_2$	758 572.1	873 565.5	2				14
844.989	$_0$	$_1$	757 035.8	875 380.5	1				14
820.239	$_2$	$_2$	751 649.3	873 565.5	1				14

Cr VII (Ar sequence) – Continued

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
865.800	$3s^23p^54p$	$^3D_1$	$3s^23p^5(^2P^\circ_{3/2})4d$	$^2[^5/_2]^\circ_2$	748 629.3	864 129.5	4				14
841.747		2		2	745 328.9	864 129.5	2				14
836.644		3		3	745 631.1	865 155.8	2				14
848.517	$3s^23p^54p$	$^1P_1$	$3s^23p^5(^2P^\circ_{1/2})4d$	$^2[^5/_2]^\circ_2$	754 378.9	872 231.6	3				14
821.788	$3s^23p^54p$	$^3S_1$	$3s^23p^5(^2P^\circ_{3/2})4d$	$^2[^1/_2]^\circ_0$	734 605.3	856 292.2	1				14
815.474		1		1	734 605.3	857 234.5	2				14
801.277	$3s^23p^54p$	$^3S_1$	$3s^23p^5(^2P^\circ_{3/2})4d$	$^2[^3/_2]^\circ_2$	734 605.3	859 407.1	3				14
741.889	$3s^23p^53d$	$^1P^\circ_1$	$3s3p^63d$	$^1D_2$	493 035.4	627 826.7	2				14
453.183	$3s^23p^53d$	$^1F^\circ_3$	$3s3p^63d$	$^3D_3$	389 226.2	609 887.8	5				14
450.314	$3s^23p^53d$	$^3D^\circ_2$	$3s3p^63d$	$^3D_1$	386 616.6	608 679.6	2				14
449.386		2		2	386 616.6	609 142.7	5				14
448.729		1		1	385 828.3	608 679.6	5				14
447.882		2		3	386 616.6	609 887.8	3				14
447.792		1		2	385 828.3	609 142.7	3				14
441.680		3		2	382 737.4	609 142.7	2				14
440.244		3		3	382 737.4	609 887.8	8				14
441.584	$3s^23p^53d$	$^1D^\circ_2$	$3s3p^63d$	$^3D_2$	382 682.3	609 142.7	4				14
440.121		2		3	382 682.3	609 887.8	0				14
419.104	$3s^23p^53d$	$^1F^\circ_3$	$3s3p^63d$	$^1D_2$	389 226.2	627 826.7	5				14
414.582	$3s^23p^53d$	$^3D^\circ_2$	$3s3p^63d$	$^1D_2$	386 616.6	627 826.7	6				14
408.019		3		2	382 737.4	627 826.7	6				14
407.918	$3s^23p^53d$	$^1D^\circ_2$	$3s3p^63d$	$^1D_2$	382 682.3	627 826.7	7				14
407.138	$3s^23p^53d$	$^3F^\circ_2$	$3s3p^63d$	$^3D_1$	363 060.9	608 679.6	8				14
406.369		2		2	363 060.9	609 142.7	4				14
401.658		3		2	360 171.9	609 142.7	9				14
400.452		3		3	360 171.9	609 887.8	3				14
396.288		4		3	357 543.7	609 887.8	10				14
380.897	$3s^23p^53d$	$^3P^\circ_2$	$3s3p^63d$	$^3D_1$	346 137.1	608 679.6	0				14
380.219		2		2	346 137.1	609 142.7	5				14
379.153		2		3	346 137.1	609 887.8	9				14
376.073		1		1	342 773.5	608 679.6	4				14
375.425		1		2	342 773.5	609 142.7	7				14
377.687	$3s^23p^53d$	$^3F^\circ_2$	$3s3p^63d$	$^1D_2$	363 060.9	627 826.7	1				14
355.012	$3s^23p^53d$	$^3P^\circ_2$	$3s3p^63d$	$^1D_2$	346 137.1	627 826.7	0				14
291.738	$3s^23p^6$	$^1S_0$	$3s^23p^53d$	$^3P^\circ_1$	0	342 773.5	2				14
280.823	$3s^23p^53d$	$^1F^\circ_3$	$3s^23p^54p$	$^3D_2$	389 226.2	745 328.9	2				14
280.571		3		3	389 226.2	745 631.1	0				14
275.926	$3s^23p^53d$	$^1F^\circ_3$	$3s^23p^54p$	$^3P_2$	389 226.2	751 649.3	1				14
275.792	$3s^23p^53d$	$^3D^\circ_3$	$3s^23p^54p$	$^3D_2$	382 737.4	745 328.9	0				14
275.635		1		1	385 828.3	748 629.3	1				14
275.563		3		3	382 737.4	745 631.1	0				14
275.756	$3s^23p^53d$	$^1D^\circ_2$	$3s^23p^54p$	$^3D_2$	382 682.3	745 328.9	0				14
273.269		2		1	382 682.3	748 629.3	1				14

Cr VII (Ar sequence) – Continued

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
273.952	$3s^23p^53d$	$^3D^o_2$	$3s^23p^54p$	$^3P_2$	386 616.6	751 649.3	0				14
271.070		3		2	382 737.4	751 649.3	6				14
269.397		1		0	385 828.3	757 035.8	2				14
268.852		2		1	386 616.6	758 572.1	4				14
270.897	$3s^23p^53d$	$^1F^o_3$	$3s^23p^54p$	$^1D_2$	389 226.2	758 374.4	6				14
269.038	$3s^23p^53d$	$^1D^o_2$	$3s^23p^54p$	$^1P_1$	382 682.3	754 378.9	4				14
266.172	$3s^23p^53d$	$^1D^o_2$	$3s^23p^54p$	$^1D_2$	382 682.3	758 374.4	0				14
261.598	$3s^23p^53d$	$^3F^o_2$	$3s^23p^54p$	$^3D_2$	363 060.9	745 328.9	2				14
259.636		3		2	360 171.9	745 328.9	9				14
259.432		3		3	360 171.9	745 631.1	3				14
259.360		2		1	363 060.9	748 629.3	5				14
257.676		4		3	357 543.7	745 631.1	10				14
259.181	$3s^23p^6$	$^1S_0$	$3s^23p^53d$	$^3D^o_1$	0	385 828.3	8	2.8−3	9.3+7	E	14°,112*
257.422	$3s^23p^53d$	$^3P^o_2$	$3s^23p^54p$	$^3S_1$	346 137.1	734 605.3	4				14
255.210		1		1	342 773.5	734 605.3	4				14
254.177		0		1	341 179.3	734 605.3	2				14
255.545	$3s^23p^53d$	$^3F^o_3$	$3s^23p^54p$	$^1P_1$	363 060.9	754 378.9	3				14
255.447	$3s^23p^53d$	$^3F^o_3$	$3s^23p^54p$	$^3P_2$	360 171.9	751 649.3	0				14
252.837		2		1	363 060.9	758 572.1	0				14
251.124	$3s^23p^53d$	$^3F^o_3$	$3s^23p^54p$	$^1D_2$	360 171.9	758 374.4	2				14
250.311	$3s^23p^53d$	$^3P^o_2$	$3s^23p^54p$	$^3D_3$	346 137.1	745 631.1	3				14
245.431		0		1	341 179.3	748 629.3	2				14
246.599	$3s^23p^53d$	$^3P^o_2$	$3s^23p^54p$	$^3P_2$	346 137.1	751 649.3	4				14
244.565		1		2	342 773.5	751 649.3	1				14
242.461		2		1	346 137.1	758 572.1	1				14
241.393		1		0	342 773.5	757 035.8	2				14
242.953	$3s^23p^53d$	$^3P^o_1$	$3s^23p^54p$	$^1P_1$	342 773.5	754 378.9	2				14
242.579	$3s^23p^53d$	$^3P^o_2$	$3s^23p^54p$	$^1D_2$	346 137.1	758 374.4	4				14
202.828	$3s^23p^6$	$^1S_0$	$3s^23p^53d$	$^1P^o_1$	0	493 035.4	14	3.09	1.67+11	C	14°,112*,11, 12,3,5
179.776	$3s^23p^53d$	$^1F^o_3$	$3s^23p^5(^2P^o_{3/2})4f$	$^2[^9/_2]_4$	389 226.2	945 475.7	3				14
179.682	$3s^23p^53d$	$^3D^o_2$	$3s^23p^5(^2P^o_{3/2})4f$	$^2[^3/_2]_2$	386 616.6	943 149.1	1				14
178.851	$3s^23p^53d$	$^1D^o_2$	$3s^23p^5(^2P^o_{3/2})4f$	$^2[^3/_2]_1$	382 682.3	941 811	0				14
177.805	$3s^23p^53d$	$^3D^o_3$	$3s^23p^5(^2P^o_{3/2})4f$	$^2[^5/_2]_3$	382 737.4	944 866.7	4				14
176.053		2		2	386 616.6	954 623	5				14
175.812		1		2	385 828.3	954 623	4				14°,13
177.694	$3s^23p^53d$	$^3D^o_3$	$3s^23p^5(^2P^o_{3/2})4f$	$^2[^9/_2]_4$	382 737.4	945 475.7	4				14
176.916	$3s^23p^53d$	$^1D^o_2$	$3s^23p^5(^2P^o_{3/2})4f$	$^2[^7/_2]_3$	382 682.3	947 917.4	3				14
176.613	$3s^23p^53d$	$^3D^o_3$	$3s^23p^5(^2P^o_{3/2})4f$	$^2[^7/_2]_4$	382 737.4	948 943.9	8				14°,13
176.295	$3s^23p^53d$	$^1F^o_3$	$3s^23p^5(^2P^o_{1/2})4f$	$^2[^7/_2]_3$	389 226.2	956 454	1				14
175.315	$3s^23p^53d$	$^3D^o_2$	$3s^23p^5(^2P^o_{1/2})4f$	$^2[^5/_2]_3$	386 616.6	957 004.6	7				14°,13
174.286	$3s^23p^53d$	$^1D^o_2$	$3s^23p^5(^2P^o_{1/2})4f$	$^2[^7/_2]_3$	382 682.3	956 454	6				14°,13

Cr VII (Ar sequence) — Continued

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
174.070	$3s^23p^53d$	$^3D^\circ_3$	$3s^23p^5(^2P^\circ_{1/2})4f$	$^2[7/2]_4$	382 737.4	957 205.1	1				14
170.982	$3s^23p^53d$	$^3F^\circ_2$	$3s^23p^5(^2P^\circ_{3/2})4f$	$^2[7/2]_3$	363 060.9	947 917.4	6				14°,13
170.139		3		3	360 171.9	947 917.4	2				14
169.842		3		4	360 171.9	948 943.9	1				14
169.084		4		4	357 543.7	948 943.9	1				14
170.850	$3s^23p^53d$	$^3F^\circ_3$	$3s^23p^5(^2P^\circ_{3/2})4f$	$^2[9/2]_4$	360 171.9	945 475.7	8				14°,13
170.393		4		5	357 543.7	944 416.8	10				14°,13
170.086		4		4	357 543.7	945 475.7	1				14
168.523	$3s^23p^53d$	$^3F^\circ_2$	$3s^23p^5(^2P^\circ_{1/2})4f$	$^2[7/2]_3$	363 060.9	956 454	3				14
167.496		3		4	360 171.9	957 205.1	5				14
167.496	$3s^23p^53d$	$^3P^\circ_2$	$3s^23p^5(^2P^\circ_{3/2})4f$	$^2[3/2]_2$	346 137.1	943 149.1	5				14°,13
166.936		1		1	342 773.5	941 811	3				14°,13
166.560		1		2	342 773.5	943 149.1	4				14°,13
166.488		0		1	341 179.3	941 811	2				14°,13
167.020	$3s^23p^53d$	$^3P^\circ_2$	$3s^23p^5(^2P^\circ_{3/2})4f$	$^2[5/2]_3$	346 137.1	944 866.7	7				14°,13
148.714	$3s^23p^6$	$^1S_0$	$3s^23p^5(^2P^\circ_{3/2})4s$	$^2[3/2]^\circ_1$	0	672 427.7	10	1.3−1	1.3+10	D	14°,112*,10
146.497	$3s^23p^6$	$^1S_0$	$3s^23p^5(^2P^\circ_{1/2})4s$	$^2[1/2]^\circ_1$	0	682 610.2	12	2.9−1	3.0+10	D	14°,112*,10
116.654	$3s^23p^6$	$^1S_0$	$3s^23p^5(^2P^\circ_{3/2})4d$	$^2[1/2]^\circ_1$	0	857 234.5	1				14
115.407	$3s^23p^6$	$^1S_0$	$3s^23p^5(^2P^\circ_{3/2})4d$	$^2[3/2]^\circ_1$	0	866 502.8	8				14°,2
114.235	$3s^23p^6$	$^1S_0$	$3s^23p^5(^2P^\circ_{1/2})4d$	$^2[3/2]^\circ_1$	0	875 380.5	8				14°,2
105.139	$3s^23p^6$	$^1S_0$	$3s^23p^5(^2P^\circ_{3/2})5s$	$^2[3/2]^\circ_1$	0	951 122	3				14°,10
104.127	$3s^23p^6$	$^1S_0$	$3s^23p^5(^2P^\circ_{1/2})5s$	$^2[1/2]^\circ_1$	0	960 366	3				14°,10
101.565	$3s^23p^6$	$^1S_0$	$3s3p^64p$	$^3P^\circ_1$	0	984 590	0.8				15
100.593	$3s^23p^6$	$^1S_0$	$3s3p^64p$	$^1P^\circ_1$	0	994 105	2				14°,15
96.760	$3s^23p^6$	$^1S_0$	$3s^23p^5(^2P^\circ_{3/2})5d$	$^2[3/2]^\circ_1$	0	1 033 485	2				14
95.917	$3s^23p^6$	$^1S_0$	$3s^23p^5(^2P^\circ_{1/2})5d$	$^2[3/2]^\circ_1$	0	1 042 568	1				14
92.969	$3s^23p^6$	$^1S_0$	$3s^23p^5(^2P^\circ_{3/2})6s$	$^2[3/2]^\circ_1$	0	1 075 627	1				14
92.128	$3s^23p^6$	$^1S_0$	$3s^23p^5(^2P^\circ_{1/2})6s$	$^2[1/2]^\circ_1$	0	1 085 446	0				14
81.980	$3s^23p^6$	$^1S_0$	$3s3p^65p$	$^3P^\circ_1$	0	1 219 810	1				15
81.491	$3s^23p^6$	$^1S_0$	$3s3p^65p$	$^1P^\circ_1$	0	1 227 130	4				15
74.875	$3s^23p^6$	$^1S_0$	$3s3p^66p$	$^1P^\circ_1$	0	1 335 560	1				15
71.744	$3s^23p^6$	$^1S_0$	$3s3p^67p$	$^1P^\circ_1$	0	1 393 840					15

Cr VIII (Cl sequence)

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
430.713	$3s^23p^5$	$^2P^o_{1/2}$	$3s3p^6$	$^2S_{1/2}$	9 892	242 065		7.0−2	1.2+9	C−	17°,112*,30,8,16
413.112		$_{3/2}$		$_{1/2}$	0	242 065		1.43−1	2.79+9	C−	17°,112*,18,30,8,16
221.41	$3s^23p^5$	$^2P^o_{1/2}$	$3s^23p^4(^1D)3d$	$^2S_{1/2}$	9 892	461 540		5.40−1	3.68+10	C−	19°,112*
216.67		$_{3/2}$		$_{1/2}$	0	461 540		1.3	9.5+10	C−	19°,112*
213.03	$3s^23p^5$	$^2P^o_{1/2}$	$3s^23p^4(^3P)3d$	$^2P_{3/2}$	9 892	479 310					19
211.42		$_{1/2}$		$_{1/2}$	9 892	482 910					19
208.63		$_{3/2}$		$_{3/2}$	0	479 310					19°,3,5
207.07		$_{3/2}$		$_{1/2}$	0	482 910					19
205.65	$3s^23p^5$	$^2P^o_{1/2}$	$3s^23p^4(^3P)3d$	$^2D_{3/2}$	9 892	496 170		3.66	1.44+11	C	19°,112*,3,5
205.01		$_{3/2}$		$_{5/2}$	0	487 780		5.76	1.52+11	C	19°,112*,3,5
201.54		$_{3/2}$		$_{3/2}$	0	496 170		1.6−1	6.8+9	D	19°,112*
147.49	$3s^23p^4(^3P)3d$	$^4F_{7/2}$	$3s^23p^4(^3P)4f$	$^4G^o_{9/2}$							22°,26
147.20		$_{9/2}$		$_{11/2}$							22°,26
146.63		$_{5/2}$		$_{7/2}$							22°,26
147.30	$3s^23p^4(^1D)3d$	$^2G_{9/2}$	$3s^23p^4(^1D)4f$	$^2H^o_{11/2}$							22°,26
146.37	$3s^23p^4(^3P)3d$	$^4F_{7/2}$	$3s^23p^4(^3P)4f$	$^2G^o_{9/2}$							22°,26
143.17	$3s^23p^4(^3P)3d$	$^4D_{7/2}$	$3s^23p^4(^3P)4f$	$^4F^o_{9/2}$							22°,26
135.892	$3s^23p^5$	$^2P^o_{3/2}$	$3s^23p^4(^3P)4s$	$^4P_{5/2}$	0	735 880					21
134.942		$_{3/2}$		$_{3/2}$	0	741 060					21
135.185	$3s^23p^5$	$^2P^o_{1/2}$	$3s^23p^4(^3P)4s$	$^2P_{3/2}$	9 892	749 640	8				21°,16$^{\Delta}$
134.076		$_{1/2}$		$_{1/2}$	9 892	755 740	3				21°,16$^{\Delta}$
133.395		$_{3/2}$		$_{3/2}$	0	749 640	5				21°,16$^{\Delta}$
132.321		$_{3/2}$		$_{1/2}$	0	755 740	10				21°,16$^{\Delta}$
131.638	$3s^23p^5$	$^2P^o_{1/2}$	$3s^23p^4(^1D)4s$	$^2D_{3/2}$	9 892	769 550					21
129.998		$_{3/2}$		$_{5/2}$	0	769 240					21
125.728	$3s^23p^5$	$^2P^o_{1/2}$	$3s^23p^4(^1S)4s$	$^2S_{1/2}$	9 892	805 260					21
124.184		$_{3/2}$		$_{1/2}$	0	805 260					21
106.68	$3s^23p^5$	$^2P^o_{1/2}$	$3s^23p^4(^3P)4d$	$^2D_{3/2}$	9 892	947 300					22°,26
105.69		$_{3/2}$		$_{5/2}$	0	946 200					22°,26
103.92	$3s^23p^5$	$^2P^o_{1/2}$	$3s^23p^4(^1D)4d$	$^2P_{1/2}$	9 892	972 200					22°,26
103.03		$_{3/2}$		$_{3/2}$	0	970 600					22°,26
103.48	$3s^23p^5$	$^2P^o_{3/2}$	$3s^23p^4(^1D)4d$	$^2S_{1/2}$	0	966 400					22°,26
103.36	$3s^23p^5$	$^2P^o_{1/2}$	$3s^23p^4(^1D)4d$	$^2D_{3/2}$	9 892	977 400					22°,26
102.45		$_{3/2}$		$_{5/2}$	0	976 100					22°,26

Cr IX (S sequence)

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4621.4^{C}	$3s^23p^4$	$^3P_0$	$3s^23p^4$	$^1D_2$	9 549	30 284		E2	6.1−4	E	112*
4450.5^{C}		1		2	7 821	30 284		M1	4.2+0	E	112*
3301.1^{C}		2		2	0	30 284		M1	3.0+1	D−	112*
2733.6^{C}	$3s^23p^4$	$^1D_2$	$3s^23p^4$	$^1S_0$	30 284	66 855		E2	6.4+0	D−	112*
1693.9^{C}	$3s^23p^4$	$^3P_1$	$3s^23p^4$	$^1S_0$	7 821	66 855		M1	3.3+2	E	112*
1495.8^{C}		2		0	0	66 855		E2	8.8−1	E	112*
432.440	$3s^23p^4$	$^3P_1$	$3s3p^5$	$^3P^\circ_2$	7 821	239 068	4				17°,8,23
424.146		0		1	9 549	245 317	4				17°,8,23
421.057		1		1	7 821	245 317	5				17°,8,23
418.290		2		2	0	239 068	6	1.9−1	1.4+9	E	17°,112*,8,23
414.602		1		0	7 821	249 016	5				17°,8,23
407.637		2		1	0	245 317	5				17°,8,23
418.925	$3s^23p^4$	$^1S_0$	$3s3p^5$	$^1P^\circ_1$	66 855	305 561	4b				17
363.271	$3s^23p^4$	$^1D_2$	$3s3p^5$	$^1P^\circ_1$	30 284	305 561	5	3.4−1	5.7+9	D	17°,112*,8,23
327.267	$3s^23p^4$	$^3P_2$	$3s3p^5$	$^1P^\circ_1$	0	305 561	0				17
223.87	$3s^23p^4$	$^3P_1$	$3s^23p^3(^2D^\circ)3d$	$^3P^\circ_2$	7 821	454 510					23°,19
220.02		2		2	0	454 510		3.3	9.2+10	E	23°,112*,19
215.97	$3s^23p^4$	$^1D_2$	$3s^23p^3(^2D^\circ)3d$	$^1D^\circ_2$	30 284	493 310		3.8	1.1+11	D	23°,112*,19
215.04	$3s^23p^4$	$^1S_0$	$3s^23p^3(^2D^\circ)3d$	$^1P^\circ_1$	66 855	531 880		2.6	1.3+11	D	23°,112*
211.97	$3s^23p^4$	$^3P_1$	$3s^23p^3(^4S^\circ)3d$	$^3D^\circ_2$	7 821	479 570					23°,5
211.32		0		1	9 549	482 760					23°,5
210.61		2		3	0	474 810					24°,23,5
208.53		2		2	0	479 570					23
209.44	$3s^23p^4$	$^1D_2$	$3s^23p^3(^2D^\circ)3d$	$^1F^\circ_3$	30 284	507 750		6.5	1.4+11	D	23°,112*,5
180.57	$3s^23p^33d$	$^3G^\circ_5$	$3s^23p^34p$	$^3F_4$							26
176.86	$3s^23p^33d$	$^5D^\circ_4$	$3s^23p^34p$	$^5P_3$							26
131.08^{T}	$3s^23p^3(^2D^\circ)3d$	$^1G^\circ_4$	$3s^23p^3(^2D^\circ)4f$	$^1H_5$							26
129.99	$3s^23p^3(^2P^\circ)3d$	$^3F^\circ_4$	$3s^23p^3(^2P^\circ)4f$	$^3G_5$							22°,26
129.77	$3s^23p^3(^2D^\circ)3d$	$^3G^\circ_5$	$3s^23p^3(^2D^\circ)4f$	$^3H_6$							22°,26
127.95	$3s^23p^33d$	$^5D^\circ_4$	$3s^23p^34f$	$^5F_5$							22°,26
127.88		3		4							22°,26
127.53	$3s^23p^3(^2D^\circ)3d$	$^3F^\circ_4$	$3s^23p^3(^2D^\circ)4f$	$^3G_5$							22°,26
127.42		3		4							22°,26
127.31		2		3							22°,26
123.226	$3s^23p^4$	$^3P_0$	$3s^23p^3(^4S^\circ)4s$	$^3S^\circ_1$	9 549	821 100					25
122.964		1		1	7 821	821 100	1				25
121.781		2		1	0	821 100	2				25
122.720	$3s^23p^4$	$^1S_0$	$3s^23p^3(^2P^\circ)4s$	$^1P^\circ_1$	66 855	881 810	1				25
121.293	$3s^23p^4$	$^1D_2$	$3s^23p^3(^2D^\circ)4s$	$^1D^\circ_2$	30 284	854 730	3				25
119.569	$3s^23p^4$	$^3P_0$	$3s^23p^3(^2D^\circ)4s$	$^3D^\circ_1$	9 549	845 900	0				25
119.320		1		1	7 821	845 900	1				25
119.269		1		2	7 821	846 260	2				25
118.165		2		2	0	846 260	1				25
117.942		2		3	0	847 870	3				25

Cr IX (S sequence) – Continued

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
117.435	$3s^23p^4$	$^1D_2$	$3s^23p^3(^2P^o)4s$	$^1P^o_1$	30 284	881 810	1				25
98.08	$3s^23p^4$	$^3P_0$	$3s^23p^3(^4S^o)4d$	$^3D^o_1$	9 549	1 029 100					22°,26
97.97		1		2	7 821	1 028 500					22°,26
97.19		2		3	0	1 028 900					22°,26
96.55	$3s^23p^4$	$^1S_0$	$3s^23p^34d$	$^1P^o_1$	66 855	1 102 600					22°,26
96.48	$3s^23p^4$	$^1D_2$	$3s^23p^3(^2D^o)4d$	$^1D^o_2$	30 284	1 066 800					22°,26
96.17	$3s^23p^4$	$^1D_2$	$3s^23p^3(^2D^o)4d$	$^1F^o_3$	30 284	1 070 100					22°,26
94.33	$3s^23p^4$	$^3P_1$	$3s^23p^3(^2D^o)4d$	$^3D^o_2$	7 821	1 067 900					26

Cr X (P sequence)

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
4083.0^{C}	$3s^23p^3$	$^2D^o_{5/2}$	$3s^23p^3$	$^2P^o_{1/2}$	39 450	63 935		E2	2.5 − 1	D −	112*
3725.8^{C}		3/2		1/2	37 103	63 935		M1	2.6 + 1	C	112*
3608.2^{C}		5/2		3/2	39 450	67 157		M1	2.7 + 1	C	112*
3326.4^{C}		3/2		3/2	37 103	67 157		M1	6.2 + 1	C	112*
2694.4^{C}	$3s^23p^3$	$^4S^o_{3/2}$	$3s^23p^3$	$^2D^o_{3/2}$	0	37 103		M1	1.1 + 1	D	112*
2534.1^{C}		3/2		5/2	0	39 450		M1	3.0 − 1	E	112*
1564.10	$3s^23p^3$	$^4S^o_{3/2}$	$3s^23p^3$	$^2P^o_{1/2}$	0	63 935	0.05	M1	6.0 + 1	D	29°,112*,28^{Δ}
1489.04		3/2		3/2	0	67 157	0.09	M1	1.2 + 2	D	29°,112*,28^{Δ}
449.479^{C}	$3s^23p^3$	$^2P^o_{3/2}$	$3s3p^4$	$^2D_{3/2}$	67 157	289 637		4.0 − 4	3.3 + 6	E	112*
447.529		3/2		5/2	67 157	290 606	2	7.6 − 2	4.1 + 8	D	17°,112*
443.062		1/2		3/2	63 935	289 637	0	2.8 − 2	2.4 + 8	D	17°,112*
427.551	$3s^23p^3$	$^4S^o_{3/2}$	$3s3p^4$	$^4P_{5/2}$	0	233 890	7	1.9 − 1	1.2 + 9	D	17°,112*,30,8, 23
416.690		3/2		3/2	0	239 987	5	1.3 − 1	1.3 + 9	D	17°,112*,8,23
411.655		3/2		1/2	0	242 922	4	6.8 − 2	1.3 + 9	D	17°,112*,23
399.707	$3s^23p^3$	$^2D^o_{5/2}$	$3s3p^4$	$^2D_{3/2}$	39 450	289 637	3	6.6 − 3	7.1 + 7	E	17°,112*
398.150		5/2		5/2	39 450	290 606	10	3.1 − 1	2.1 + 9	D	17°,112*,8,23
395.984		3/2		3/2	37 103	289 637	9	2.3 − 1	2.4 + 9	D	17°,112*,8
394.473^{C}		3/2		5/2	37 103	290 606		4.8 − 3	3.4 + 7	E	112*
375.584	$3s^23p^3$	$^2P^o_{3/2}$	$3s3p^4$	$^2P_{3/2}$	67 157	333 412	0				17
371.086		1/2		3/2	63 935	333 412	0				17
365.718		1/2		1/2	63 935	337 370	2				17
355.112	$3s^23p^3$	$^2P^o_{3/2}$	$3s3p^4$	$^2S_{1/2}$	67 157	348 760	3				17°,8
351.092		1/2		1/2	63 935	348 760	0				17°,8
340.181	$3s^23p^3$	$^2D^o_{5/2}$	$3s3p^4$	$^2P_{3/2}$	39 450	333 412	7				17°,8,23
337.490		3/2		3/2	37 103	333 412	1				17
333.035		3/2		1/2	37 103	337 370	4				17°,8,23
254.15	$3s^23p^3$	$^2D^o_{5/2}$	$3s^23p^2(^3P)3d$	$^2P_{3/2}$	39 450	432 830					23
252.75		3/2		3/2	37 103	432 830					23
247.67		3/2		1/2	37 103	440 870					23
248.41^{C}	$3s^23p^3$	$^2D^o_{5/2}$	$3s^23p^2(^3P)3d$	$^4P_{5/2}$	39 450	442 010		3.2 − 2	5.7 + 8	E	112*
246.97^{C}		3/2		5/2	37 103	442 010		8.8 − 3	1.6 + 8	E	112*
244.14^{C}		3/2		1/2	37 103	446 710		6.0 − 3	3.4 + 8	E	112*

Cr x (P sequence) – Continued

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
244.19^{C}	$3s^23p^3$	$^2P^o_{3/2}$	$3s^23p^2(^1D)3d$	$^2D_{5/2}$	67 157	476 680		3.1−1	5.8+9	D	112*
244.10^{C}		3/2		3/2	67 157	476 820		3.7−3	1.0+8	E	112*
242.20^{C}		1/2		3/2	63 935	476 820		1.8−1	5.0+9	D	112*
233.80	$3s^23p^3$	$^2P^o_{1/2}$	$3s^23p^2(^1D)3d$	$^2P_{1/2}$	63 935	491 650					23
232.96		3/2		3/2	67 157	496 430		1.4	4.4+10	E	23°,112*
231.21		1/2		3/2	63 935	496 430		4.0−1	1.2+10	E	23°,112*
228.71	$3s^23p^3$	$^2D^o_{5/2}$	$3s^23p^2(^1D)3d$	$^2D_{5/2}$	39 450	476 680		2.1	4.5+10	D	23°,112*
228.64^{C}		5/2		3/2	39 450	476 820		2.5−1	8.1+9	D	112*
227.49^{C}		3/2		5/2	37 103	476 680		8.4−2	1.8+9	D	112*
227.42		3/2		3/2	37 103	476 820		1.6	5.2+10	D	23°,112*
226.24	$3s^23p^3$	$^4S^o_{3/2}$	$3s^23p^2(^3P)3d$	$^4P_{5/2}$	0	442 010		3.4	7.3+10	D	23°,112*,31
224.74		3/2		3/2	0	444 960		2.3	7.6+10	D	23°,112*,31
223.86		3/2		1/2	0	446 710		1.2	7.7+10	D	23°,112*,31
221.18	$3s^23p^3$	$^2P^o_{3/2}$	$3s^23p^2(^3P)3d$	$^2D_{5/2}$	67 157	519 280					23
220.42		3/2		3/2	67 157	520 820					23
218.88		1/2		3/2	63 935	520 820					23
218.83^{C}	$3s^23p^3$	$^2D^o_{5/2}$	$3s^23p^2(^1D)3d$	$^2P_{3/2}$	39 450	496 430		2.9−2	1.0+9	E	112*
217.71^{C}		3/2		3/2	37 103	496 430		2.1−2	7.4+8	E	112*
216.72	$3s^23p^3$	$^2D^o_{5/2}$	$3s^23p^2(^3P)3d$	$^2F_{7/2}$	39 450	500 880		5.0	9.0+10	E	23°,112*,3,5
209.78^{C}	$3s^23p^3$	$^4S^o_{3/2}$	$3s^23p^2(^1D)3d$	$^2D_{5/2}$	0	476 680		4.4−3	1.1+8	E	112*
117.09	$3s^23p^2(^1D)3d$	$^2G_{9/2}$	$3s^23p^24f$	$^2H^o_{11/2}$							22°,26
116.75		7/2		9/2							22°,26
115.29	$3s^23p^23d$	$^4F_{9/2}$	$3s^23p^24f$	$^4G^o_{11/2}$							22°,26
113.70	$3s^23p^3$	$^2P^o_{1/2}$	$3s^23p^2(^3P)4s$	$^2P_{1/2}$	63 935	943 300					22°,26
113.31		3/2		3/2	67 157	949 800					22°,26
111.16	$3s^23p^3$	$^2P^o_{3/2}$	$3s^23p^2(^1D)4s$	$^2D_{5/2}$	67 157	967 000					22°,26
111.02		3/2		3/2	67 157	967 800					22°,26
110.37	$3s^23p^3$	$^2D^o_{3/2}$	$3s^23p^2(^3P)4s$	$^2P_{1/2}$	37 103	943 300					22°,26
109.84		5/2		3/2	39 450	949 800					22°,26
107.80	$3s^23p^3$	$^2D^o_{5/2}$	$3s^23p^2(^1D)4s$	$^2D_{5/2}$	39 450	967 000					22°,26
107.45		3/2		3/2	37 103	967 800					22°,26
107.70	$3s^23p^3$	$^4S^o_{3/2}$	$3s^23p^2(^3P)4s$	$^4P_{1/2}$	0	928 500					22°,26
107.14		3/2		3/2	0	933 400					22°,26
106.49		3/2		5/2	0	939 100					22°,26

Cr XI (Si sequence)

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
8345.0^{C}	$3s^23p^2$	$^3P_0$	$3s^23p^2$	$^3P_2$	0	11 980		E2	1.1−3	D−	112*
3996.8	$3s^23p^2$	$^3P_2$	$3s^23p^2$	$^1D_2$	11 980	36 994		M1	2.6+1	E	27^{c},112*,33,32
3177.9^{C}		1		2	5 536	36 994		M1	1.8+1	E	112*
2899.6^{C}	$3s3p^3$	$^3D^o_3$	$3s3p^3$	$^3P^o_1$	243 916	278 394		E2	1.4+0	D−	112*
2874.2^{C}		3		2	243 916	278 698		M1	3.2+1	E	112*
2807.9^{C}		2		0	242 456	278 059		E2	3.5+0	D−	112*
2799.3^{C}		1		0	242 346	278 059		M1	4.2+1	E	112*
2781.7^{C}		2		1	242 456	278 394		E2	2.8−1	E	112*
2773.3^{C}		1		1	242 346	278 394		M1	4.2+1	E	112*
2758.4^{C}		2		2	242 456	278 698		M1	2.5+1	E	112*
2750.1^{C}		1		2	242 346	278 698		M1	7.3+0	E	112*
2631.8^{C}	$3s^23p^2$	$^1D_2$	$3s^23p^2$	$^1S_0$	36 994	74 980		E2	6.9+0	D−	112*
1587.3^{C}	$3s^23p^2$	$^3P_2$	$3s^23p^2$	$^1S_0$	11 980	74 980		E2	1.5+0	E	112*
1440.01		1		0	5 536	74 980		M1	3.7+2	E	28^{c},112*
1563^{C}	$3s3p^3$	$^5S^o_2$	$3s3p^3$	$^3D^o_2$	178 470	242 456		M1	7.5+0	E	112*
1528^{C}		2		3	178 470	243 916		E2	2.5−1	E	112*
1001^{C}	$3s3p^3$	$^5S^o_2$	$3s3p^3$	$^3P^o_1$	178 470	278 394		M1	1.3+2	E	112*
997.7^{C}		2		2	178 470	278 698		M1	2.4+2	E	112*
600.7	$3s^23p^2$	$^3P_2$	$3s3p^3$	$^5S^o_2$	11 980	178 470					35
578.0		1		2	5 536	178 470					35
519.12^{C}	$3s3p^3$	$^3D^o_3$	$3s^23p3d$	$^3D^o_3$	243 916	436 550		M1	4.1+1	E	112*
491.608^{C}	$3s^23p^2$	$^1S_0$	$3s3p^3$	$^3P^o_1$	74 980	278 394		1.1−3	9.7+6	E	112*
483.274^{C}	$3s^23p^2$	$^1D_2$	$3s3p^3$	$^3D^o_3$	36 994	243 916		7.5−3	3.1+7	E	112*
434.092^{C}	$3s^23p^2$	$^3P_2$	$3s3p^3$	$^3D^o_1$	11 980	242 346		7.0−4	8.3+6	E	112*
433.885^{C}		2		2	11 980	242 456		1.0−2	7.4+7	D−	112*
431.154		2		3	11 980	243 916		1.9−1	9.8+8	D	17^{c},112*,8,23
422.282		1		1	5 536	242 346		2.4−2	3.0+8	D−	17^{c},112*
422.083		1		2	5 536	242 456		1.4−1	1.0+9	D	17^{c},112*,8,23
412.629		0		1	0	242 346		6.3−2	8.3+8	D	17^{c},112*
375.356^{C}	$3s^23p^2$	$^3P_2$	$3s3p^3$	$^3P^o_1$	11 980	278 394		5.0−2	8.0+8	D	112*
374.927		2		2	11 980	278 698		2.4−1	2.3+9	D	17^{c},112*,23
366.942		1		0	5 536	278 059		6.0−2	3.0+9	C−	17^{c},112*
366.491		1		1	5 536	278 394		7.2−2	1.2+9	D	17^{c},112*
366.085		1		2	5 536	278 698		4.2−2	4.1+8	D	17^{c},112*
359.203^{C}		0		1	0	278 394		5.5−2	9.5+8	D	112*
370.959	$3s^23p^2$	$^1D_2$	$3s3p^3$	$^1D^o_2$	36 994	306 570					17^{c},23
339.446	$3s^23p^2$	$^3P_2$	$3s3p^3$	$^1D^o_2$	11 980	306 570					17
298.059	$3s^23p^2$	$^1D_2$	$3s3p^3$	$^1P^o_1$	36 994	372 498					17^{c},8,23
290.323	$3s^23p^2$	$^3P_2$	$3s3p^3$	$^3S^o_1$	11 980	356 424					17^{c},24,8,23
284.988		1		1	5 536	356 424					17^{c},24,8,23
280.572		0		1	0	356 424					17
256.32	$3s^23p^2$	$^1D_2$	$3s^23p3d$	$^1D^o_2$	36 994	427 090					23
250.28^{C}	$3s^23p^2$	$^1D_2$	$3s^23p3d$	$^3D^o_3$	36 994	436 550		6.5−2	1.0+9	E	112*
245.70	$3s^23p^2$	$^3P_2$	$3s^23p3d$	$^3P^o_2$	11 980	418 980					23
241.87		1		2	5 536	418 980					23
235.03		0		1	0	425 480					23

Cr XI (Si sequence) – Continued

λ (Å)	Classification				Energy Levels (cm⁻¹)		Int.	gf	A (s⁻¹)	Acc.	References
240.76	$3s^23p^2$	$^1S_0$	$3s^23p3d$	$^1P^o_1$	74 980	490 330		1.2	4.8+10	D	23°,112*
237.24	$3s^23p^2$	$^3P_1$	$3s^23p3d$	$^1D^o_2$	5 536	427 090					23
235.74	$3s^23p^2$	$^3P_2$	$3s^23p3d$	$^3D^o_2$	11 980	436 210					23
235.53		2		3	11 980	436 550		3.2	5.5+10	D	23°,112*,31
233.26		1		1	5 536	434 240					23
232.18		1		2	5 536	436 210					23
230.29		0		1	0	434 240					23
226.45	$3s^23p^2$	$^1D_2$	$3s^23p3d$	$^1F^o_3$	36 994	478 590		3.2	6.0+10	C	23°,112*,31
214.31[C]	$3s^23p^2$	$^3P_2$	$3s^23p3d$	$^1F^o_3$	11 980	478 590		6.5−2	1.4+9	E	112*
203.94[C]	$3s^23p^2$	$^3P_0$	$3s^23p3d$	$^1P^o_1$	0	490 330		4.9−3	2.6+8	E	112*
117.13	$3s^23p3d$	$^1P^o_1$	$3s^23p4f$	$^1D_2$	490 330	1 344 100					36
115.13	$3s^23p3d$	$^1F^o_3$	$3s^23p4f$	$^1G_4$	478 590	1 347 200					36
105.65	$3s^23p3d$	$^3F^o_3$	$3s^23p4f$	$^3G_4$							36°,22,26
105.26		4		5							36°,22,26
100.90	$3s^23p^2$	$^1D_2$	$3s^23p4s$	$^1P^o_1$	36 994	1 028 100					22°,26
100.13	$3s^23p^2$	$^3P_2$	$3s^23p4s$	$^3P^o_1$	11 980	1 010 700					22°,26
99.67		1		0	5 536	1 008 800					22°,26
99.48		1		1	5 536	1 010 700					22°,26
99.10		2		2	11 980	1 021 100					22°,26
98.94		0		1	0	1 010 700					22°,26
98.47		1		2	5 536	1 021 100					22°,26
100.09[T]	$3s3p^3$	$^1D^o_2$	$3s^23p4f$	$^3G_3$	306 570	1 305 700					36
99.13[T]	$3s3p^3$	$^1D^o_2$	$3s^23p4f$	$^1F_3$	306 570	1 315 400					36
83.31	$3s^23p^2$	$^1S_0$	$3s^23p4d$	$^1P^o_1$	74 980	1 275 300					36
82.05	$3s^23p^2$	$^1D_2$	$3s^23p4d$	$^1F^o_3$	36 994	1 255 800					36°,22,26
81.55	$3s^23p^2$	$^3P_2$	$3s^23p4d$	$^3D^o_3$	11 980	1 238 200					36°,22,26
81.23		1		2	5 536	1 236 600					36
81.02		0		1	0	1 234 300					36
81.18	$3s^23p^2$	$^3P_2$	$3s^23p4d$	$^3F^o_3$	11 980	1 243 800					36

Cr XII (Al sequence)

λ (Å)	Classification		Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
8907.8^{C}	$3s3p^2$ $^4P_{1/2}$	$3s3p^2$ $^4P_{5/2}$	192 115	203 338		E2	1.3−3	D−	112*
8153.8	$3s^23p$ $^2P^o_{1/2}$	$3s^23p$ $^2P^o_{3/2}$	0	12 261		M1	1.55+1	C	27°,112*,33
605.433^{C}	$3s3p^2$ $^2P_{3/2}$	$3p^3$ $^4S^o_{3/2}$	339 258	504 429		6.4−3	3.0+7	E	112*
555.0	$3s^23p$ $^2P^o_{3/2}$	$3s3p^2$ $^4P_{1/2}$	12 261	192 115					35
541.0	3/2	3/2	12 261	196 904					35
523.26	3/2	5/2	12 261	203 338					35
520.83	1/2	1/2	0	192 115					35
508.3	1/2	3/2	0	196 904					35
474.046^{C}	$3s3p^2$ $^2P_{3/2}$	$3p^3$ $^2P^o_{1/2}$	339 258	550 208		4.0−2	6.0+8	D	112*
470.868	3/2	3/2	339 258	551 634		2.7−1	2.0+9	D	38°,112*
460.775	1/2	1/2	333 199	550 208		1.6−1	2.5+9	D	38°,112*
457.802^{C}	1/2	3/2	333 199	551 634		2.8−3	2.2+7	E	112*
428.519^{C}	$3s^23d$ $^2D_{5/2}$	$3s3p(^3P^o)3d$ $^2F^o_{5/2}$	409 752	643 114		3.7−2	2.2+8	E	112*
426.507^{C}	3/2	5/2	408 651	643 114		2.1−1	1.3+9	E	112*
411.431^{C}	5/2	7/2	409 752	652 806		3.5−1	1.7+9	E	112*
422.912^{C}	$3s3p^2$ $^2S_{1/2}$	$3p^3$ $^2P^o_{1/2}$	313 752	550 208		1.5−2	2.8+8	E	112*
420.376^{C}	1/2	3/2	313 752	551 634		1.6−1	1.5+9	D	112*
420.415^{C}	$3s3p^2$ $^2D_{5/2}$	$3p^3$ $^2D^o_{3/2}$	255 577	493 437		6.6−2	6.0+8	E	112*
418.406	3/2	3/2	254 435	493 437		2.0−1	1.9+9	E	38°,112*
417.006	5/2	5/2	255 577	495 382		3.7−1	2.4+9	E	38°,112*
415.029^{C}	3/2	5/2	254 435	495 382		3.4−2	2.2+8	E	112*
412.926^{C}	$3s^23p$ $^2P^o_{3/2}$	$3s3p^2$ $^2D_{3/2}$	12 261	254 435		9.6−3	9.4+7	E	112*
410.989	3/2	5/2	12 261	255 577		2.2−1	1.5+9	D	38°,112*,30,8,23
393.028	1/2	3/2	0	254 435		1.5−1	1.7+9	D	38°,112*,8,23
347.233^{C}	$3s^23d$ $^2D_{5/2}$	$3s3p(^3P^o)3d$ $^2P^o_{3/2}$	409 752	697 743		1.5−2	2.1+8	E	112*
345.911^{C}	3/2	3/2	408 651	697 743		1.8−2	2.6+8	E	112*
344.710^{C}	$3s3p^2$ $^4P_{5/2}$	$3p^3$ $^2D^o_{3/2}$	203 338	493 437		1.1−2	1.5+8	E	112*
331.871^{C}	1/2	3/2	192 115	493 437		3.4−3	5.3+7	E	112*
338.689	$3s^23d$ $^2D_{5/2}$	$3s3p(^1P^o)3d$ $^2F^o_{7/2}$	409 752	705 021		2.8	2.0+10	E	38°,112*
336.254^{C}	5/2	5/2	409 752	707 146		9.0−2	8.9+8	E	112*
335.017	3/2	5/2	408 651	707 146		2.0	2.0+10	E	38°,112*
338.116	$3s3p^2$ $^2D_{3/2}$	$3p^3$ $^2P^o_{1/2}$	254 435	550 208		3.4−1	1.0+10	D	38°,112*
337.772	5/2	3/2	255 577	551 634		5.5−1	8.0+9	D	38°,112*
336.475^{C}	3/2	3/2	254 435	551 634		6.8−2	1.0+9	D	112*
332.126	$3s3p^2$ $^4P_{5/2}$	$3p^3$ $^4S^o_{3/2}$	203 338	504 429		9.0−1	1.4+10	D	37°,112*,8,23,38
325.177	3/2	3/2	196 904	504 429		6.4−1	9.9+9	D	37°,112*,8,23,38
320.191	1/2	3/2	192 115	504 429		3.2−1	5.2+9	D	37°,112*,8,23,38
331.687	$3s^23p$ $^2P^o_{3/2}$	$3s3p^2$ $^2S_{1/2}$	12 261	313 752		6.8−2	2.1+9	D	38°,112*,8,23
318.722	1/2	1/2	0	313 752		3.4−1	1.1+10	D	38°,112*,8,23
316.466	$3s^23d$ $^2D_{5/2}$	$3s3p(^1P^o)3d$ $^2P^o_{3/2}$	409 752	725 713					38
316.466	3/2	1/2	408 651	724 656		7.6−1	2.5+10	D	38°,112*
312.949	$3s^23d$ $^2D_{3/2}$	$3s3p(^1P^o)3d$ $^2D^o_{3/2}$	408 651	728 194					38
312.949	5/2	5/2	409 752	729 319		1.4	1.5+10	E	38°,112*
311.849^{C}	3/2	5/2	408 651	729 319		4.0−2	4.8+8	E	112*
311.587	$3s^23p$ $^2P^o_{3/2}$	$3s3p^2$ $^2P_{1/2}$	12 261	333 199		4.8−1	1.6+10	D	38°,112*,30,8,23
305.816	3/2	3/2	12 261	339 258		1.55	2.76+10	C−	38°,112*,30,8,23
300.120	1/2	1/2	0	333 199		3.8−1	1.4+10	D	38°,112*
294.758	1/2	3/2	0	339 258		3.14−1	6.0+9	C−	38°,112*,23

Cr XII (Al sequence) — Continued

λ (Å)	Classification		Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
294.655^C	$3s3p^2$ $^2D_{5/2}$	$3s3p(^3P^o)3d$ $^4P^o_{5/2}$	255 577	594 957		3.8−2	4.9+8	E	112*
286.988^C	$3s3p^2$ $^2D_{5/2}$	$3s3p(^3P^o)3d$ $^4D^o_{7/2}$	255 577	604 024		1.5−2	1.5+8	E	112*
281.905^C	$3s3p^2$ $^4P_{3/2}$	$3p^3$ $^2P^o_{3/2}$	196 904	551 634		1.0−2	2.1+8	E	112*
278.149^C	1/2	3/2	192 115	551 634		4.4−3	9.4+7	E	112*
278.952^C	$3s3p^2$ $^2P_{3/2}$	$3s3p(^3P^o)3d$ $^2P^o_{3/2}$	339 258	697 743		4.4−1	9.6+9	D	112*
274.315^C	1/2	3/2	333 199	697 743		3.4−2	7.6+8	D	112*
276.818	$3s3p^2$ $^2D_{5/2}$	$3s3p(^3P^o)3d$ $^2D^o_{5/2}$	255 577	616 825					38
276.191	3/2	3/2	254 435	616 503					38
271.822^C	$3s3p^2$ $^2P_{3/2}$	$3s3p(^1P^o)3d$ $^2F^o_{5/2}$	339 258	707 146		8.0−3	1.2+8	E	112*
260.429	$3s3p^2$ $^2S_{1/2}$	$3s3p(^3P^o)3d$ $^2P^o_{3/2}$	313 752	697 743		1.3	3.2+10	D	38°,112*
259.472^C	$3s3p^2$ $^2P_{3/2}$	$3s3p(^1P^o)3d$ $^2P^o_{1/2}$	339 258	724 656		1.42−1	7.0+9	C−	112*
255.456	1/2	1/2	333 199	724 656		1.3−1	6.7+9	D	38°,112*
254.768	1/2	3/2	333 199	725 713					38
258.040^C	$3s3p^2$ $^2D_{5/2}$	$3s3p(^3P^o)3d$ $^2F^o_{5/2}$	255 577	643 114		1.0−1	1.7+9	E	112*
257.282	3/2	5/2	254 435	643 114		6.8−1	1.1+10	E	38°,112*
251.744	5/2	7/2	255 577	652 806		1.0	1.3+10	E	38°,112*
257.112	$3s3p^2$ $^2P_{3/2}$	$3s3p(^1P^o)3d$ $^2D^o_{3/2}$	339 258	728 194					38
256.370	3/2	5/2	339 258	729 319		3.0	5.0+10	E	38°,112*
253.168	1/2	3/2	333 199	728 194					38
255.350^C	$3s3p^2$ $^4P_{5/2}$	$3s3p(^3P^o)3d$ $^4P^o_{5/2}$	203 338	594 957		2.0−1	3.4+9	D	112*
251.223	3/2	5/2	196 904	594 957		1.1	2.0+10	D	38°,112*
247.065	1/2	3/2	192 115	596 867					38
246.255	3/2	1/2	196 904	602 987		4.4−1	2.4+10	D	38°,112*
243.385^C	1/2	1/2	192 115	602 987		2.2−2	1.2+9	D	112*
252.276	$3s^23p$ $^2P^o_{3/2}$	$3s^23d$ $^2D_{3/2}$	12 261	408 651		2.5−1	6.6+9	D	38°,112*,31
251.578	3/2	5/2	12 261	409 752		1.9	3.4+10	D	38°,112*,24,31, 23,5
244.708	1/2	3/2	0	408 651		1.1	3.0+10	D	38°,112*,31,23,5
249.572	$3s3p^2$ $^4P_{5/2}$	$3s3p(^3P^o)3d$ $^4D^o_{7/2}$	203 338	604 024		2.62	3.5+10	C−	38°,112*
249.374	5/2	5/2	203 338	604 342		1.2	2.2+10	D	38°,112*
246.200	1/2	1/2	192 115	598 289		6.0−1	3.3+10	D	38°,112*
245.469	3/2	5/2	196 904	604 342		6.0−1	1.1+10	D	38°,112*
245.469	3/2	3/2	196 904	604 287					38
243.366^C	$3s3p^2$ $^2S_{1/2}$	$3s3p(^1P^o)3d$ $^2P^o_{1/2}$	313 752	724 656		2.6−1	1.5+10	D	112*
222.491	$3s3p^2$ $^2D_{5/2}$	$3s3p(^1P^o)3d$ $^2F^o_{7/2}$	255 577	705 021		1.4	2.3+10	E	38°,112*
221.450^C	5/2	5/2	255 577	707 146		5.9−2	1.3+9	E	112*
220.890	3/2	5/2	254 435	707 146		1.0	2.3+10	E	38°,112*
222.485^C	$3s3p^2$ $^4P_{5/2}$	$3s3p(^3P^o)3d$ $^2F^o_{7/2}$	203 338	652 806		1.1−2	1.9+8	E	112*
212.666^C	$3s3p^2$ $^2D_{3/2}$	$3s3p(^1P^o)3d$ $^2P^o_{1/2}$	254 435	724 656		2.2−3	1.6+8	E	112*
199.329^C	$3s3p^2$ $^4P_{5/2}$	$3s3p(^1P^o)3d$ $^2F^o_{7/2}$	203 338	705 021		7.2−3	1.5+8	E	112*
197.774^C	$3s3p^2$ $^4P_{1/2}$	$3s3p(^3P^o)3d$ $^2P^o_{3/2}$	192 115	697 743		3.6−3	1.6+8	E	112*
101.46	$3s^23d$ $^2D_{5/2}$	$3s^24f$ $^2F^o_{7/2}$	409 752	1 395 400					40
101.39	3/2	5/2	408 651	1 395 000					40
96.50	$3s3p3d$ $^4F^o_{7/2}$	$3s3p4f$ $^4G_{9/2}$							40
96.35	5/2	7/2							40
96.11	9/2	11/2							40

Cr XII (Al sequence) – Continued

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
90.86	$3s3p^2$	$^4P_{5/2}$	$3s3p4s$	$^4P^{\circ}_{5/2}$	203 338	1 303 900					40
76.488	$3s^23p$	$^2P^{\circ}_{3/2}$	$3s^24d$	$^2D_{5/2}$	12 261	1 319 660					39
75.815		$_{1/2}$		$_{3/2}$	0	1 319 000					39

Cr XIII (Mg sequence)

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
634.78	$3s3d$	$^1D_2$	$3p3d$	$^1D^{\circ}_2$	662 428	819 961		1.8−1	6.0+8	D	41°,112*
560.18	$3s3p$	$^1P^{\circ}_1$	$3p^2$	$^1D_2$	304 629	483 144		3.0−1	1.3+9	E	41°,112*,22,26
514.01	$3s3p$	$^1P^{\circ}_1$	$3p^2$	$^3P_2$	304 629	499 174					41
482.17	$3s^2$	$^1S_0$	$3s3p$	$^3P^{\circ}_1$	0	207 399		1.9−3	1.8+7	E	42°,112*,114
464.92^{C}	$3s3d$	$^3D_3$	$3p3d$	$^3F^{\circ}_2$	590 063	805 156		2.0−3	1.3+7	E	112*
462.95		$_2$		$_2$	589 150	805 156		1.1−1	6.8+8	D	41°,112*
461.69		$_1$		$_2$	588 562	805 156		4.5−1	2.8+9	D	41°,112*,8
451.69		$_3$		$_3$	590 063	811 454		1.5−1	6.9+8	C	41°,112*
449.83		$_2$		$_3$	589 150	811 454		7.5−1	3.5+9	C	41°,112*,8
437.32		$_3$		$_4$	590 063	818 730		1.20	4.64+9	C	41°,112*,8
387.40	$3s3d$	$^1D_2$	$3p3d$	$^1F^{\circ}_3$	662 428	920 560		2.3	1.5+10	D	14°,112*
380.70	$3s3d$	$^3D_3$	$3p3d$	$^3P^{\circ}_2$	590 063	852 734					14
366.48		$_1$		$_1$	588 562	861 427					14
378.79	$3s3d$	$^3D_2$	$3p3d$	$^3D^{\circ}_1$	589 150	853 150					14
369.22		$_3$		$_3$	590 063	860 904		9.1−1	6.4+9	C	14°,112*,8
367.98^{C}		$_2$		$_3$	589 150	860 904		1.9−1	1.3+9	C	112*
366.77		$_2$		$_2$	589 150	861 799					41
377.65	$3s3p$	$^1P^{\circ}_1$	$3p^2$	$^1S_0$	304 629	569 421		3.3−1	1.5+10	C	41°,112*,8
375.11	$3s3p$	$^3P^{\circ}_2$	$3p^2$	$^1D_2$	216 557	483 144		1.3−1	1.3+9	E	41°,112*
362.66		$_1$		$_2$	207 399	483 144		6.3−2	6.4+8	E	41°,112*
371.30	$3s3d$	$^1D_2$	$3p3d$	$^1P^{\circ}_1$	662 428	931 754		6.5−1	1.1+10	D	41°,112*
368.10	$3s3p$	$^3P^{\circ}_2$	$3p^2$	$^3P_1$	216 557	488 223		3.7−1	6.1+9	C	14°,112*,30
364.00		$_1$		$_0$	207 399	482 122		3.0−1	1.5+10	C	14°,112*,30
356.10		$_1$		$_1$	207 399	488 223		2.3−1	4.0+9	C	14°,112*,30
353.84		$_2$		$_2$	216 557	499 174		9.5−1	1.0+10	D	14°,112*,30
351.15		$_0$		$_1$	203 444	488 223		3.1−1	5.6+9	C	14°,112*,30
342.73		$_1$		$_2$	207 399	499 174		3.0−1	3.4+9	D	14°,112*,30
352.736	$3p3d$	$^1P^{\circ}_1$	$3d^2$	$^1D_2$	931 754	1 215 243					44°,45
336.308	$3p3d$	$^1F^{\circ}_3$	$3d^2$	$^1G_4$	920 560	1 217 906		2.86	1.88+10	C−	44°,112*,45,43
328.267	$3s^2$	$^1S_0$	$3s3p$	$^1P^{\circ}_1$	0	304 629		9.02−1	1.86+10	B	42°,112*,24,18, 31,30,41
310.55	$3p^2$	$^1D_2$	$3p3d$	$^3F^{\circ}_2$	483 144	805 156					41
306.448	$3p3d$	$^3P^{\circ}_1$	$3d^2$	$^3F_2$	861 427	1 187 767					44
297.631		$_2$		$_3$	852 734	1 188 753					44

Cr XIII (Mg sequence) — Continued

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
305.87^T	$3p3d$	$^3D^\circ_2$	$3d^2$	$^3F_3$	861 799	1 188 753					43
303.960		3		4	860 904	1 189 901					44°,45,43
298.853		1		2	853 150	1 187 767					44°,45,43
296.89	$3p^2$	$^1D_2$	$3p3d$	$^1D^\circ_2$	483 144	819 961		8.5−1	1.3+10	E	41°,112*
282.84	$3p^2$	$^3P_2$	$3p3d$	$^3P^\circ_2$	499 174	852 734					41°,8
274.34		1		2	488 223	852 734					41
267.95		1		1	488 223	861 427					41
279.84	$3p3d$	$^3P^\circ_1$	$3d^2$	$^3P_1$	861 427	1 218 751					45
273.23		2		1	852 734	1 218 751					45
272.61		2		2	852 734	1 219 532					45
279.48	$3s3p$	$^1P^\circ_1$	$3s3d$	$^1D_2$	304 629	662 428		2.1	3.5+10	D	41°,112*,22,26
278.86	$3p3d$	$^3D^\circ_3$	$3d^2$	$^3P_2$	860 904	1 219 532					45
273.74		1		0	853 150	1 218 447					45
276.44	$3p^2$	$^3P_2$	$3p3d$	$^3D^\circ_3$	499 174	860 904		1.8	2.2+10	D	41°,112*
275.77		2		2	*499 174*	*861 799*					*41*
269.47		0		1	482 122	853 150					41
276.00	$3p^2$	$^1S_0$	$3p3d$	$^1P^\circ_1$	569 421	931 754		7.3−1	2.1+10	C	41°,112*,8
269.411	$3p3d$	$^3F^\circ_4$	$3d^2$	$^3F_4$	818 730	1 189 901					45°,43,44
265.042		3		3	811 454	1 188 753					44°,45,43
261.359		2		2	805 156	1 187 767					44°,45,43
268.81^C	$3s3p$	$^3P^\circ_2$	$3s3d$	$^3D_1$	216 557	588 562		1.7−2	5.2+8	D	112*
268.38		2		2	216 557	589 150		2.6−1	4.8+9	C	41°,112*
267.74		2		3	216 557	590 063		1.43	1.9+10	C	41°,112*,31, 8,22,26
262.36		1		1	207 399	588 562		2.6−1	8.4+9	C	41°,112*,31, 22,26
261.95		1		2	207 399	589 150		7.8−1	1.5+10	C	41°,112*,31, 8,22,26
259.66		0		1	203 444	588 562		3.5−1	1.2+10	C	41°,112*,31, 22,26
264.73	$3p^2$	$^1D_2$	$3p3d$	$^3D^\circ_3$	483 144	860 904					41
252.983	$3p3d$	$^1D^\circ_2$	$3d^2$	$^1D_2$	819 961	1 215 243					44°,45
228.62	$3p^2$	$^1D_2$	$3p3d$	$^1F^\circ_3$	483 144	920 560		1.0	1.8+10	E	41°,112*
222.911^C	$3p^2$	$^1D_2$	$3p3d$	$^1P^\circ_1$	483 144	931 754		6.5−3	2.9+8	E	112*
97.25	$3s3d$	$^1D_2$	$3s4f$	$^1F^\circ_3$	662 428	1 690 860					40
96.86	$3p3d$	$^1F^\circ_3$	$3p4f$	$^1G_4$	920 560	1 953 000					40
93.42	$3p3d$	$^3D^\circ_3$	$3p4f$	$^3F_4$	860 904	1 931 340					40
92.61	$3p3d$	$^3D^\circ_3$	$3p4f$	$^3D_3$	860 904	1 940 700					40
92.37		2		2	861 799	1 944 400					40
92.16	$3p3d$	$^3P^\circ_1$	$3p4f$	$^3D_1$	861 427	1 946 500					40
92.01		0		1	859 662	1 946 500					40
91.855	$3s3d$	$^3D_3$	$3s4f$	$^3F^\circ_4$	590 063	1 678 740					39°,26
91.792		2		3	589 150	1 678 570					39°,26
91.749		1		2	588 562	1 678 490					39°,26
91.30	$3s3p$	$^1P^\circ_1$	$3s4s$	$^1S_0$	304 629	1 400 000					26

Cr XIII (Mg sequence) — Continued

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
90.85	$3p3d$	$^1D^o_2$	$3p4f$	$^3F_3$	819 961	1 920 670					40
90.17	$3p3d$	$^3F^o_3$	$3p4f$	$^3G_4$	811 454	1 920 470					40
90.02		2		3	805 156	*1 916 020*					40
89.99		4		5	818 730	1 929 970					40
86.78	$3p^2$	$^3P_2$	$3p4s$	$^3P^o_2$	499 174	1 652 000					26
85.566	$3s3p$	$^3P^o_2$	$3s4s$	$^3S_1$	216 557	1 385 260					39
84.898		1		1	207 399	1 385 260					39
84.616		0		1	203 444	1 385 260					39
82.79	$3p^2$	$^1D_2$	$3s4f$	$^1F^o_3$	483 144	1 690 860					22°,26
76.17	$3s3p$	$^1P^o_1$	$3s4d$	$^1D_2$	304 629	1 617 480					22°,40,26
73.31	$3p^2$	$^1D_2$	$3p4d$	$^1F^o_3$	483 144	1 847 000					26
72.88	$3p^2$	$^3P_2$	$3p4d$	$^3D^o_3$	499 174	1 871 000					26
72.57		1		2	488 223	1 866 000					26
72.27		0		1	482 122	1 866 000					26
72.13	$3p^2$	$^1D_2$	$3p4d$	$^3F^o_3$	483 144	1 870 000					26
71.86	$3p^2$	$^3P_2$	$3p4d$	$^3P^o_2$	499 174	1 891 000					26
71.435	$3s3p$	$^3P^o_2$	$3s4d$	$^3D_2$	216 557	1 616 450					39
71.398		2		3	216 557	1 617 160					39°,26
70.973		1		1	207 399	1 616 210					39
70.973		1		2	207 399	1 616 450					39°,26
70.792		0		1	203 444	1 616 210					39°,26
66.983	$3s^2$	$^1S_0$	$3s4p$	$^1P^o_1$	0	1 492 920		3.38 − 1	1.67 + 11	E	39°,112*,26
65.968	$3s3d$	$^3D_3$	$3s5f$	$^3F^o_4$	*590 063*	*2 105 950*					*39°,26*
65.39^T	$3s3p$	$^3P^o_2$	$3p4p$	$^3D_3$	216 557	1 746 000					26
65.13	$3s3p$	$^3P^o_2$	$3p4p$	$^3P_2$	216 557	1 752 000					26
65.04	$3s3p$	$^3P^o_2$	$3p4p$	$^3S_1$	216 557	1 754 000					26
57.24	$3s3d$	$^3D_3$	$3s6f$	$^3F^o_4$	590 063	2 337 000					26
57.24	$3s3p$	$^3P^o_2$	$3s5s$	$^3S_1$	216 557	1 963 000					26
56.96		1		1	207 399	1 963 000					26
56.37	$3s3p$	$^1P^o_1$	$3s5d$	$^1D_2$	304 629	2 079 000					26
53.765	$3s3p$	$^3P^o_2$	$3s5d$	$^3D_3$	216 557	2 076 500					39°,26
53.506		1		2	207 399	2 076 350					39°,26
53.39		0		1	203 444	2 076 000					26
53.02	$3s3d$	$^3D_3$	$3s7f$	$^3F^o_4$	590 063	2 476 000					26
49.59	$3s^2$	$^1S_0$	$3s5p$	$^1P^o_1$	0	2 017 000		1.09 − 1	9.9 + 10	C	26°,112*
49.03	$3s3p$	$^3P^o_2$	$3s6s$	$^3S_1$	216 557	2 256 000					26
47.55	$3s3p$	$^3P^o_2$	$3s6d$	$^3D_3$	216 557	2 320 000					26
47.34		1		2	207 399	2 320 000					26
47.26		0		1	203 444	2 319 000					26
43.75	$3s^2$	$^1S_0$	$3s6p$	$^1P^o_1$	0	2 286 000					26
40.92	$3s^2$	$^1S_0$	$3s7p$	$^1P^o_1$	0	2 444 000					26

Cr XIV (Na sequence)

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
823.99^{C}	$2p^64p$	$^2P^o_{3/2}$	$2p^64d$	$^2D_{3/2}$	1 579 180	1 700 540		1.8−1	4.5+8	C	112*
818.73^{C}		3/2		5/2	1 579 180	1 701 320		1.7	2.8+9	C	112*
789.27^{C}		1/2		3/2	1 573 840	1 700 540		9.6−1	2.6+9	C	112*
416.23^{C}	$2p^65d$	$^2D_{3/2}$	$2p^66p$	$^2P^o_{1/2}$	2 210 730	2 450 980		5.2−1	1.0+10	C	112*
414.97^{C}		5/2		3/2	2 211 080	2 452 060		9.36−1	9.1+9	C	112*
414.37^{C}		3/2		3/2	2 210 730	2 452 060		1.0−1	1.0+9	D	112*
412.047^{P}	$2p^63s$	$^2S_{1/2}$	$2p^63p$	$^2P^o_{1/2}$	0	242 690		2.74−1	5.37+9	B	49°,112*,48,18,30,42,46
389.862^{P}		1/2		3/2	0	256 500		5.84−1	6.41+9	B	49°,112*,48,18,30,42,46
400.49^{C}	$2p^65f$	$^2F^o_{5/2}$	$2p^66d$	$^2D_{3/2}$	2 235 295	2 484 990		2.7−1	2.8+9	C	112*
400.37^{C}		7/2		5/2	2 235 440	2 485 210		3.8−1	2.7+9	C	112*
400.14^{C}		5/2		5/2	2 235 295	2 485 210		2.0−2	1.4+8	D	112*
367.04^{C}	$2p^65p$	$^2P^o_{3/2}$	$2p^66s$	$^2S_{1/2}$	2 152 020	2 424 470		6.4−1	1.6+10	C	112*
363.40^{C}		1/2		1/2	2 149 290	2 424 470		3.24−1	8.2+9	C	112*
347.19^{C}	$2p^65d$	$^2D_{5/2}$	$2p^66f$	$^2F^o_{5/2}$	2 211 080	2 499 105		1.9−1	1.7+9	D	112*
347.01^{C}		5/2		7/2	2 211 080	2 499 260		3.6	2.5+10	C	112*
346.77^{C}		3/2		5/2	2 210 730	2 499 105		2.6	2.4+10	C	112*
301.819^{P}	$2p^63p$	$^2P^o_{3/2}$	$2p^63d$	$^2D_{3/2}$	256 500	587 825		1.26−1	2.3+9	B	49°,112*,48,47,30
300.287^{P}		3/2		5/2	256 500	589 515		1.14	1.41+10	B	49°,112*,48,47,31,30,22,26
289.742^{P}		1/2		3/2	242 690	587 825		6.58−1	1.31+10	B	49°,112*,48,47,18,31,30,22,26
300.33^{C}	$2p^65p$	$^2P^o_{3/2}$	$2p^66d$	$^2D_{3/2}$	2 152 020	2 484 990		8.8−2	1.6+9	D	112*
300.13^{C}		3/2		5/2	2 152 020	2 485 210		8.0−1	9.7+9	C	112*
297.89^{C}		1/2		3/2	2 149 290	2 484 990		4.42−1	8.3+9	C	112*
287.19^{C}	$2p^65s$	$^2S_{1/2}$	$2p^66p$	$^2P^o_{1/2}$	2 102 780	2 450 980		1.6−1	6.3+9	C	112*
286.30^{C}		1/2		3/2	2 102 780	2 452 060		3.10−1	6.3+9	C	112*
281.67	$2p^53s3p$	$^4D_{7/2}$	$2p^53s3d$	$^4F^o_{9/2}$							50°,48
241.67^{C}	$2p^65f$	$^2F^o_{5/2}$	$2p^67d$	$^2D_{3/2}$	2 235 295	2 649 080		4.8−2	1.4+9	D	112*
241.49^{C}		7/2		5/2	2 235 440	2 649 530		6.9−2	1.3+9	D	112*
241.41^{C}		5/2		5/2	2 235 295	2 649 530		3.4−3	6.5+7	E	112*
239.23^{C}	$2p^65d$	$^2D_{5/2}$	$2p^67p$	$^2P^o_{3/2}$	2 211 080	2 629 090		1.61−1	4.71+9	C	112*
239.03^{C}		3/2		1/2	2 210 730	2 629 090		9.2−2	5.3+9	C	112*
239.03^{C}		3/2		3/2	2 210 730	2 629 090		1.8−2	5.2+8	D	112*
223.65^{C}	$2p^65d$	$^2D_{5/2}$	$2p^67f$	$^2F^o_{5/2}$	2 211 080	2 658 215		5.0−2	1.1+9	D	112*
223.61^{C}		5/2		7/2	2 211 080	2 658 280		1.0	1.7+10	C	112*
223.47^{C}		3/2		5/2	2 210 730	2 658 215		6.8−1	1.5+10	C	112*
222.84^{C}	$2p^64d$	$^2D_{3/2}$	$2p^65p$	$^2P^o_{1/2}$	1 700 540	2 149 290		3.3−1	2.2+10	C	112*
221.88^{C}		5/2		3/2	1 701 320	2 152 020		5.9−1	2.0+10	C	112*
221.49^{C}		3/2		3/2	1 700 540	2 152 020		6.4−2	2.2+9	D	112*
217.38^{C}	$2p^65p$	$^2P^o_{3/2}$	$2p^67s$	$^2S_{1/2}$	2 152 020	2 612 050		1.2−1	8.8+9	C	112*
216.09^{C}		1/2		1/2	2 149 290	2 612 050		6.28−2	4.49+9	C	112*
216.97^{C}	$2p^64f$	$^2F^o_{5/2}$	$2p^65d$	$^2D_{3/2}$	1 749 830	2 210 730		1.1−1	4.0+9	C	112*
216.92^{C}		7/2		5/2	1 750 080	2 211 080		1.61−1	3.80+9	C	112*
216.80^{C}		5/2		5/2	1 749 830	2 211 080		7.8−3	1.9+8	D	112*
205.01	$2p^64f$	$^2F^o_{7/2}$	$2p^65g$	$^2G_{9/2}$	1 750 080	2 237 860					51
204.91		5/2		7/2	1 749 830	2 237 850					51

Cr XIV (Na sequence) — Continued

λ (Å)	Classification		Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
201.18^{C}	$2p^65p$ $^2P^o_{3/2}$	$2p^67d$ $^2D_{3/2}$	2 152 020	2 649 080		3.2−2	1.3+9	D	112*
201.00^{C}	3/2	5/2	2 152 020	2 649 530		2.9−1	7.9+9	C	112*
200.08^{C}	1/2	3/2	2 149 290	2 649 080		1.5−1	6.3+9	C	112*
190.99^{C}	$2p^64p$ $^2P^o_{3/2}$	$2p^65s$ $^2S_{1/2}$	1 579 180	2 102 780		4.52−1	4.12+10	C	112*
189.06^{C}	1/2	1/2	1 573 840	2 102 780		2.28−1	2.13+10	C	112*
188.25^{C}	$2p^65d$ $^2D_{5/2}$	$2p^68p$ $^2P^o_{3/2}$	2 211 080	2 742 280		6.0−2	2.8+9	C	112*
188.13^{C}	3/2	1/2	2 210 730	2 742 280		3.4−2	3.2+9	D	112*
188.13^{C}	3/2	3/2	2 210 730	2 742 280		6.8−3	3.1+8	D	112*
187.30	$2p^64d$ $^2D_{5/2}$	$2p^65f$ $^2F^o_{7/2}$	1 701 320	2 235 440		4.1	9.6+10	C	51°,112*
187.27^{C}	5/2	5/2	1 701 320	2 235 295		2.1−1	6.7+9	D	112*
187.02	3/2	5/2	1 700 540	2 235 295		2.9	9.3+10	C	51°,112*
170.12^{C}	$2p^63s$ $^2S_{1/2}$	$2p^63d$ $^2D_{3/2}$	0	587 825		E2	5.5+5	C	112*
169.63^{C}	1/2	5/2	0	589 515		E2	5.5+5	C	112*
165.74^{C}	$2p^65p$ $^2P^o_{3/2}$	$2p^68d$ $^2D_{5/2}$	2 152 020	2 755 380		1.4−1	5.7+9	C	112*
165.71^{C}	3/2	3/2	2 152 020	2 755 500		1.6−2	9.5+8	D	112*
164.96^{C}	1/2	3/2	2 149 290	2 755 500		7.86−2	4.81+9	C	112*
158.34^{C}	$2p^64p$ $^2P^o_{3/2}$	$2p^65d$ $^2D_{3/2}$	1 579 180	2 210 730		9.2−2	6.2+9	D	112*
158.25^{C}	3/2	5/2	1 579 180	2 211 080		8.4−1	3.7+10	C	112*
157.01^{C}	1/2	3/2	1 573 840	2 210 730		4.8−1	3.3+10	C	112*
149.07^{C}	$2p^64s$ $^2S_{1/2}$	$2p^65p$ $^2P^o_{1/2}$	1 478 480	2 149 290		1.4−1	2.1+10	C	112*
148.47^{C}	1/2	3/2	1 478 480	2 152 020		2.88−1	2.18+10	C	112*
133.26^{C}	$2p^64d$ $^2D_{3/2}$	$2p^66p$ $^2P^o_{1/2}$	1 700 540	2 450 980		5.6−2	1.0+10	C	112*
133.20^{C}	5/2	3/2	1 701 320	2 452 060		9.6−2	9.2+9	C	112*
133.06^{C}	3/2	3/2	1 700 540	2 452 060		1.1−2	1.0+9	D	112*
125.35^{C}	$2p^64d$ $^2D_{5/2}$	$2p^66f$ $^2F^o_{5/2}$	1 701 320	2 499 105		5.1−2	3.6+9	D	112*
125.32^{C}	5/2	7/2	1 701 320	2 499 260		1.0	5.4+10	C	112*
125.22^{C}	3/2	5/2	1 700 540	2 499 105		7.2−1	5.0+10	C	112*
118.30^{C}	$2p^64p$ $^2P^o_{3/2}$	$2p^66s$ $^2S_{1/2}$	1 579 180	2 424 470		8.8−2	2.1+10	C	112*
117.56^{C}	1/2	1/2	1 573 840	2 424 470		4.4−2	1.1+10	C	112*
110.40^{C}	$2p^64p$ $^2P^o_{3/2}$	$2p^66d$ $^2D_{3/2}$	1 579 180	2 484 990		3.3−2	4.5+9	D	112*
110.37^{C}	3/2	5/2	1 579 180	2 485 210		3.0−1	2.8+10	C	112*
109.75^{C}	1/2	3/2	1 573 840	2 484 990		1.7−1	2.3+10	C	112*
107.79^{C}	$2p^64d$ $^2D_{5/2}$	$2p^67p$ $^2P^o_{3/2}$	1 701 320	2 629 090		3.7−2	5.3+9	D	112*
107.69^{C}	3/2	1/2	1 700 540	2 629 090		2.0−2	5.7+9	D	112*
107.69^{C}	3/2	3/2	1 700 540	2 629 090		4.0−3	5.7+8	E	112*
104.50^{C}	$2p^64d$ $^2D_{5/2}$	$2p^67f$ $^2F^o_{5/2}$	1 701 320	2 658 215		2.0−2	2.1+9	D	112*
104.50^{C}	5/2	7/2	1 701 320	2 658 280		4.1−1	3.1+10	C	112*
104.42^{C}	3/2	5/2	1 700 540	2 658 215		2.9−1	3.0+10	C	112*
102.83^{C}	$2p^64s$ $^2S_{1/2}$	$2p^66p$ $^2P^o_{1/2}$	1 478 480	2 450 980		4.8−2	1.5+10	C	112*
102.71^{C}	1/2	3/2	1 478 480	2 452 060		9.2−2	1.4+10	C	112*
101.42	$2p^63d$ $^2D_{3/2}$	$2p^64p$ $^2P^o_{1/2}$	587 825	1 573 840		1.49−1	4.83+10	C	40°,112*
101.05	5/2	3/2	589 515	1 579 180		2.7−1	4.4+10	C	40°,112*
100.87^{C}	3/2	3/2	587 825	1 579 180		3.0−2	4.9+9	D	112*
99.473^{C}	$2p^64f$ $^2F^o_{7/2}$	$2p^68d$ $^2D_{5/2}$	1 750 080	2 755 380		4.6−3	5.1+8	E	112*
99.448^{C}	5/2	5/2	1 749 830	2 755 380		2.3−4	2.5+7	E	112*
99.436^{C}	5/2	3/2	1 749 830	2 755 500		3.1−3	5.2+8	E	112*
96.818^{C}	$2p^64p$ $^2P^o_{3/2}$	$2p^67s$ $^2S_{1/2}$	1 579 180	2 612 050		3.4−2	1.2+10	D	112*
96.320^{C}	1/2	1/2	1 573 840	2 612 050		1.7−2	6.0+9	D	112*

Cr XIV (Na sequence) – Continued

λ (Å)	Classification		Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
96.065[C]	$2p^64d\ ^2D_{5/2}$	$2p^68p\ ^2P^o_{3/2}$	1 701 320	2 742 280		1.8−2	3.3+9	D	112*
95.993[C]	$_{3/2}$	$_{1/2}$	1 700 540	2 742 280		1.0−2	3.7+9	D	112*
95.993[C]	$_{3/2}$	$_{3/2}$	1 700 540	2 742 280		2.0−3	3.6+8	E	112*
93.467[C]	$2p^64p\ ^2P^o_{3/2}$	$2p^67d\ ^2D_{3/2}$	1 579 180	2 649 080		1.6−2	3.0+9	D	112*
93.427[C]	$_{3/2}$	$_{5/2}$	1 579 180	2 649 530		1.4−1	1.8+10	C	112*
93.002[C]	$_{1/2}$	$_{3/2}$	1 573 840	2 649 080		8.2−2	1.6+10	C	112*
86.183[C]	$2p^63d\ ^2D_{5/2}$	$2p^64f\ ^2F^o_{5/2}$	589 515	1 749 830		2.6−1	3.9+10	D	112*
86.164[P]	$_{5/2}$	$_{7/2}$	589 515	1 750 080		5.3	5.9+11	C	49°,112*,52,26
86.059[P]	$_{3/2}$	$_{5/2}$	587 825	1 749 830		3.5	5.3+11	C	49°,112*,52,26
85.020[C]	$2p^64p\ ^2P^o_{3/2}$	$2p^68d\ ^2D_{5/2}$	1 579 180	2 755 380		8.28−2	1.27+10	C	112*
85.011[C]	$_{3/2}$	$_{3/2}$	1 579 180	2 755 500		9.2−3	2.1+9	D	112*
84.627[C]	$_{1/2}$	$_{3/2}$	1 573 840	2 755 500		4.64−2	1.08+10	C	112*
81.838	$2p^63p\ ^2P^o_{3/2}$	$2p^64s\ ^2S_{1/2}$	256 500	1 478 480					52
80.916	$_{1/2}$	$_{1/2}$	242 690	1 478 480					52°,26
69.247	$2p^63p\ ^2P^o_{3/2}$	$2p^64d\ ^2D_{3/2}$	256 500	1 700 540		1.1−1	3.8+10	D	47°,112*,52
69.213	$_{3/2}$	$_{5/2}$	256 500	1 701 320		9.96−1	2.31+11	C	47°,112*,52,26
68.594	$_{1/2}$	$_{3/2}$	242 690	1 700 540		5.58−1	1.98+11	C	47°,112*,52,26
64.042[C]	$2p^63d\ ^2D_{3/2}$	$2p^65p\ ^2P^o_{1/2}$	587 825	2 149 290		2.4−2	1.9+10	D	112*
64.005	$_{5/2}$	$_{3/2}$	589 515	2 152 020		4.3−2	1.7+10	D	47°,112*,22,26
63.931[C]	$_{3/2}$	$_{3/2}$	587 825	2 152 020		4.8−3	1.9+9	E	112*
63.539	$2p^63s\ ^2S_{1/2}$	$2p^64p\ ^2P^o_{1/2}$	0	1 573 840		1.37−1	1.13+11	C+	47°,112*,52,26
63.324	$_{1/2}$	$_{3/2}$	0	1 579 180		2.58−1	1.07+11	C+	47°,112*,52,26
60.761[C]	$2p^63d\ ^2D_{5/2}$	$2p^65f\ ^2F^o_{5/2}$	589 515	2 235 295		4.9−2	1.5+10	D	112*
60.756	$_{5/2}$	$_{7/2}$	589 515	2 235 440		9.72−1	2.19+11	C	52°,112*,26
60.699	$_{3/2}$	$_{5/2}$	587 825	2 235 295		6.80−1	2.05+11	C	52°,112*,26
54.164	$2p^63p\ ^2P^o_{3/2}$	$2p^65s\ ^2S_{1/2}$	256 500	2 102 780		5.2−2	5.9+10	C	47°,112*,26
53.760	$_{1/2}$	$_{1/2}$	242 690	2 102 780		2.60−2	3.0+10	C	47°,112*,26
53.690[C]	$2p^63d\ ^2D_{5/2}$	$2p^66p\ ^2P^o_{3/2}$	589 515	2 452 060		1.5−2	8.5+9	D	112*
53.672[C]	$_{3/2}$	$_{1/2}$	587 825	2 450 980		8.4−3	9.8+9	D	112*
53.641[C]	$_{3/2}$	$_{3/2}$	587 825	2 452 060		1.6−3	9.5+8	E	112*
52.367[C]	$2p^63d\ ^2D_{5/2}$	$2p^66f\ ^2F^o_{5/2}$	589 515	2 499 105		1.8−2	7.3+9	D	112*
52.363	$_{5/2}$	$_{7/2}$	589 515	2 499 260		3.7−1	1.1+11	C	52°,112*,47,26
52.321	$_{3/2}$	$_{5/2}$	587 825	2 499 105		2.6−1	1.0+11	C	47°,112*
51.171[C]	$2p^63p\ ^2P^o_{3/2}$	$2p^65d\ ^2D_{3/2}$	256 500	2 210 730		3.6−2	2.3+10	D	112*
51.162	$_{3/2}$	$_{5/2}$	256 500	2 211 080		3.3−1	1.4+11	C	52°,112*,47,26
50.812	$_{1/2}$	$_{3/2}$	242 690	2 210 730		1.9−1	1.2+11	C	52°,112*,47,26
49.030[C]	$2p^63d\ ^2D_{5/2}$	$2p^67p\ ^2P^o_{3/2}$	589 515	2 629 090		6.6−3	4.7+9	D	112*
48.989[C]	$_{3/2}$	$_{1/2}$	587 825	2 629 090		3.9−3	5.4+9	E	112*
48.989[C]	$_{3/2}$	$_{3/2}$	587 825	2 629 090		8.0−4	5.6+8	E	112*
48.340[C]	$2p^63d\ ^2D_{5/2}$	$2p^67f\ ^2F^o_{5/2}$	589 515	2 658 215		9.0−3	4.2+9	D	112*
48.338	$_{5/2}$	$_{7/2}$	589 515	2 658 280		1.78−1	6.3+10	C	47°,112*,26
48.300	$_{3/2}$	$_{5/2}$	587 825	2 658 215		1.24−1	5.9+10	C	47°,112*
46.527	$2p^63s\ ^2S_{1/2}$	$2p^65p\ ^2P^o_{1/2}$	0	2 149 290		4.4−2	6.7+10	C	52°,112*
46.468	$_{1/2}$	$_{3/2}$	0	2 152 020		8.4−2	6.6+10	C	52°,112*
46.452[C]	$2p^63d\ ^2D_{5/2}$	$2p^68p\ ^2P^o_{3/2}$	589 515	2 742 280		4.3−3	3.3+9	E	112*
46.415[C]	$_{3/2}$	$_{1/2}$	587 825	2 742 280		2.4−3	3.7+9	E	112*
46.415[C]	$_{3/2}$	$_{3/2}$	587 825	2 742 280		4.8−4	3.7+8	E	112*
46.125	$2p^63p\ ^2P^o_{3/2}$	$2p^66s\ ^2S_{1/2}$	256 500	2 424 470		2.0−2	3.1+10	D	47°,112*,26
45.835	$_{1/2}$	$_{1/2}$	242 690	2 424 470		1.0−2	1.6+10	D	47°,112*,26

Cr XIV (Na sequence) – Continued

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
46.039	$2p^63d$	$^2D_{5/2}$	$2p^68f$	$^2F^\circ_{7/2}$	589 515	2 761 590					47°,26
44.873^C	$2p^63p$	$^2P^\circ_{3/2}$	$2p^66d$	$^2D_{3/2}$	256 500	2 484 990		1.7−2	1.4+10	D	112
44.869		3/2		5/2	256 500	2 485 210		1.51−1	8.3+10	C	47°,112*,26
44.597		1/2		3/2	242 690	2 484 990		8.44−2	7.1+10	C	47°,112*,26
44.59	$2p^63d$	$^2D_{5/2}$	$2p^69f$	$^2F^\circ_{7/2}$	589 515	2 832 000					26
43.60	$2p^63d$	$^2D_{5/2}$	$2p^610f$	$^2F^\circ_{7/2}$	589 515	2 883 000					26
42.453	$2p^63p$	$^2P^\circ_{3/2}$	$2p^67s$	$^2S_{1/2}$	256 500	2 612 050		1.1−2	2.0+10	D	47°,112*
42.205^C		1/2		1/2	242 690	2 612 050		5.2−3	9.8+9	D	112*
41.796^C	$2p^63p$	$^2P^\circ_{3/2}$	$2p^67d$	$^2D_{3/2}$	256 500	2 649 080		9.6−3	9.0+9	D	112*
41.788		3/2		5/2	256 500	2 649 530		8.36−2	5.3+10	C	47°,112*,26
41.556		1/2		3/2	242 690	2 649 080		4.6−2	4.5+10	C	47°,112*,26
40.800	$2p^63s$	$^2S_{1/2}$	$2p^66p$	$^2P^\circ_{1/2}$	0	2 450 980		1.9−2	3.9+10	D	47°,112*
40.782		1/2		3/2	0	2 452 060		3.8−2	3.9+10	C	47°,112*,26
40.018	$2p^63p$	$^2P^\circ_{3/2}$	$2p^68d$	$^2D_{5/2}$	256 500	2 755 380		5.2−2	3.6+10	C	47°,112*,26
40.016^C		3/2		3/2	256 500	2 755 500		5.6−3	6.0+9	D	112*
39.796		1/2		3/2	242 690	2 755 500		2.90−2	3.05+10	C	47°,112*,26
38.899	$2p^63p$	$^2P^\circ_{3/2}$	$2p^69d$	$^2D_{5/2}$	256 500	2 827 260					47°,26
38.679		1/2		3/2	242 690	2 828 070					47°,26
38.1	$2p^63p$	$^2P^\circ_{3/2}$	$2p^610d$	$^2D_{5/2}$	256 500	2 880 000					26
38.036	$2p^63s$	$^2S_{1/2}$	$2p^67p$	$^2P^\circ_{3/2}$	0	2 629 090					47°,26
38.036		1/2		1/2	0	2 629 090					47
37.60	$2p^63p$	$^2P^\circ_{3/2}$	$2p^611d$	$^2D_{5/2}$	256 500	2 916 000					26
36.466	$2p^63s$	$^2S_{1/2}$	$2p^68p$	$^2P^\circ_{3/2}$	0	2 742 280					47°,26
36.466		1/2		1/2	0	2 742 280					47
35.450	$2p^63s$	$^2S_{1/2}$	$2p^69p$	$^2P^\circ_{3/2}$	0	2 820 870					47°,26
35.450		1/2		1/2	0	2 820 870					47
21.770	$2p^63s$	$^2S_{1/2}$	$2p^53s^2$	$^2P^\circ_{3/2}$	0	4 593 500					53
21.467		1/2		1/2	0	4 658 300					53

Cr XV (Ne sequence)

λ (Å)	Classification				Energy Levels (cm⁻¹)		Int.	*gf*	*A* (s⁻¹)	Acc.	References
1764.5^{C}	$2p^5(^2P^\circ_{3/2})3s$	$(^3/_2,^1/_2)^\circ_1$	$2p^5(^2P^\circ_{1/2})3s$	$(^1/_2,^1/_2)^\circ_0$	4 727 500	4 784 174		M1	5.2+3	D+	112*
702.96^{C}	$2p^5(^2P^\circ_{1/2})3s$	$(^1/_2,^1/_2)^\circ_0$	$2p^5(^2P^\circ_{3/2})3p$	$^2[^1/_2]_1$	4 784 174	4 926 429		4.2−3	1.9+7	E	112*
471.30	$2p^5(^2P^\circ_{3/2})3s$	$(^3/_2,^1/_2)^\circ_2$	$2p^5(^2P^\circ_{3/2})3p$	$^2[^1/_2]_1$	4 714 294	4 926 429	2	2.4−1	2.5+9	D	61°,112*,48
348.356		1		0	4 727 500	5 014 563	2				61°,62,48
440.722	$2p^5(^2P^\circ_{3/2})3s$	$(^3/_2,^1/_2)^\circ_1$	$2p^5(^2P^\circ_{3/2})3p$	$^2[^5/_2]_2$	4 727 500	4 954 368	3				61°,48
416.59		2		2	4 714 294	4 954 368	2				61°,48
405.035		2		3	4 714 294	4 961 187	4	7.5−1	4.4+9	D	61°,112*,48,60
439.15	$2p^5(^2P^\circ_{1/2})3s$	$(^1/_2,^1/_2)^\circ_1$	$2p^5(^2P^\circ_{1/2})3p$	$^2[^3/_2]_1$	4 793 200	5 020 941					48
422.33		0		1	4 784 174	5 020 941	1				61°,48
402.346		1		2	4 793 200	5 041 714	3				61°,48,60
411.28	$2p^5(^2P^\circ_{3/2})3s$	$(^3/_2,^1/_2)^\circ_1$	$2p^5(^2P^\circ_{3/2})3p$	$^2[^3/_2]_1$	4 727 500	4 970 636	2				61°,48
392.81		1		2	4 727 500	4 982 062	2				61°,48
373.487		2		2	4 714 294	4 982 062	2				61°,48
408.40^{C}	$2p^5(^2P^\circ_{3/2})3p$	$^2[^1/_2]_0$	$2p^5(^2P^\circ_{3/2})3d$	$^2[^1/_2]^\circ_1$	5 014 563	5 259 419		1.3−2	1.8+8	D−	112*
305.83		1		0	4 926 429	5 253 448	*bl*	1.2−1	8.5+9	D	48°,112*
300.30		1		1	4 926 429	5 259 419	*bl*	2.8−1	7.0+9	D	48°,112*
405.035	$2p^5(^2P^\circ_{1/2})3s$	$(^1/_2,^1/_2)^\circ_1$	$2p^5(^2P^\circ_{1/2})3p$	$^2[^1/_2]_1$	4 793 200	5 039 971	4				61
390.959		0		1	4 784 174	5 039 971	3*bl*				61°,62,48
285.375		1		0	4 793 200	5 143 616	1				61°,62,48
346.189	$2p^5(^2P^\circ_{3/2})3p$	$^2[^3/_2]_2$	$2p^5(^2P^\circ_{3/2})3d$	$^2[^3/_2]^\circ_2$	4 982 062	5 270 945	2				61°,62
325.9	$2p^5(^2P^\circ_{1/2})3p$	$^2[^3/_2]_2$	$2p^5(^2P^\circ_{1/2})3d$	$^2[^5/_2]^\circ_2$	5 041 714	5 348 574					48
317.404		2		3	5 041 714	5 356 770	2				61°,48,60
305.205		1		2	5 020 941	5 348 574	2				61°,48
322.96^{C}	$2p^5(^2P^\circ_{3/2})3p$	$^2[^1/_2]_0$	$2p^5(^2P^\circ_{3/2})3d$	$^2[^3/_2]^\circ_1$	5 014 563	5 324 200		1.9−1	4.0+9	D	112*
290.18		1		2	4 926 429	5 270 945					48
321.244	$2p^5(^2P^\circ_{3/2})3p$	$^2[^5/_2]_3$	$2p^5(^2P^\circ_{3/2})3d$	$^2[^7/_2]^\circ_4$	4 961 187	5 272 468	4	1.1	8.1+9	D	61°,112*,48,60
315.51		3		3	4 961 187	5 278 128	1				61°,62
308.895		2		3	4 954 368	5 278 128	4				61°,48,60
320.13	$2p^5(^2P^\circ_{1/2})3p$	$^2[^3/_2]_2$	$2p^5(^2P^\circ_{1/2})3d$	$^2[^3/_2]^\circ_2$	5 041 714	5 354 045					48
318.439	$2p^5(^2P^\circ_{1/2})3p$	$^2[^1/_2]_1$	$2p^5(^2P^\circ_{1/2})3d$	$^2[^3/_2]^\circ_2$	5 039 971	5 354 045	2				61°,48
317.682	$2p^5(^2P^\circ_{3/2})3p$	$^2[^3/_2]_2$	$2p^5(^2P^\circ_{3/2})3d$	$^2[^5/_2]^\circ_3$	4 982 062	5 296 812	2				61°,48,60
313.319		1		2	4 970 636	5 289 794	2				61°,48
298.11	$2p^5(^2P^\circ_{3/2})3p$	$^2[^5/_2]_2$	$2p^5(^2P^\circ_{3/2})3d$	$^2[^5/_2]^\circ_2$	4 954 368	5 289 794	*bl*				48
298.11		3		3	4 961 187	5 296 812	*bl*				62
240.2	$2p^5(^2P^\circ_{3/2})3s$	$(^3/_2,^1/_2)^\circ_1$	$2p^5(^2P^\circ_{1/2})3p$	$^2[^1/_2]_0$	4 727 500	5 143 616					62°,48
104.59	$2s^22p^5(^2P^\circ_{1/2})3s$	$(^1/_2,^1/_2)^\circ_1$	$2s2p^63s$	$^1S_0$	4 793 200	5 749 300					64
103.30^{C}	$2s^22p^5(^2P^\circ_{3/2})3p$	$^2[^1/_2]_1$	$2s2p^63p$	$^3P^\circ_1$	4 926 429	5 894 500		7.5−2	1.5+10	E	112*
97.87	$2s^22p^5(^2P^\circ_{3/2})3s$	$(^3/_2,^1/_2)^\circ_1$	$2s2p^63s$	$^1S_0$	4 727 500	5 749 300	*bl*				64
78.625	$2p^5(^2P^\circ_{1/2})3d$	$^2[^3/_2]^\circ_1$	$2p^5(^2P^\circ_{1/2})4f$	$^2[^5/_2]_2$	5 406 300	6 678 200	10				59
75.446		2		3	5 354 045	6 679 495	70				59*,66
77.874	$2p^5(^2P^\circ_{3/2})3d$	$^2[^3/_2]^\circ_1$	$2p^5(^2P^\circ_{3/2})4f$	$^2[^5/_2]_2$	5 324 200	6 608 300	10				59
74.695		2		3	5 270 945	6 609 778	60				59*,66
76.371	$2p^5(^2P^\circ_{3/2})3d$	$^2[^5/_2]^\circ_3$	$2p^5(^2P^\circ_{3/2})4f$	$^2[^9/_2]_4$	5 296 812	6 606 203	6				59

Cr xv (Ne sequence) – Continued

λ (Å)	Classification				Energy Levels (cm⁻¹)		Int.	*gf*	*A* (s⁻¹)	Acc.	References
76.162	$2p^5(^2P^o_{3/2})3d$	$^2[^5/_2]^o_3$	$2p^5(^2P^o_{3/2})4f$	$^2[^5/_2]_3$	5 296 812	6 609 778	25				59
76.125	$2p^5(^2P^o_{3/2})3d$	$^2[^5/_2]^o_3$	$2p^5(^2P^o_{3/2})4f$	$^2[^7/_2]_4$	5 296 812	6 610 470	100				59°,66
75.743		2		3	5 289 794	6 610 006	90				59°,66
75.886	$2p^5(^2P^o_{3/2})3d$	$^2[^5/_2]^o_2$	$2p^5(^2P^o_{3/2})4f$	$^2[^3/_2]_2$	5 289 794	6 607 601	1				59
75.670	$2p^5(^2P^o_{1/2})3d$	$^2[^5/_2]^o_3$	$2p^5(^2P^o_{1/2})4f$	$^2[^7/_2]_4$	5 356 770	6 678 300	90				59°,66
75.241		2		3	5 348 574	6 677 634	50				59°,66
75.605	$2p^5(^2P^o_{1/2})3d$	$^2[^5/_2]^o_3$	$2p^5(^2P^o_{1/2})4f$	$^2[^5/_2]_3$	5 356 770	6 679 495	1				59
75.297	$2p^5(^2P^o_{3/2})3d$	$^2[^7/_2]^o_3$	$2p^5(^2P^o_{3/2})4f$	$^2[^9/_2]_4$	5 278 128	6 606 203	90				59°,66
74.975		4		5	5 272 468	6 606 248	100				59°,66
75.084	$2p^5(^2P^o_{3/2})3d$	$^2[^7/_2]^o_3$	$2p^5(^2P^o_{3/2})4f$	$^2[^7/_2]_3$	5 278 128	6 610 006	3				59
75.054		3		4	5 278 128	6 610 470	7				59
74.738		4		4	5 272 468	6 610 470	8				59°,66
74.813	$2p^5(^2P^o_{3/2})3d$	$^2[^3/_2]^o_2$	$2p^5(^2P^o_{3/2})4f$	$^2[^3/_2]_2$	5 270 945	6 607 601	10				59°,66
74.209	$2p^5(^2P^o_{3/2})3d$	$^2[^1/_2]^o_1$	$2p^5(^2P^o_{3/2})4f$	$^2[^3/_2]_1$	5 259 419	6 606 943	9				59
74.173		1		2	5 259 419	6 607 601	20				59
73.884		0		1	5 253 448	6 606 943	10				59
73.627	$2p^5(^2P^o_{3/2})3p$	$^2[^3/_2]_2$	$2p^5(^2P^o_{3/2})4s$	$(^3/_2,^1/_2)^o_2$	4 982 062	6 340 270	5				59
73.286		2		1	4 982 062	6 346 291	3				59
72.692		1		1	4 970 636	6 346 291	1				59
72.971	$2p^5(^2P^o_{1/2})3p$	$^2[^1/_2]_1$	$2p^5(^2P^o_{1/2})4s$	$(^1/_2,^1/_2)^o_0$	5 039 971	6 410 346	1				59
72.849		1		1	5 039 971	6 412 678	5				59
72.941	$2p^5(^2P^o_{1/2})3p$	$^2[^3/_2]_2$	$2p^5(^2P^o_{1/2})4s$	$(^1/_2,^1/_2)^o_1$	5 041 714	6 412 678	2				59
71.975		1		0	5 020 941	6 410 346	1				59
72.511	$2p^5(^2P^o_{3/2})3p$	$^2[^5/_2]_3$	$2p^5(^2P^o_{3/2})4s$	$(^3/_2,^1/_2)^o_2$	4 961 187	6 340 270	20				59
72.157		2		2	4 954 368	6 340 270	5				59
71.845		2		1	4 954 368	6 346 291	10				59
70.728	$2p^5(^2P^o_{3/2})3p$	$^2[^1/_2]_1$	$2p^5(^2P^o_{3/2})4s$	$(^3/_2,^1/_2)^o_2$	4 926 429	6 340 270	4				59
70.428		1		1	4 926 429	6 346 291	1				59
63.637	$2p^5(^2P^o_{3/2})3p$	$^2[^3/_2]_2$	$2p^5(^2P^o_{3/2})4d$	$^2[^3/_2]^o_2$	4 982 062	6 553 480	3				59
62.233		1		1	4 970 636	6 577 496	2				59
63.061	$2p^5(^2P^o_{1/2})3p$	$^2[^1/_2]_1$	$2p^5(^2P^o_{1/2})4d$	$^2[^3/_2]^o_2$	5 039 971	6 625 741	40				59°,65
63.061	$2p^5(^2P^o_{1/2})3p$	$^2[^3/_2]_2$	$2p^5(^2P^o_{1/2})4d$	$^2[^5/_2]^o_3$	5 041 714	6 627 484	40				59°,66,65
62.378		1		2	5 020 941	6 624 071	10				59°,66,65
62.958	$2p^5(^2P^o_{3/2})3p$	$^2[^3/_2]_1$	$2p^5(^2P^o_{3/2})4d$	$^2[^5/_2]^o_2$	4 970 636	6 559 009	10				59°,66,65
62.842	$2p^5(^2P^o_{3/2})3p$	$^2[^5/_2]_3$	$2p^5(^2P^o_{3/2})4d$	$^2[^7/_2]^o_4$	4 961 187	6 552 477	50				59°,66,65
62.754		3		3	4 961 187	6 554 730	3				59
62.485		2		3	4 954 368	6 554 730	25				59°,66,65
62.318	$2p^5(^2P^o_{3/2})3p$	$^2[^5/_2]_2$	$2p^5(^2P^o_{3/2})4d$	$^2[^5/_2]^o_2$	4 954 368	6 559 009	4				59°,66
61.746	$2p^5(^2P^o_{3/2})3p$	$^2[^1/_2]_1$	$2p^5(^2P^o_{3/2})4d$	$^2[^1/_2]^o_0$	4 926 429	6 545 969	1				59
61.639		1		1	4 926 429	6 548 779	5				59
61.460	$2p^5(^2P^o_{3/2})3p$	$^2[^1/_2]_1$	$2p^5(^2P^o_{3/2})4d$	$^2[^3/_2]^o_2$	4 926 429	6 553 480	3				59
58.555	$2p^5(^2P^o_{3/2})3s$	$(^3/_2,^1/_2)^o_1$	$2p^5(^2P^o_{3/2})4p$	$^2[^5/_2]_2$	4 727 500	6 435 277	3				59
58.107		2		2	4 714 294	6 435 277	3				59
58.008		2		3	4 714 294	6 438 194	10				59°,66

Cr xv (Ne sequence) – Continuede

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
58.469	$2p^5(^2P^\circ_{1/2})3s$	$(^1/_2,^1/_2)^\circ_1$	$2p^5(^2P^\circ_{1/2})4p$	$^2[^3/_2]_1$	4 793 200	6 503 510	1				59
58.194		1		2	4 793 200	6 511 590	2				59°,66
58.350	$2p^5(^2P^\circ_{3/2})3s$	$(^3/_2,^1/_2)^\circ_1$	$2p^5(^2P^\circ_{3/2})4p$	$^2[^3/_2]_1$	4 727 500	6 441 300	10				59
57.775		2		2	4 714 294	6 445 145	2				59
58.350	$2p^5(^2P^\circ_{3/2})3s$	$(^3/_2,^1/_2)^\circ_2$	$2p^5(^2P^\circ_{3/2})4p$	$^2[^1/_2]_1$	4 714 294	6 428 094	10				59
21.213	$2p^6$	$^1S_0$	$2p^5(^2P^\circ_{3/2})3s$	$(^3/_2,^1/_2)^\circ_2$	0	4 714 294					56°,57
21.153		0		1	0	4 727 500	4	1.1−1	5.6+11	C−	55°,112*,54,56,57
20.863	$2p^6$	$^1S_0$	$2p^5(^2P^\circ_{1/2})3s$	$(^1/_2,^1/_2)^\circ_1$	0	4 793 200	3	1.2−1	6.0+11	C−	55°,112*,54,56,57
19.015	$2p^6$	$^1S_0$	$2p^5(^2P^\circ_{3/2})3d$	$^2[^1/_2]^\circ_1$	0	5 259 419	0	1.0−2	6.3+10	E	55°,112*
18.782	$2p^6$	$^1S_0$	$2p^5(^2P^\circ_{3/2})3d$	$^2[^3/_2]^\circ_1$	0	5 324 200	2	4.4−1	2.8+12	D	55°,112*,54,56,57
18.497	$2p^6$	$^1S_0$	$2p^5(^2P^\circ_{1/2})3d$	$^2[^3/_2]^\circ_1$	0	5 406 300	4	2.49	1.62+13	C−	55°,112*,54,56,57
16.965	$2s^22p^6$	$^1S_0$	$2s2p^63p$	$^3P^\circ_1$	0	5 894 500	0				55
16.889	$2s^22p^6$	$^1S_0$	$2s2p^63p$	$^1P^\circ_1$	0	5 921 000	1				55
15.21	$2p^6$	$^1S_0$	$2p^5(^2P^\circ_{3/2})4d$	$^2[^3/_2]^\circ_1$	0	6 577 496	0				55
15.06	$2p^6$	$^1S_0$	$2p^5(^2P^\circ_{1/2})4d$	$^2[^3/_2]^\circ_1$	0	6 641 000	0				55
13.991	$2p^6$	$^1S_0$	$2p^5(^2P^\circ_{3/2})5d$	$^2[^3/_2]^\circ_1$	0	7 148 000	2				58
13.862	$2p^6$	$^1S_0$	$2p^5(^2P^\circ_{1/2})5d$	$^2[^3/_2]^\circ_1$	0	7 215 000	2				58
13.416	$2p^6$	$^1S_0$	$2p^5(^2P^\circ_{3/2})6d$	$^2[^3/_2]^\circ_1$	0	7 452 000	1				58
13.294	$2p^6$	$^1S_0$	$2p^5(^2P^\circ_{1/2})6d$	$^2[^3/_2]^\circ_1$	0	7 524 000	1				58

Cr XVI (F sequence)

λ (Å)	Classification		Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1410.60	$2s^22p^5$ $^2P^o_{3/2}$	$2s^22p^5$ $^2P^o_{1/2}$	0	70 892		M1	6.39+3	B	42°,112*,68,67
115.33	$2s^22p^5$ $^2P^o_{1/2}$	$2s2p^6$ $^2S_{1/2}$	70 892	937 940	9	1.18−1	2.95+10	C+	51°,112*,71,48, 24,70,69
106.62	3/2	1/2	0	937 940	10	2.58−1	7.58+10	C+	51°,112*,71,48, 24,70,69
19.995	$2s^22p^5$ $^2P^o_{1/2}$	$2s^22p^4(^3P)3s$ $^4P_{3/2}$	70 892	5 072 300	2				72
19.847	1/2	1/2	70 892	5 109 300	1				72
19.807	3/2	5/2	0	5 048 700	*10bl*	1.5−2	4.3+10	E	72°,112*,73,57
19.714	3/2	3/2	0	5 072 300	20				72°,73,57
19.951	$2s2p^6$ $^2S_{1/2}$	$2s2p^5(^3P^o)3s$ $^2P^o_{3/2}$	937 940	5 950 200	6				72°,73
19.807	1/2	1/2	937 940	5 986 600	10*bl*				72
19.807	$2s^22p^5$ $^2P^o_{1/2}$	$2s^22p^4(^3P)3s$ $^2P_{3/2}$	70 892	5 118 200	10*bl*				72°,57
19.714	1/2	1/2	70 892	5 143 400	20	1.3−1	1.1+12	D	72°,112*,57
19.538	3/2	3/2	0	5 118 200	10				72°,73,57
19.442	3/2	1/2	0	5 143 400	6	1.1−1	9.9+11	D	72°,112*,73
19.511	$2s^22p^5$ $^2P^o_{1/2}$	$2s^22p^4(^1D)3s$ $^2D_{3/2}$	70 892	5 196 100	10	2.0−1	8.8+11	D	72°,112*,73,57
19.255	3/2	5/2	0	5 193 500	15	2.6−1	7.7+11	D	72°,112*,73,57
19.038	$2s^22p^5$ $^2P^o_{1/2}$	$2s^22p^4(^1S)3s$ $^2S_{1/2}$	70 892	5 323 500	8	7.0−2	6.4+11	D	72°,112*
18.775	3/2	1/2	0	5 323 500	30*bl*	2.7−2	2.6+11	E	72°,112*
18.017	$2s^22p^5$ $^2P^o_{1/2}$	$2s^22p^4(^3P)3d$ $^4P_{3/2}$	70 892	5 620 600	2				72
17.833	3/2	1/2	0	5 607 600	2				72
17.793	3/2	3/2	0	5 620 600	2				72°,57
17.730	3/2	5/2	0	5 640 200	3				72
17.993	$2s^22p^5$ $^2P^o_{1/2}$	$2s^22p^4(^3P)3d$ $^2P_{1/2}$	70 892	5 628 500	3				72°,73
17.856	1/2	3/2	70 892	5 671 200	2				72°,73
17.633	3/2	3/2	0	5 671 200	2				72°,73
17.931	$2s^22p^5$ $^2P^o_{1/2}$	$2s^22p^4(^3P)3d$ $^2D_{3/2}$	70 892	5 648 100	2				72
17.704	3/2	3/2	0	5 648 100	2				72°,73
17.603	3/2	5/2	0	5 680 800	5				72°,73
17.785	$2s^22p^5$ $^2P^o_{3/2}$	$2s^22p^4(^3P)3d$ $^4F_{5/2}$	0	5 622 700	5				72
17.671	$2s^22p^5$ $^2P^o_{3/2}$	$2s^22p^4(^3P)3d$ $^2F_{5/2}$	0	5 659 000	4				72
17.656	$2s^22p^5$ $^2P^o_{1/2}$	$2s^22p^4(^1D)3d$ $^2S_{1/2}$	70 892	5 734 600		1.9−1	2.0+12	D	112*
17.438	3/2	1/2	0	5 734 600	6	9.6−1	1.1+13	D	72°,112*
17.589	$2s^22p^5$ $^2P^o_{1/2}$	$2s^22p^4(^1D)3d$ $^2P_{3/2}$	70 892	5 756 200	2	3.8−1	2.0+12	E	72°,112*
17.373^C	3/2	3/2	0	5 756 200		2.5	1.4+13	E	112*
17.514	$2s^22p^5$ $^2P^o_{1/2}$	$2s^22p^4(^1D)3d$ $^2D_{3/2}$	70 892	5 780 500	3	1.9	1.1+13	E	72°,112*
17.370	3/2	5/2	0	5 757 100	8				72°,73,57
17.300^C	3/2	3/2	0	5 780 500		4.4−1	2.5+12	E	112*
17.242	$2s^22p^5$ $^2P^o_{1/2}$	$2s^22p^4(^1S)3d$ $^2D_{3/2}$	70 892	5 870 600	5	1.5	8.6+12	D	72°,112*,73
17.073	3/2	5/2	0	5 857 200	3	3.1−1	1.2+12	D	72°,112*,73
17.034^C	3/2	3/2	0	5 870 600		1.7−2	9.9+10	E	112*

Cr XVII (O sequence)

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1722.1^C	$2s^22p^4$	$^3P_2$	$2s^22p^4$	$^3P_0$	0	58 070		E2	1.9−1	E	112*
1656.3		2		1	0	60 376		M1	4.59+3	C+	67°,112*,68
1340.7	$2s^22p^4$	$^3P_1$	$2s^22p^4$	$^1D_2$	60 376	134 998		M1	4.0+2	D	68°,112*
740.75		2		2	0	134 998		M1	6.6+3	D	42°,112*,68,67
781.42^C	$2s^22p^4$	$^1D_2$	$2s^22p^4$	$^1S_0$	134 998	262 970		E2	2.8+1	E	112*
493.8	$2s^22p^4$	$^3P_1$	$2s^22p^4$	$^1S_0$	60 376	262 970		M1	6.5+4	D	67°,112*
168.02^C	$2s^22p^4$	$^1S_0$	$2s2p^5$	$^3P^o_1$	262 970	858 120		6.4−3	5.0+8	E	112*
147.40	$2s^22p^4$	$^1D_2$	$2s2p^5$	$^3P^o_2$	134 998	813 540		2.4−2	1.4+9	E	51°,112*
132.76	$2s^22p^4$	$^3P_1$	$2s2p^5$	$^3P^o_2$	60 376	813 540		1.23−1	9.3+9	C	51°,112*,71,48,24,70,69
125.35		1		1	60 376	858 120		7.71−2	1.09+10	C	51°,112*,70,69
125.00		0		1	58 070	858 120		9.6−2	1.4+10	C	51°,112*,70,69
122.91		2		2	0	813 540		3.7−1	3.3+10	C	51°,112*,71,48,24,70,69
120.84		1		0	60 376	887 920		1.09−1	4.99+10	C	51°,112*,71,48,70,69
116.53		2		1	0	858 120		1.49−1	2.44+10	C	51°,112*,71,48,70,69
129.78	$2s2p^5$	$^1P^o_1$	$2p^6$	$^1S_0$	1 116 240	1 886 850		3.54−1	1.4+11	C	51°,112*,75
117.20	$2s^22p^4$	$^1S_0$	$2s2p^5$	$^1P^o_1$	262 970	1 116 240		5.9−2	9.6+9	C	51°,112*,70
101.91	$2s^22p^4$	$^1D_2$	$2s2p^5$	$^1P^o_1$	134 998	1 116 240		6.15−1	1.32+11	C	51°,112*,71,48,70,69
97.20	$2s2p^5$	$^3P^o_1$	$2p^6$	$^1S_0$	858 120	1 886 850		8.4−3	5.9+9	E	51°,112*
94.69	$2s^22p^4$	$^3P_1$	$2s2p^5$	$^1P^o_1$	60 376	1 116 240		2.0−3	4.8+8	E	51°,112*
94.49		0		1	58 070	1 116 240		3.8−3	9.5+8	E	51°,112*
89.586^C		2		1	0	1 116 240		3.0−2	8.5+9	E	112*
18.531	$2s^22p^4$	$^3P_1$	$2s^22p^3(^4S^o)3s$	$^3S^o_1$	60 376	5 455 000		9.0−2	5.8+11	C−	76°,112*
18.531		0		1	58 070	5 455 000		5.0−2	3.2+11	C−	76°,112*
18.336		2		1	0	5 455 000		2.6−1	1.7+12	C−	76°,112*
18.389	$2s^22p^4$	$^1S_0$	$2s^22p^3(^2P^o)3s$	$^1P^o_1$	262 970	5 700 700		1.4−1	9.2+11	D	76°,112*
18.336	$2s^22p^4$	$^1D_2$	$2s^22p^3(^2D^o)3s$	$^1D^o_2$	134 998	5 588 700		4.0−1	1.6+12	D	76°,112*
18.227^C	$2s^22p^4$	$^3P_1$	$2s^22p^3(^2D^o)3s$	$^3D^o_1$	60 376	5 546 800		1.0−1	7.0+11	D	112*
18.219		0		1	58 070	5 546 800		2.6−2	1.7+11	D	76°,112*
18.219		1		2	60 376	5 549 400		5.1−2	2.0+11	D	76°,112*
18.020		2		2	0	5 549 400		1.5−1	6.4+11	D	76°,112*
17.957		2		3	0	5 568 900		2.6−1	7.8+11	C	76°,112*
18.089^C	$2s^22p^4$	$^3P_1$	$2s^22p^3(^2D^o)3s$	$^1D^o_2$	60 376	5 588 700		4.2−2	1.7+11	E	112*
17.893^C		2		2	0	5 588 700		2.3−2	9.6+10	E	112*
17.968	$2s^22p^4$	$^1D_2$	$2s^22p^3(^2P^o)3s$	$^1P^o_1$	134 998	5 700 700		1.2−1	8.6+11	D	76°,112*
17.201^C	$2s^22p^4$	$^1D_2$	$2s^22p^3(^4S^o)3d$	$^3D^o_3$	134 998	5 948 500		2.1−2	6.8+10	E	112*
16.84^C	$2s^22p^4$	$^1D_2$	$2s^22p^3(^2D^o)3d$	$^3D^o_3$	134 998	6 074 000		6.0−2	2.0+11	E	112*
16.811	$2s^22p^4$	$^3P_2$	$2s^22p^3(^4S^o)3d$	$^3D^o_3$	0	5 948 500		1.3	4.4+12	D	77°,112*
16.696	$2s^22p^4$	$^1D_2$	$2s^22p^3(^2D^o)3d$	$^1F^o_3$	134 998	6 124 400		2.0	6.8+12	D	77°,112*

Cr XVII (O sequence) – Continued

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
16.64	$2s^22p^4$	$^3P_1$	$2s^22p^3(^2D^o)3d$	$^3D^o_2$	60 376	6 070 000					77
16.46		2		3	0	6 074 000		3.7	1.3+13	D	77°,112*
16.328^{C}	$2s^22p^4$	$^3P_2$	$2s^22p^3(^2D^o)3d$	$^1F^o_3$	0	6 124 400		9.0−1	3.2+12	E	112*
16.31	$2s^22p^4$	$^3P_2$	$2s^22p^3(^2P^o)3d$	$^3P^o_2$	0	6 131 000					77
16.31	$2s^22p^4$	$^3P_0$	$2s^22p^3(^2P^o)3d$	$^3D^o_1$	58 070	6 189 000					77
16.249		1		2	60 376	6 214 600					77
16.221		2		3	0	6 164 800					77
12.909	$2s^22p^4$	$^1D_2$	$2s^22p^3(^2D^o)4d$	$^1D^o_2$	134 998	7 882 000					74
12.779	$2s^22p^4$	$^1D_2$	$2s^22p^3(^2D^o)4d$	$^3F^o_3$	134 998	7 960 000					74

Cr XVIII (N sequence)

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
4038.6	$2s^22p^3$	$^2D^o_{3/2}$	$2s^22p^3$	$^2D^o_{5/2}$	126 060	150 814		M1	1.27+2	C+	78°,112*,67
2606.4	$2s^22p^3$	$^2P^o_{1/2}$	$2s^22p^3$	$^2P^o_{3/2}$	226 100	264 456		M1	3.82+2	C	78°,112*
1337.1^{C}	$2p^5$	$^2P^o_{3/2}$	$2p^5$	$^2P^o_{1/2}$	1 738 700	1 813 490		M1	7.6+3	C+	112*
1328.3^{C}	$2s^22p^3$	$^2D^o_{5/2}$	$2s^22p^3$	$^2P^o_{1/2}$	150 814	226 100		E2	6.3−1	E	112*
999.60^{C}		3/2		1/2	126 060	226 100		M1	3.4+3	D	112*
879.96^{C}		5/2		3/2	150 814	264 456		M1	5.2+3	D	112*
722.1		3/2		3/2	126 060	264 456		M1	1.6+4	D	78°,112*
793.4	$2s^22p^3$	$^4S^o_{3/2}$	$2s^22p^3$	$^2D^o_{3/2}$	0	126 060		M1	6.1+3	D	78°,112*,67
663.1		3/2		5/2	0	150 814		M1	3.2+2	D−	78°,112*
442.1	$2s^22p^3$	$^4S^o_{3/2}$	$2s^22p^3$	$^2P^o_{1/2}$	0	226 100		M1	1.3+4	E	78°,112*
378.0		3/2		3/2	0	264 456		M1	1.6+4	E	78°,112*
248.07^{C}	$2s^22p^3$	$^2P^o_{3/2}$	$2s2p^4$	$^4P_{5/2}$	264 456	667 560		1.3−3	2.3+7	E	112*
221.98^{C}		3/2		3/2	264 456	714 950		3.4−3	1.1+8	E	112*
197.48^{C}		1/2		1/2	226 100	732 490		1.2−3	1.0+8	E	112*
193.52^{C}	$2s^22p^3$	$^2D^o_{5/2}$	$2s2p^4$	$^4P_{5/2}$	150 814	667 560		4.8−3	1.4+8	E	112*
184.67^{C}		3/2		5/2	126 060	667 560		8.0−3	2.6+8	E	112*
169.81^{C}		3/2		3/2	126 060	714 950		7.2−4	4.2+7	E	112*
164.90^{C}		3/2		1/2	126 060	732 490		1.0−3	1.3+8	E	112*
175.90^{C}	$2s2p^4$	$^2P_{1/2}$	$2p^5$	$^2P^o_{3/2}$	1 170 200	1 738 700		3.80−2	2.05+9	C	112*
157.40		3/2		3/2	1 103 370	1 738 700		4.20−1	2.83+10	C	51°,112*
155.46		1/2		1/2	1 170 200	1 813 490		2.06−1	2.84+10	C	51°,112*
140.82^{C}		3/2		1/2	1 103 370	1 813 490		1.58−1	2.66+10	C	112*
151.90^{C}	$2s^22p^3$	$^2P^o_{3/2}$	$2s2p^4$	$^2D_{3/2}$	264 456	922 800		8.4−3	6.1+8	D	112*
149.94		3/2		5/2	264 456	931 420		1.08−1	5.3+9	C	51°,112*,70
143.53		1/2		3/2	226 100	922 800		3.52−2	2.85+9	C	51°,112*
149.80	$2s^22p^3$	$^4S^o_{3/2}$	$2s2p^4$	$^4P_{5/2}$	0	667 560		2.4−1	1.2+10	C	51°,112*,71, 48,24,70
139.87		3/2		3/2	0	714 950		1.75−1	1.49+10	C	51°,112*,71, 48,24,70
136.52		3/2		1/2	0	732 490		9.28−2	1.66+10	C	51°,112*,71, 48,24,70

Cr XVIII (N sequence) — Continued

λ (Å)	Classification		Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
147.79	$2s2p^4\ ^2S_{1/2}$	$2p^5\ ^2P^o_{3/2}$	1 062 040	1 738 700		9.38−2	7.2+9	C	51°,112*
133.08[C]	$_{1/2}$	$_{1/2}$	1 062 040	1 813 490		4.6−3	8.7+8	D	112*
129.54[C]	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^2D_{3/2}$	150 814	922 800		2.9−3	2.9+8	E	112*
128.10	$_{5/2}$	$_{5/2}$	150 814	931 420		4.1−1	2.8+10	C	51°,112*,71, 48,70,69
125.51	$_{3/2}$	$_{3/2}$	126 060	922 800		3.2−1	3.4+10	C	51°,112*,71, 24,70,69
125.38	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^2S_{1/2}$	264 456	1 062 040		2.5−2	5.3+9	D	51°,112*
119.62	$_{1/2}$	$_{1/2}$	226 100	1 062 040		1.4−1	3.2+10	C	51°,112*,79
123.87	$2s2p^4\ ^2D_{5/2}$	$2p^5\ ^2P^o_{3/2}$	931 420	1 738 700		3.6−1	3.9+10	C	51°,112*,75, 77
122.56	$_{3/2}$	$_{3/2}$	922 800	1 738 700		1.12−1	1.24+10	C	51°,112*,75, 77
112.27	$_{3/2}$	$_{1/2}$	922 800	1 813 490		1.60−1	4.24+10	C	51°,112*,75
119.21	$2s^22p^3\ ^2P^o_{3/2}$	$2s2p^4\ ^2P_{3/2}$	264 456	1 103 370		7.60−2	8.9+9	C	51°,112*,70
113.99	$_{1/2}$	$_{3/2}$	226 100	1 103 370		5.48−2	7.0+9	C	51°,112*,71, 70
110.41	$_{3/2}$	$_{1/2}$	264 456	1 170 200		2.9−1	7.9+10	C	51°,112*,71, 70
105.92	$_{1/2}$	$_{1/2}$	226 100	1 170 200		1.7−2	4.9+9	D	51°,112*,70
108.37	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^2D_{3/2}$	0	922 800		4.4−3	6.2+8	E	51°,112*
106.84	$2s^22p^3\ ^2D^o_{3/2}$	$2s2p^4\ ^2S_{1/2}$	126 060	1 062 040		1.2−1	3.4+10	E	51°,112*,79
104.98	$2s^22p^3\ ^2D^o_{5/2}$	$2s2p^4\ ^2P_{3/2}$	150 814	1 103 370		5.8−1	8.7+10	C	51°,112*,71, 48,70,69
102.32	$_{3/2}$	$_{3/2}$	126 060	1 103 370		9.68−2	1.54+10	C	51°,112*,70
95.77	$_{3/2}$	$_{1/2}$	126 060	1 170 200		8.48−2	3.08+10	C	51°,112*,70, 69
99.383[C]	$2s2p^4\ ^4P_{1/2}$	$2p^5\ ^2P^o_{3/2}$	732 490	1 738 700		1.5−3	2.5+8	E	112*
97.680[C]	$_{3/2}$	$_{3/2}$	714 950	1 738 700		4.0−3	7.0+8	E	112*
93.36	$_{5/2}$	$_{3/2}$	667 560	1 738 700		9.0−3	1.7+9	E	51°,112*
92.507[C]	$_{1/2}$	$_{1/2}$	732 490	1 813 490		1.4−3	5.5+8	E	112*
94.16	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^2S_{1/2}$	0	1 062 040		2.4−3	9.2+8	E	51°,112*
90.63	$2s^22p^3\ ^4S^o_{3/2}$	$2s2p^4\ ^2P_{3/2}$	0	1 103 370		1.2−2	2.4+9	E	51°,112*
15.60	$2s^22p^3\ ^2D^o_{5/2}$	$2s^22p^2(^1D)3d\ ^2F_{7/2}$	150 814	6 555 000					77
15.519	$2s^22p^3\ ^4S^o_{3/2}$	$2s^22p^2(^3P)3d\ ^4P_{5/2}$	0	6 443 000					57°,77
15.519	$_{3/2}$	$_{3/2}$	0	6 443 000					57

Cr XIX (C sequence)

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
2885.4	$2s^22p^2$	$^3P_1$	$2s^22p^2$	$^3P_2$	47 811	82 458		M1	4.69+2	C+	67°,112*,80
2090.9		0		1	0	47 811		M1	1.81+3	C+	67°,112*,80
1212.7^{C}		0		2	0	82 458		E2	1.8−1	E	112*
979.1	$2s^22p^2$	$^3P_2$	$2s^22p^2$	$^1D_2$	82 458	184 597		M1	5.7+3	C	78°,112*,67
731.1		1		2	47 811	184 597		M1	5.7+3	D	78°,112*,68,67
875.63^{C}	$2s^22p^2$	$^1D_2$	$2s^22p^2$	$^1S_0$	184 597	298 800		E2	1.3+1	E	112*
398.4	$2s^22p^2$	$^3P_1$	$2s^22p^2$	$^1S_0$	47 811	298 800		M1	6.4+4	D	67°,112*
311.71^{C}	$2s^22p^2$	$^3P_2$	$2s2p^3$	$^5S^o_2$	82 458	[403 268]		1.3−3	1.7+7	E	112*
281.33^{C}		1		2	47 811	[403 268]		8.7−4	1.5+7	E	112*
278.11^{C}	$2s2p^3$	$^1P^o_1$	$2p^4$	$^3P_2$	1 090 660	1 450 230		5.1−3	8.8+7	E	112*
236.04^{C}		1		1	1 090 660	1 514 320		1.2−2	4.7+8	E	112*
267.40^{C}	$2s^22p^2$	$^1S_0$	$2s2p^3$	$^3D^o_1$	298 800	672 770		1.2−3	3.7+7	E	112*
210.97^{C}	$2s2p^3$	$^1D^o_2$	$2p^4$	$^3P_2$	976 220	1 450 230		2.1−2	6.3+8	E	112*
185.84^{C}		2		1	976 220	1 514 320		2.2−3	1.4+8	E	112*
205.32^{C}	$2s^22p^2$	$^1D_2$	$2s2p^3$	$^3D^o_2$	184 597	671 630		1.0−3	3.3+7	E	112*
204.85^{C}		2		1	184 597	672 770		2.3−3	1.2+8	E	112*
199.11^{C}		2		3	184 597	686 830		2.6−2	6.2+8	E	112*
203.94^{C}	$2s2p^3$	$^3S^o_1$	$2p^4$	$^3P_2$	959 880	1 450 230		1.9−1	6.3+9	C	112*
180.37		1		1	959 880	1 514 320		1.6−1	1.1+10	C	51°,112*
179.18		1		0	959 880	1 517 990		6.96−2	1.45+10	C	51°,112*
201.89^{C}	$2s^22p^2$	$^1S_0$	$2s2p^3$	$^3P^o_1$	298 800	794 130		2.0−3	1.1+8	E	112*
201.82	$2s2p^3$	$^1P^o_1$	$2p^4$	$^1D_2$	1 090 660	1 586 230		1.27−1	4.16+9	C	51°,112*
169.73	$2s^22p^2$	$^3P_2$	$2s2p^3$	$^3D^o_2$	82 458	671 630		2.1−4	9.5+6	E	51°,112*
169.40^{C}		2		1	82 458	672 770		3.3−4	2.6+7	E	112*
165.46		2		3	82 458	686 830		1.69−1	5.9+9	C	51°,112*,71,48,24,77
160.30		1		2	47 811	671 630		1.6−1	8.3+9	C	51°,112*,71,48,24,77
160.01		1		1	47 811	672 770		1.2−2	1.1+9	D	51°,112*
148.64		0		1	0	672 770		8.9−2	9.0+9	C	51°,112*,48,24
164.06^{C}	$2s^22p^2$	$^1D_2$	$2s2p^3$	$^3P^o_1$	184 597	794 130		3.3−3	2.8+8	E	112*
161.25^{C}		2		2	184 597	804 750		3.8−3	1.9+8	E	112*
163.94	$2s2p^3$	$^1D^o_2$	$2p^4$	$^1D_2$	976 220	1 586 230		6.25−1	3.10+10	C	51°,112*
154.92	$2s2p^3$	$^3P^o_2$	$2p^4$	$^3P_2$	804 750	1 450 230		6.35−2	3.53+9	C	51°,112*
152.42		1		2	794 130	1 450 230		5.70−2	3.27+9	C	51°,112*
140.92		2		1	804 750	1 514 320		1.23−1	1.38+10	C	51°,112*
138.86		1		1	794 130	1 514 320					51
138.15		1		0	794 130	1 517 990		5.01−2	1.75+10	C	51°,112*,24
137.89		0		1	789 160	1 514 320		3.56−2	4.16+9	C	51°,112*,24
151.27^{C}	$2s^22p^2$	$^1S_0$	$2s2p^3$	$^3S^o_1$	298 800	959 880		4.3−3	4.2+8	E	112*
143.57	$2s2p^3$	$^1P^o_1$	$2p^4$	$^1S_0$	1 090 660	1 787 180		2.2−1	7.2+10	C	51°,112*,24
140.51	$2s^22p^2$	$^3P_2$	$2s2p^3$	$^3P^o_1$	82 458	794 130		3.1−2	3.5+9	D	51°,112*
138.45		2		2	82 458	804 750		2.45−1	1.71+10	C	51°,112*,71,77,79
134.89		1		0	47 811	789 160		5.40−2	1.98+10	C	51°,112*
133.99		1		1	47 811	794 130		9.75−2	1.21+10	C	51°,112*
132.11		1		2	47 811	804 750		9.3−3	7.1+8	D	51°,112*
125.93		0		1	0	794 130		2.89−2	4.05+9	C	51°,112*

Cr XIX (C sequence) – Continued

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
130.99	$2s2p^3$	$^3D^\circ_3$	$2p^4$	$^3P_2$	686 830	1 450 230		3.7−1	2.9+10	C	51°,112*,77
128.63		1		2	672 770	1 450 230		2.9−2	2.3+9	D	51°,112*
128.43		2		2	671 630	1 450 230		1.47−1	1.19+10	C	51°,112*
118.83		1		1	672 770	1 514 320		8.58−2	1.35+10	C	51°,112*,77
118.67		2		1	671 630	1 514 320		1.33−1	2.10+10	C	51°,112*,77
118.31		1		0	672 770	1 517 990		6.90−2	3.29+10	C	51°,112*
128.99[C]	$2s^22p^2$	$^1D_2$	$2s2p^3$	$^3S^\circ_1$	184 597	959 880		5.5−4	7.3+7	E	112*
127.95	$2s2p^3$	$^3P^\circ_2$	$2p^4$	$^1D_2$	804 750	1 586 230		1.2−2	1.0+9	E	51°,112*
126.25[C]		1		2	794 130	1 586 230		8.4−3	7.0+8	E	112*
126.33	$2s^22p^2$	$^1D_2$	$2s2p^3$	$^1D^\circ_2$	184 597	976 220		5.20−1	4.35+10	C	51°,112*,71, 77,79
126.30	$2s^22p^2$	$^1S_0$	$2s2p^3$	$^1P^\circ_1$	298 800	1 090 660		1.12−1	1.56+10	C	51°,112*
113.97	$2s^22p^2$	$^3P_2$	$2s2p^3$	$^3S^\circ_1$	82 458	959 880		3.2−1	5.5+10	C	51°,112*,71,24, 77,79
109.64		1		1	47 811	959 880		1.33−1	2.46+10	C	51°,112*,71, 77,79
104.18		0		1	0	959 880		4.38−2	9.0+9	C	51°,112*,71,79
111.88	$2s^22p^2$	$^3P_2$	$2s2p^3$	$^1D^\circ_2$	82 458	976 220		5.0−2	5.3+9	E	51°,112*
107.71[C]		1		2	47 811	976 220		2.1−3	2.4+8	E	112*
111.18	$2s2p^3$	$^3D^\circ_3$	$2p^4$	$^1D_2$	686 830	1 586 230		3.4−2	3.7+9	E	51°,112*
109.34[C]		2		2	671 630	1 586 230		4.9−3	5.5+8	E	112*
110.37	$2s^22p^2$	$^1D_2$	$2s2p^3$	$^1P^\circ_1$	184 597	1 090 660		3.3−1	6.0+10	C	51°,112*,71, 77,79
100.70[C]	$2s2p^3$	$^3P^\circ_1$	$2p^4$	$^1S_0$	794 130	1 787 180		3.9−3	2.6+9	E	112*
95.88	$2s^22p^2$	$^3P_1$	$2s2p^3$	$^1P^\circ_1$	47 811	1 090 660		1.5−2	3.6+9	E	51°,112*
95.514[C]	$2s2p^3$	$^5S^\circ_2$	$2p^4$	$^3P_2$	[403 268]	1 450 230		4.9−3	7.2+8	E	112*
90.005[C]		2		1	[403 268]	1 514 320		6.5−4	1.8+8	E	112*
2.2414	$1s^22s^22p^2$	$^1S_0$	$1s2s^22p^3$	$^1P^\circ_1$	298 800	44 924 000					82
2.2386	$1s^22s^22p^2$	$^1D_2$	$1s2s^22p^3$	$^1D^\circ_2$	184 597	44 855 000					82
2.2371	$1s^22s^22p^2$	$^3P_1$	$1s2s^22p^3$	$^3P^\circ_0$	47 811	44 749 000					82
2.2347	$1s^22s^22p^2$	$^1D_2$	$1s2s^22p^3$	$^1P^\circ_1$	184 597	44 924 000					82

Cr XX (B sequence)

λ (Å)	Classification		Energy Levels (cm⁻¹)		Int.	*gf*	*A* (s⁻¹)	Acc.	References
1205.9	$2s^22p$ $^2P^o_{1/2}$	$2s^22p$ $^2P^o_{3/2}$	0	82 926		M1	5.11+3	B	67°,112*,68,80
416.35[C]	$2s2p^2$ $^2P_{3/2}$	$2p^3$ $^4S^o_{3/2}$	861 660	1 101 840		2.0−3	1.9+7	E	112*
368.13[C]	$2s^22p$ $^2P^o_{3/2}$	$2s2p^2$ $^4P_{1/2}$	82 926	354 570		4.4−4	1.1+7	E	112*
287.58[C]	3/2	5/2	82 926	430 650		2.4−3	3.3+7	E	112*
282.03[C]	1/2	1/2	0	354 570		1.0−3	4.2+7	E	112*
271.72	$2s2p^2$ $^2P_{3/2}$	$2p^3$ $^2D^o_{3/2}$	861 660	1 229 660	2	2.4−3	5.4+7	E	51°,112*
258.59[C]	3/2	5/2	861 660	1 248 380		1.79−1	2.98+9	C	112*
213.10	1/2	3/2	760 400	1 229 660	4				51
216.99[C]	$2s2p^2$ $^2D_{3/2}$	$2p^3$ $^4S^o_{3/2}$	640 980	1 101 840		1.2−3	4.2+7	E	112*
192.82	$2s2p^2$ $^2P_{3/2}$	$2p^3$ $^2P^o_{1/2}$	861 660	1 380 270	1	2.6−2	2.3+9	D	51°,112*
180.85	3/2	3/2	861 660	1 414 590	5	3.1−1	1.6+10	C	51°,112*
161.33	1/2	1/2	760 400	1 380 270	2				51
152.86	1/2	3/2	760 400	1 414 590	3				51
187.79	$2s2p^2$ $^2S_{1/2}$	$2p^3$ $^2P^o_{1/2}$	847 750	1 380 270	3				51
176.42	1/2	3/2	847 750	1 414 590	1				51
179.21	$2s^22p$ $^2P^o_{3/2}$	$2s2p^2$ $^2D_{3/2}$	82 926	640 980	4*bl*	2.2−3	1.1+8	E	51°,112*
175.42	3/2	5/2	82 926	652 990	7*bl*	1.47−1	5.3+9	C	51°,112*,71,24
156.00	1/2	3/2	0	640 980	8	1.2−1	8.4+9	C	51°,112*,71,24
173.42	$2s2p^2$ $^2D_{5/2}$	$2p^3$ $^2D^o_{3/2}$	652 990	1 229 660	4	7.26−2	4.03+9	C	51°,112*
169.87	3/2	3/2	640 980	1 229 660	5	1.22−1	7.1+9	C	51°,112*
167.97	5/2	5/2	652 990	1 248 380	8	2.84−1	1.12+10	C	51°,112*
164.63	3/2	5/2	640 980	1 248 380	4	5.88−2	2.41+9	C	51°,112*
148.99	$2s2p^2$ $^4P_{5/2}$	$2p^3$ $^4S^o_{3/2}$	430 650	1 101 840	9	2.33−1	1.75+10	C	51°,112*
140.75	3/2	3/2	391 360	1 101 840	9	1.60−1	1.35+10	C	51°,112*
133.82	1/2	3/2	354 570	1 101 840	7	8.90−2	8.3+9	C	51°,112*
147.62[T]	$2s^22p$ $^2P^o_{3/2}$	$2s2p^2$ $^2P_{1/2}$	82 926	760 400	1				51
131.50	1/2	1/2	0	760 400	9				51 ,71,24
128.42	3/2	3/2	82 926	861 660	11*bl*	3.7−1	3.8+10	C	51°,112*,71, 24,83,77
116.05	1/2	3/2	0	861 660	5	4.60−2	5.7+9	C	51°,112*,83
135.26	$2s2p^2$ $^2D_{3/2}$	$2p^3$ $^2P^o_{1/2}$	640 980	1 380 270	6	1.32−1	2.41+10	C	51°,112*
131.31	5/2	3/2	652 990	1 414 590	7	1.31−1	1.27+10	C	51°,112*
129.26	3/2	3/2	640 980	1 414 590	4	4.28−2	4.27+9	C	51°,112*
130.76	$2s^22p$ $^2P^o_{3/2}$	$2s2p^2$ $^2S_{1/2}$	82 926	847 750	9				51°,24,77
117.95	1/2	1/2	0	847 750	3				51
122.29[T]	$2s2p^2$ $^4P_{5/2}$	$2p^3$ $^2D^o_{5/2}$	430 650	1 248 380	2	1.3−2	9.8+8	E	51°,112*
119.29[C]	3/2	3/2	391 360	1 229 660		8.4−3	9.8+8	E	112*
101.63[C]	$2s2p^2$ $^4P_{5/2}$	$2p^3$ $^2P^o_{3/2}$	430 650	1 414 590		6.6−4	1.1+8	E	112*
97.730[C]	3/2	3/2	391 360	1 414 590		1.1−3	2.0+8	E	112*
97.494[C]	1/2	1/2	354 570	1 380 270		4.2−4	1.5+8	E	112*
14.685	$2s2p^2$ $^2P_{1/2}$	$2s2p(^3P^o)3d$ $^2P^o_{3/2}$	760 400	7 570 100	25				86
14.660	$2s2p^2$ $^2D_{5/2}$	$2s2p(^3P^o)3d$ $^2D^o_{5/2}$	652 990	7 473 700	30				86
14.660	3/2	3/2	640 980	7 462 300	30				86
14.635	3/2	5/2	640 980	7 473 700	25				86
14.533	$2s2p^2$ $^2D_{5/2}$	$2s2p(^3P^o)3d$ $^2F^o_{5/2}$	652 990	7 533 800	5				86
14.508	3/2	5/2	640 980	7 533 800	35				86
14.442	5/2	7/2	652 990	7 577 200	65				86
14.466	$2s2p^2$ $^2P_{3/2}$	$2s2p(^1P^o)3d$ $^2D^o_{5/2}$	861 660	7 774 400	35				86

Cr XX (B sequence)

λ (Å)	Classification		Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
14.457[T]	$2s2p^2$ $^2S_{1/2}$	$2s2p(^1P°)3d$ $^2D°_{3/2}$	847 750	7 764 800	30				86
14.402	$2s2p^2$ $^2P_{3/2}$	$2s2p(^1P°)3d$ $^2P°_{3/2}$	861 660	7 806 900	80				86
14.213	$_{1/2}$	$_{1/2}$	760 400	7 796 200	90				86
14.366	$2s2p^2$ $^2S_{1/2}$	$2s2p(^1P°)3d$ $^2P°_{3/2}$	847 750	7 806 900	40				86
14.323	$2s2p^2$ $^4P_{5/2}$	$2s2p(^3P°)3d$ $^4F°_{7/2}$	430 650	7 412 400	35				86°,74
14.213	$2s2p^2$ $^4P_{3/2}$	$2s2p(^3P°)3d$ $^4P°_{5/2}$	391 360	7 427 200	90				86
14.152	$_{5/2}$	$_{3/2}$	430 650	7 498 700	55				86
14.066	$_{3/2}$	$_{3/2}$	391 360	7 498 700	65				86
14.066	$_{3/2}$	$_{1/2}$	391 360	7 500 700	65				86
14.172	$2s2p^2$ $^4P_{5/2}$	$2s2p(^3P°)3d$ $^4D°_{7/2}$	430 650	7 486 800	65				86
14.152	$_{5/2}$	$_{5/2}$	430 650	7 496 800	55				86
14.121	$_{1/2}$	$_{3/2}$	354 570	7 436 200	65				86
14.121	$_{1/2}$	$_{1/2}$	354 570	7 436 200	65				86°,74
14.121	$2s2p^2$ $^4P_{3/2}$	$2s2p(^3P°)3d$ $^2D°_{5/2}$	391 360	7 473 700	65				86
14.066	$2s2p^2$ $^2D_{5/2}$	$2s2p(^1P°)3d$ $^2F°_{7/2}$	652 990	7 762 300	65				86
14.037	$_{3/2}$	$_{5/2}$	640 980	7 765 000	100				86
11.030	$2s^22p$ $^2P°_{3/2}$	$2s^24s$ $^2S_{1/2}$	82 926	9 145 000	5				74
10.940	$_{1/2}$	$_{1/2}$	0	9 145 000	3				74
10.840	$2s^22p$ $^2P°_{3/2}$	$2s^24d$ $^2D_{5/2}$	82 926	9 308 000	2				74
10.712	$_{1/2}$	$_{3/2}$	0	9 335 000	3				74
2.2263	$1s^22s^22p$ $^2P°_{3/2}$	$1s2s^22p^2$ $^2D_{5/2}$	82 926	45 000 000					82
2.2233	$1s^22s^22p$ $^2P°_{1/2}$	$1s2s^22p^2$ $^2P_{1/2}$	0	44 978 000					82
2.2222	$_{3/2}$	$_{3/2}$	82 926	45 083 000					82
2.2199	$1s^22s^22p$ $^2P°_{3/2}$	$1s2s^22p^2$ $^2S_{1/2}$	82 926	45 130 000					82

Cr XXI (Be sequence)

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
4330^{C}	$1s^22s2p$	$^3P^o_0$	$1s^22s2p$	$^3P^o_1$	318 030	341 120		M1	2.18+2	C+	112*
1565^{C}		1		2	341 120	405 020		M1	3.45+3	C+	112*
2777^{C}	$1s^22p^2$	$^3P_1$	$1s^22p^2$	$^3P_2$	911 080	947 080		M1	5.2+2	C	112*
2157^{C}		0		1	864 730	911 080		M1	1.72+3	C	112*
954.47^{C}	$1s^22p^2$	$^3P_2$	$1s^22p^2$	$^1D_2$	947 080	1 051 850		M1	6.8+3	D+	112*
710.38^{C}		1		2	911 080	1 051 850		M1	6.3+3	D+	112*
506.12^{C}	$1s^22s2p$	$^1P^o_1$	$1s^22p^2$	$^3P_0$	667 150	864 730		7.2−4	1.9+7	E	112*
409.95^{C}		1		1	667 150	911 080		3.0−4	4.0+6	E	112*
357.23^{C}		1		2	667 150	947 080		2.0−2	2.1+8	D	112*
381.49^{C}	$1s^22s2p$	$^3P^o_2$	$1s^22s2p$	$^1P^o_1$	405 020	667 150		M1	6.0+3	D	112*
306.72^{C}		1		1	341 120	667 150		M1	6.8+3	D−	112*
286.43^{C}		0		1	318 030	667 150		M1	1.1+4	D	112*
293.15	$1s^22s^2$	$^1S_0$	$1s^22s2p$	$^3P^o_1$	0	341 120		1.0−3	2.6+7	D	18°,112*,24, 88,87
290.91^{C}	$1s^22p^2$	$^3P_1$	$1s^22p^2$	$^1S_0$	911 080	1 254 830		M1	9.2+4	D	112*
259.97	$1s^22s2p$	$^1P^o_1$	$1s^22p^2$	$^1D_2$	667 150	1 051 850		1.85−1	3.65+9	B	51°,112*
197.61	$1s^22s2p$	$^3P^o_2$	$1s^22p^2$	$^3P_1$	405 020	911 080		7.05−2	4.01+9	B	51°,112*
190.98		1		0	341 120	864 730		5.97−2	1.09+10	B	51°,112*
184.48		2		2	405 020	947 080		1.88−1	7.37+9	B	51°,112*
175.45		1		1	341 120	911 080		4.74−2	3.42+9	B	51°,112*
168.62		0		1	318 030	911 080		6.70−2	5.24+9	B	51°,112*
165.03		1		2	341 120	947 080		8.73−2	4.28+9	B	51°,112*
170.16	$1s^22s2p$	$^1P^o_1$	$1s^22p^2$	$^1S_0$	667 150	1 254 830		1.18−1	2.71+10	B	51°,112*
154.61	$1s^22s2p$	$^3P^o_2$	$1s^22p^2$	$^1D_2$	405 020	1 051 850		5.05−2	2.82+9	C	51°,112*
140.70^{C}		1		2	341 120	1 051 850		3.6−3	2.4+8	D	112*
149.89	$1s^22s^2$	$^1S_0$	$1s^22s2p$	$^1P^o_1$	0	667 150		1.64−1	1.62+10	B	71°,112*,24, 89,51
14.24^{C}	$1s^22p^2$	$^1S_0$	$1s^22p3d$	$^1P^o_1$	1 254 830	8 275 000		1.29	1.41+13	C−	112*
14.17^{C}	$1s^22s2p$	$^3P^o_2$	$1s^22s3s$	$^3S_1$	405 020	7 463 000		1.3−1	1.4+12	D	112*
14.041		1		1	341 120	7 463 000		8.1−2	9.1+11	D	91°,112*,90
14.00^{C}		0		1	318 030	7 463 000		2.8−2	3.2+11	D	112*
13.950	$1s^22p^2$	$^1D_2$	$1s^22p3d$	$^3P^o_2$	1 051 850	8 219 000		5.5−1	3.8+12	C−	91°,112*,90,86
13.94^{C}	$1s^22p^2$	$^3P_2$	$1s^22p3d$	$^3D^o_2$	947 080	8 121 000		1.6−1	1.1+12	D	112*
13.91^{C}		2		1	947 080	8 134 000		9.0−3	1.0+11	D	112*
13.870		1		2	911 080	8 121 000		1.22	8.5+12	C−	91°,112*,90,74
13.844		1		1	911 080	8 134 000		3.0−1	3.5+12	C−	91°,112*,90
13.779		2		3	947 080	8 204 000		3.4	1.7+13	C−	91°,112*,90,86, 77,74
13.752		0		1	864 730	8 134 000		1.29	1.51+13	C−	91°,112*,90
13.844	$1s^22p^2$	$^1D_2$	$1s^22p3d$	$^1P^o_1$	1 051 850	8 275 000		7.5−2	8.7+11	D	91°,112*,90
13.844	$1s^22p^2$	$^1D_2$	$1s^22p3d$	$^1F^o_3$	1 051 850	8 275 000		5.20	2.59+13	C−	91°,112*,86,74
13.752	$1s^22p^2$	$^3P_2$	$1s^22p3d$	$^3P^o_1$	947 080	8 219 000		3.8−1	4.5+12	C−	91°,112*,90,86
13.752		2		2	947 080	8 219 000		1.35	9.5+12	C−	91°,112*,90,86
13.684		1		2	911 080	8 219 000		1.7−1	1.2+12	D	91°,112*,90,86
13.684		1		0	911 080	8 219 000		3.3−1	1.2+13	C−	91°,112*,90,86
13.684		1		1	911 080	8 219 000		6.9−1	8.2+12	C−	91°,112*,90,86
13.60^{C}		0		1	864 730	8 219 000		5.1−3	6.1+10	D	112*

Cr XXI (Be sequence) – Continued

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	*gf*	*A* (s^{-1})	Acc.	References
13.67[C]	$1s^22s2p$	$^3P^o_2$	$1s^22s3d$	$^3D_2$	405 020	7 721 000		5.5−1	3.9+12	C−	112*
13.647		2		3	405 020	7 733 000		3.0	1.5+13	C−	91°,112*,90, 86,77
13.55		1		2	341 120	7 721 000		1.6	1.2+13	C−	77°,112*,86,74
13.60[C]	$1s^22s2p$	$^1P^o_1$	$1s^22p3p$	$^1P_1$	667 150	8 022 000		1.3−1	1.6+12	D	112*
13.44[C]	$1s^22s2p$	$^1P^o_1$	$1s^22p3p$	$^3P_2$	667 150	8 109 000		1.6−1	1.2+12	D	112*
13.203	$1s^22s2p$	$^1P^o_1$	$1s^22s3s$	$^1S_0$	*667 150*	*8 241 300*					*91°,90*
13.123	$1s^22s^2$	$^1S_0$	$1s^22s3p$	$^3P^o_1$	0	7 620 000		2.9−1	3.7+12	C−	91°,112*,90
13.060	$1s^22s2p$	$^3P^o_0$	$1s^22p3p$	$^3D_1$	318 030	7 975 100		8.2−2	1.1+12	D	91°,112*,90
13.018		1		2	341 120	8 023 000		4.8−1	3.8+12	C−	91°,112*,90
13.018		2		3	405 020	8 087 000		7.0−1	3.9+12	C−	91°,112*,90,74
13.018	$1s^22s2p$	$^3P^o_1$	$1s^22p3p$	$^1P_1$	341 120	8 022 000					91°,90
12.981		0		1	318 030	8 022 000					91°,90
12.981	$1s^22s2p$	$^3P^o_2$	$1s^22p3p$	$^3S_1$	405 020	8 108 700					91
12.981	$1s^22s2p$	$^3P^o_2$	$1s^22p3p$	$^3P_2$	405 020	8 109 000		4.9−1	3.9+12	C−	91°,112*
12.981		1		0	341 120	8 045 000		1.2−1	4.8+12	D	91°,112*,74
12.87[C]		1		2	341 120	8 109 000		3.3−2	2.7+11	D	112*
2.2173	$1s^22s2p$	$^1P^o_1$	$1s2s2p^2$	$^1D_2$	667 150	45 770 000					82
2.2140	$1s^22s2p$	$^3P^o_2$	$1s2s2p^2$	$^3D_3$	405 020	45 570 000					82
2.2115		1		2	341 120	45 560 000					82
2.2103		1		1	341 120	45 580 000					82
2.2079	$1s^22s^2$	$^1S_0$	$1s2s^22p$	$^1P^o_1$	0	45 290 000					82

Cr XXII (Li sequence)

λ (Å)	Classification		Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
1099.9[C]	$1s^22p$ $^2P^o_{1/2}$	$1s^22p$ $^2P^o_{3/2}$	357 490	448 410		M1	6.76+3	B	112*
279.729	$1s^22s$ $^2S_{1/2}$	$1s^22p$ $^2P^o_{1/2}$	0	357 490		3.86−2	1.65+9	B+	95°,112*,24,18,89,96°,51,88,93
223.010	1/2	3/2	0	448 410		9.80−2	3.29+9	B+	95°,112*,24,18,94,89,96°,51,88,93
38.02[C]	$1s^23p$ $^2P^o_{3/2}$	$1s^24d$ $^2D_{3/2}$	7 922 000	10 552 000		2.3−1	2.7+11	C+	112*
37.65[C]	1/2	3/2	7 896 000	10 552 000		1.2	1.4+12	B	112*
37.55[C]	3/2	5/2	7 922 000	10 585 000		2.1	1.7+12	B	112*
13.549	$1s^22p$ $^2P^o_{3/2}$	$1s^23s$ $^2S_{1/2}$	448 410	7 826 000					97
13.393	1/2	1/2	357 490	7 826 000					97
13.307[C]	$1s^22p$ $^2P^o_{3/2}$	$1s^23d$ $^2D_{3/2}$	448 410	7 963 000		2.7−1	2.6+12	B	112*
13.292	3/2	5/2	448 410	7 972 000		2.44	1.54+13	B	98°,112*,97,74
13.149	1/2	3/2	357 490	7 963 000		1.34	1.29+13	B	98°,112*,97,74
12.664	$1s^22s$ $^2S_{1/2}$	$1s^23p$ $^2P^o_{1/2}$	0	7 896 000		2.54−1	5.28+12	B	98°,112*,97,74
12.623	1/2	3/2	0	7 922 000		4.90−1	5.13+12	B	98°,112*,97,74
9.897[C]	$1s^22p$ $^2P^o_{3/2}$	$1s^24d$ $^2D_{3/2}$	448 410	10 552 000		4.8−2	7.9+11	C+	112*
9.865	3/2	5/2	448 410	10 585 000		4.4−1	4.9+12	B	98°,112*
9.809	1/2	3/2	357 490	10 552 000		2.4−1	4.1+12	B	98°,112*
9.493	$1s^22s$ $^2S_{1/2}$	$1s^24p$ $^2P^o_{1/2}$	0	10 534 000					98
9.493	1/2	3/2	0	10 534 000					98
2.2016	$1s^22p$ $^2P^o_{3/2}$	$1s2p^2$ $^2D_{5/2}$	448 410	45 870 000		6.8−1	1.6+14	C	82°,112*,99
2.1982	1/2	3/2	357 490	45 849 000		6.6−1	2.3+14	C	82°,112*,99
2.1955	$1s^22s$ $^2S_{1/2}$	$1s2s2p$ $^2P^o_{3/2}$	0	45 548 000					82°,99
2.1907	1/2	1/2	0	45 648 000					100°,99,82
2.1854	$1s^23p$ $^2P^o_{3/2}$	$1s2p3p$ $^2D_{5/2}$	7 922 000	53 680 000					100
2.1846	1/2	3/2	7 896 000	53 671 000					100
2.1846	$1s^23p$ $^2P^o_{3/2}$	$1s2p3p$ $^2P_{3/2}$	7 922 000	53 697 000					100
2.1846	$1s^23s$ $^2S_{1/2}$	$1s2p3s$ $^2P^o_{1/2}$	7 826 000	53 601 000					100
2.1846	1/2	3/2	7 826 000	53 601 000					100
2.1846	$1s^23d$ $^2D_{5/2}$	$1s2p3d$ $^2D^o_{5/2}$	7 972 000	53 755 000					100
2.1834	3/2	5/2	7 963 000	53 755 000					100
2.1834	$1s^23d$ $^2D_{5/2}$	$1s2p3d$ $^2F^o_{7/2}$	7 972 000	53 772 000					100
2.1834	$1s^24p$ $^2P^o_{3/2}$	$1s2p4p$ $^2D_{5/2}$	10 534 000	56 334 000					100

Cr XXIII (He sequence)

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
7461[C]	1s5s	$^3S_1$	1s5p	$^3P^\circ_1$	[57 992 700]	[58 006 100]					
7351[C]	1s5s	$^1S_0$	1s5p	$^1P^\circ_1$	[58 005 800]	[58 019 400]					
3815.7[C]	1s4s	$^3S_1$	1s4p	$^3P^\circ_1$	[56 658 500]	[56 684 700]					
3772.5[C]	1s4s	$^1S_0$	1s4p	$^1P^\circ_1$	[56 684 100]	[56 710 600]					
1604.9[C]	1s3s	$^3S_1$	1s3p	$^3P^\circ_1$	[53 760 091]	[53 822 402]					
1150.2[C]		1		2	[53 760 091]	[53 847 036]					
1590.5[C]	1s3s	$^1S_0$	1s3p	$^1P^\circ_1$	[53 821 183]	[53 884 056]					
472.02[C]	1s2s	$^3S_1$	1s2p	$^3P^\circ_0$	[45 384 051]	[45 595 907]		1.11−2	3.33+8	B	112*
444.00[C]		1		1	[45 384 051]	[45 609 274]		3.36−2	3.77+8	B	112*
325.06[C]		1		2	[45 384 051]	[45 691 687]		8.10−2	1.02+9	B	112*,94
466.36[C]	1s2s	$^1S_0$	1s2p	$^1P^\circ_1$	[45 614 364]	[45 828 791]		3.27−2	3.34+8	B	112*
224.85[C]	1s2s	$^3S_1$	1s2p	$^1P^\circ_1$	[45 384 051]	[45 828 791]		4.41−3	1.94+8	B	112*
77.21[C]	1s4p	$^1P^\circ_1$	1s5s	$^1S_0$	[56 710 600]	[58 005 800]		1.6−1	1.8+11	C	112*
76.45[C]	1s4p	$^3P^\circ_1$	1s5s	$^3S_1$	[56 684 700]	[57 992 700]		1.6−1	6.3+10	D	112*
74.89[C]	1s4s	$^1S_0$	1s5p	$^1P^\circ_1$	[56 684 100]	[58 019 400]		4.5−1	1.8+11	D	112*
74.21[C]	1s4s	$^3S_1$	1s5p	$^3P^\circ_1$	[56 658 500]	[58 006 100]		4.59−1	1.83+11	C	112*
35.714[C]	1s3p	$^1P^\circ_1$	1s4s	$^1S_0$	[53 884 056]	[56 684 100]		1.0−1	5.3+11	C	112*
35.455[C]	1s3d	$^1D_2$	1s4p	$^1P^\circ_1$	[53 890 154]	[56 710 600]					
35.346[C]	1s3p	$^1P^\circ_1$	1s4d	$^1D_2$	[53 884 056]	[56 713 200]					
35.260[C]	1s3p	$^3P^\circ_1$	1s4s	$^3S_1$	[53 822 402]	[56 658 500]		9.9−2	1.8+11	C−	112*
34.609[C]	1s3s	$^1S_0$	1s4p	$^1P^\circ_1$	[53 821 183]	[56 710 600]		4.05−1	7.5+11	C	112*
34.193[C]	1s3s	$^3S_1$	1s4p	$^3P^\circ_1$	[53 760 091]	[56 684 700]		4.08−1	7.8+11	C	112*
24.262[C]	1s3p	$^1P^\circ_1$	1s5s	$^1S_0$	[53 884 056]	[58 005 800]		2.3−2	2.6+11	C	112*
23.979[C]	1s3p	$^3P^\circ_1$	1s5s	$^3S_1$	[53 822 402]	[57 992 700]		2.3−2	8.9+10	D	112*
23.820[C]	1s3s	$^1S_0$	1s5p	$^1P^\circ_1$	[53 821 183]	[58 019 400]		1.04−1	4.08+11	C+	112*
23.552[C]	1s3s	$^3S_1$	1s5p	$^3P^\circ_1$	[53 760 091]	[58 006 100]		1.0−1	4.2+11	C	112*
12.5119[C]	1s2p	$^1P^\circ_1$	1s3s	$^1S_0$	[45 828 791]	[53 821 183]		4.5−2	1.9+12	C+	112*
12.4048[C]	1s2p	$^1P^\circ_1$	1s3d	$^1D_2$	[45 828 791]	[53 890 154]					
12.2687[C]	1s2p	$^3P^\circ_1$	1s3s	$^3S_1$	[45 609 274]	[53 760 091]		4.2−2	6.2+11	C−	112*
12.0923[C]	1s2s	$^1S_0$	1s3p	$^1P^\circ_1$	[45 614 364]	[53 884 056]		3.68−1	5.6+12	C	112*
11.8507[C]	1s2s	$^3S_1$	1s3p	$^3P^\circ_1$	[45 384 051]	[53 822 402]		3.69−1	5.8+12	C	112*
11.8162[C]		1		2	[45 384 051]	[53 847 036]					
9.2121[C]	1s2p	$^1P^\circ_1$	1s4s	$^1S_0$	[45 828 791]	[56 684 100]		9.3−3	7.3+11	C	112*
9.1875[C]	1s2p	$^1P^\circ_1$	1s4d	$^1D_2$	[45 828 791]	[56 713 200]					
9.0504[C]	1s2p	$^3P^\circ_1$	1s4s	$^3S_1$	[45 609 274]	[56 658 500]		9.3−3	2.5+11	D	112*

Cr XXIII (He sequence) – Continued

λ (Å)	Classification				Energy Levels (cm⁻¹)		Int.	*gf*	*A* (s⁻¹)	Acc.	References
9.0121[C]	1s2s	$^1S_0$	1s4p	$^1P^\circ_1$	[45 614 364]	[56 710 600]		8.9–2	2.4+12	C+	112*
8.8490[C]	1s2s	$^3S_1$	1s4p	$^3P^\circ_1$	[45 384 051]	[56 684 700]		9.0–2	2.6+12	C+	112*
8.2122[C]	1s2p	$^1P^\circ_1$	1s5s	$^1S_0$	[45 828 791]	[58 005 800]		3.9–3	3.9+11	C	112*
8.0753[C]	1s2p	$^3P^\circ_1$	1s5s	$^3S_1$	[45 609 274]	[57 992 700]		3.9–3	1.3+11	D	112*
8.0612[C]	1s2s	$^1S_0$	1s5p	$^1P^\circ_1$	[45 614 364]	[58 019 400]		3.7–2	1.3+12	C+	112*
7.9226[C]	1s2s	$^3S_1$	1s5p	$^3P^\circ_1$	[45 384 051]	[58 006 100]		3.6–2	1.3+12	C+	112*
2.20342[C]	$1s^2$	$^1S_0$	1s2s	$^3S_1$	0	[45 384 051]		M1	9.37+7	B	112*,99,82
2.19254[C]	$1s^2$	$^1S_0$	1s2p	$^3P^\circ_1$	0	[45 609 274]		5.05–2	2.34+13	B	112*,99,82
2.18858[C]		0		2	0	[45 691 687]		M2	3.45+9	B	112*,100,99,82
2.18203[C]	$1s^2$	$^1S_0$	1s2p	$^1P^\circ_1$	0	[45 828 791]		7.21–1	3.37+14	B	112*,102,100, 101,99,103, 104,82
1.85796[C]	$1s^2$	$^1S_0$	1s3p	$^3P^\circ_1$	0	[53 822 402]		1.3–2	8.4+12	E	112*
1.85584[C]	$1s^2$	$^1S_0$	1s3p	$^1P^\circ_1$	0	[53 884 056]		1.39–1	8.97+13	C+	112*
1.76414[C]	$1s^2$	$^1S_0$	1s4p	$^3P^\circ_1$	0	[56 684 700]		4.5–3	3.2+12	E	112*
1.76334[C]	$1s^2$	$^1S_0$	1s4p	$^1P^\circ_1$	0	[56 710 600]		5.14–2	3.68+13	C+	112*,101
1.72396[C]	$1s^2$	$^1S_0$	1s5p	$^3P^\circ_1$	0	[58 006 100]		2.2–3	1.6+12	E	112*
1.72356[C]	$1s^2$	$^1S_0$	1s5p	$^1P^\circ_1$	0	[58 019 400]		2.48–2	1.86+13	C+	112*,101

Cr XXIV (H sequence)

λ (Å)	Classification				Energy Levels (cm^{-1})		Int.	gf	A (s^{-1})	Acc.	References
2805.72[C]	$3s$	$^2S_{1/2}$	$3p$	$^2P^o_{3/2}$	[56 599 131]	[56 634 762]		4.06−2	8.60+6	A	111*
2728.75[C]	$3p$	$^2P^o_{1/2}$	$3d$	$^2D_{3/2}$	[56 598 060]	[56 634 696]		2.61−2	5.84+6	A	111*
830.868[C]	$2s$	$^2S_{1/2}$	$2p$	$^2P^o_{3/2}$	[47 723 240]	[47 843 596]		2.28−2	5.52+7	A	111*
32.5023[C]	$3d$	$^2D_{5/2}$	$4f$	$^2F^o_{7/2}$	[56 646 755]	[59 723 456]		5.82	4.60+12	A	111*
32.4027[C]	$3p$	$^2P^o_{3/2}$	$4d$	$^2D_{5/2}$	[56 634 762]	[59 720 929]		2.23	2.37+12	A	111*
32.0849[C]	$3s$	$^2S_{1/2}$	$4p$	$^2P^o_{3/2}$	[56 599 131]	[59 715 866]		6.56−1	1.06+12	A	111*
22.2261[C]	$3d$	$^2D_{5/2}$	$5f$	$^2F^o_{7/2}$	[56 646 755]	[61 145 978]		8.96−1	1.51+12	A	111*
22.1733[C]	$3p$	$^2P^o_{3/2}$	$5d$	$^2D_{5/2}$	[56 634 762]	[61 144 683]		5.03−1	1.14+12	A	111*
22.0121[C]	$3s$	$^2S_{1/2}$	$5p$	$^2P^o_{3/2}$	[56 599 131]	[61 142 091]		1.63−1	5.61+11	A	111*
11.3596[C]	$2p$	$^2P^o_{3/2}$	$3d$	$^2D_{5/2}$	[47 843 596]	[56 646 755]		2.51	2.16+13	A	111*
11.2214[C]	$2s$	$^2S_{1/2}$	$3p$	$^2P^o_{3/2}$	[47 723 240]	[56 634 762]		5.89−1	7.80+12	A	111*
8.41940[C]	$2p$	$^2P^o_{3/2}$	$4d$	$^2D_{5/2}$	[47 843 596]	[59 720 929]		4.39−1	6.89+12	A	111*
8.33846[C]	$2s$	$^2S_{1/2}$	$4p$	$^2P^o_{3/2}$	[47 723 240]	[59 715 866]		1.39−1	3.32+12	A	111*
7.51818[C]	$2p$	$^2P^o_{3/2}$	$5d$	$^2D_{5/2}$	[47 843 596]	[61 144 683]		1.60−1	3.15+12	A	111*
7.45220[C]	$2s$	$^2S_{1/2}$	$5p$	$^2P^o_{3/2}$	[47 723 240]	[61 142 091]		5.65−2	1.70+12	A	111*
2.095567[C]	$1s$	$^2S_{1/2}$	$2p$	$^2P^o_{1/2}$	0	[47 719 790]		2.79−1	2.12+14	A	111*
2.090144[C]		1/2		3/2	0	[47 843 596]		5.60−1	2.14+14	A	111*
1.766845[C]	$1s$	$^2S_{1/2}$	$3p$	$^2P^o_{1/2}$	0	[56 598 060]		5.31−2	5.68+13	A	111*
1.765700[C]		1/2		3/2	0	[56 634 762]		1.06−1	5.69+13	A	111*
1.674597[C]	$1s$	$^2S_{1/2}$	$4p$	$^2P^o_{3/2}$	0	[59 715 866]		3.90−2	2.32+13	A	111*
1.635534[C]	$1s$	$^2S_{1/2}$	$5p$	$^2P^o_{3/2}$	0	[61 142 091]		1.87−2	1.17+13	A	111*

5. Explanation of Grotrian Diagrams

Notations on the Diagrams generally have the same meanings as for the Tables (see Explanation of Tables).

Abscissa

Energy of the levels in cm^{-1}.

Short vertical lines

Energy levels are indicated as the vertical lines. The electronic configuration (with the parentage in parentheses) and the level energy in cm^{-1} are given to the right of the vertical line, and at the top is the *J* value. Energy levels with the same *LS* label for the upper term are grouped together. The term designation is given at the right of the diagram; the ordering is by increasing multiplicity and orbital angular momentum. For the lower level, the term is adjacent to the configuration.

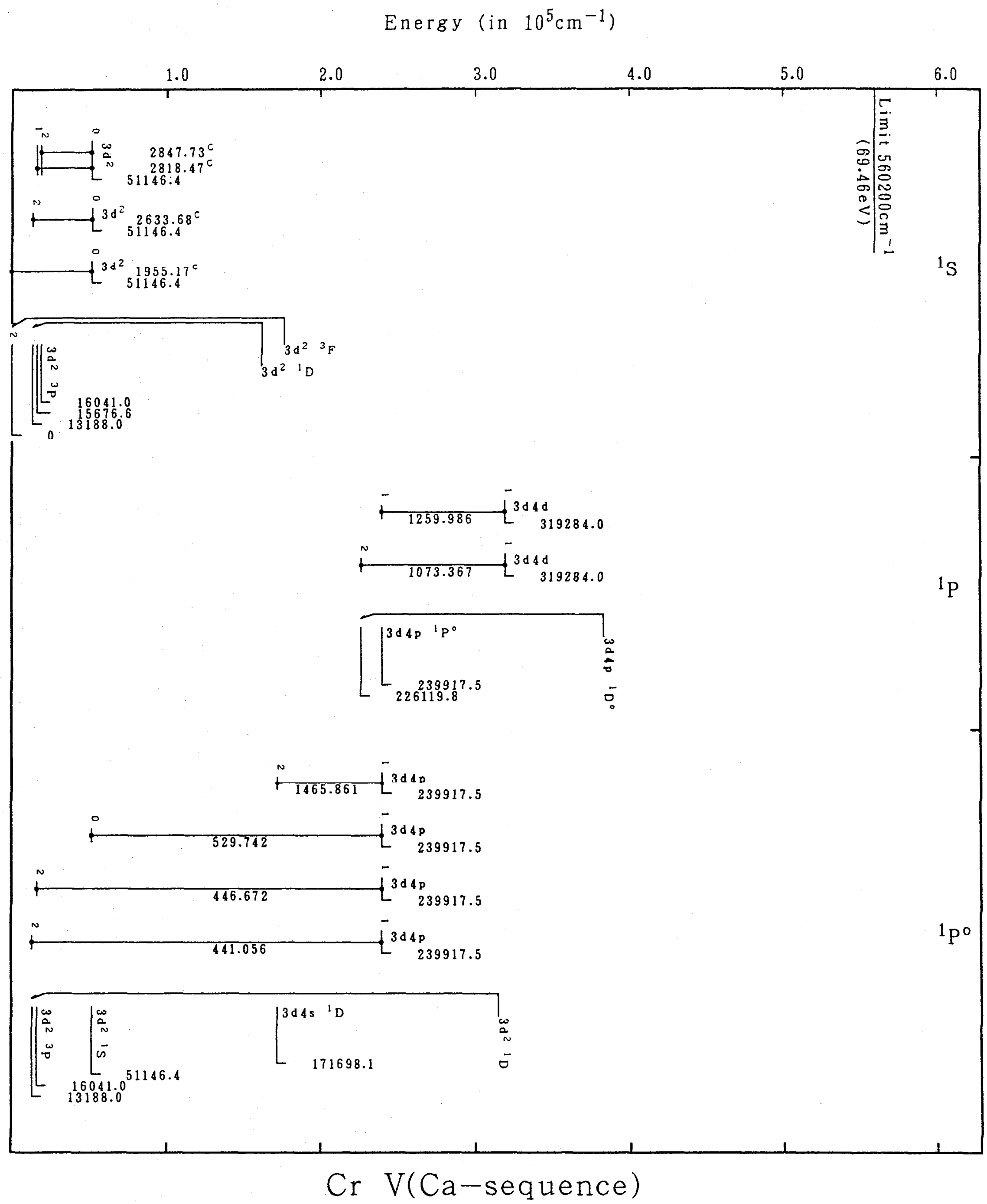
Horizontal lines

Transitions between levels. The number below each line gives the transition wavelength in Angstroms (10^{-8} cm). Heavier dashed lines indicate resonance transitions with absorption oscillator strengths $f \geq 0.01$.

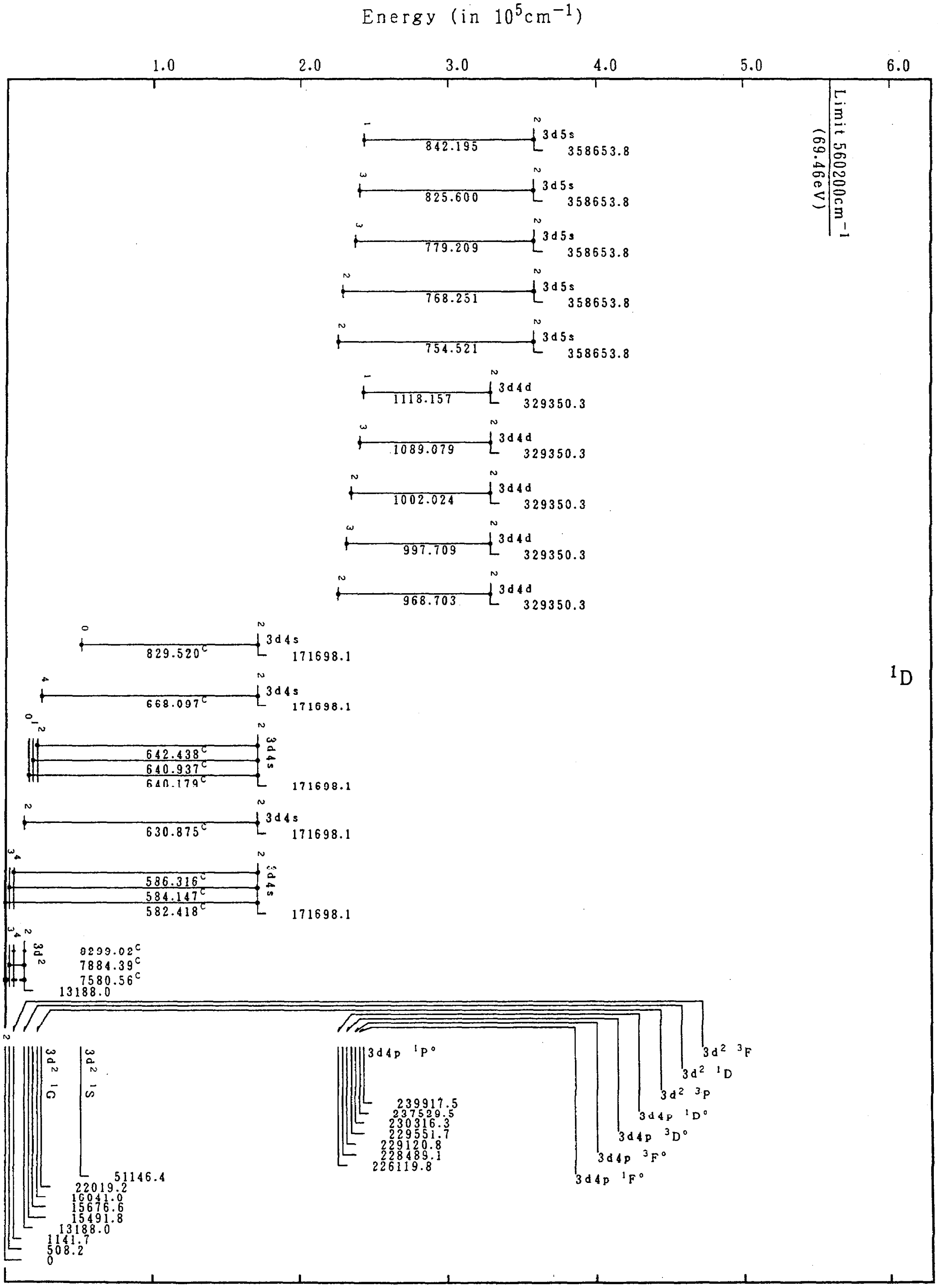
Limit

Principal ionization limit in cm^{-1} and eV.

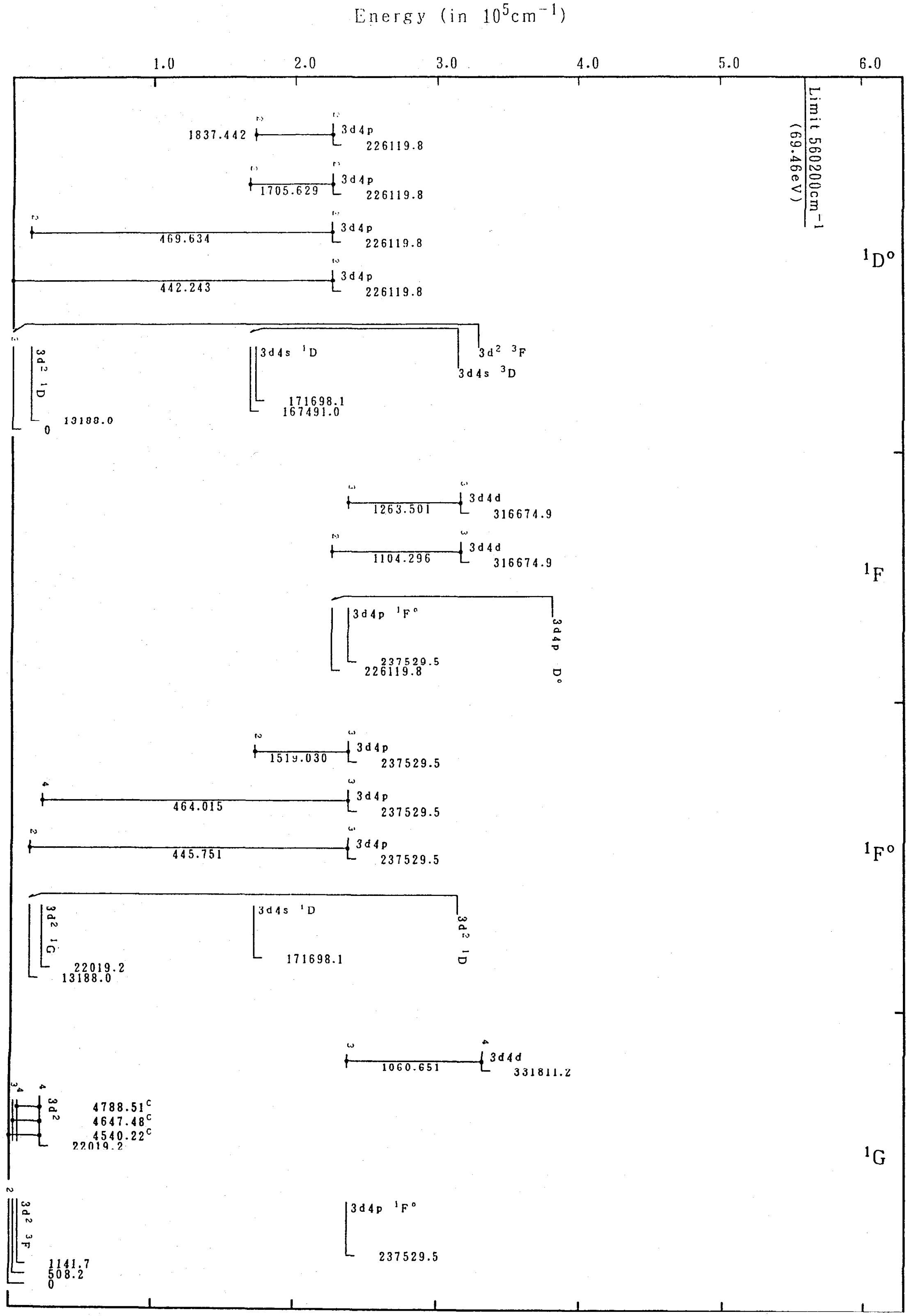
6. Grotrian Diagrams for Cr v through Cr xxiv



Cr V(Ca−sequence)



Cr V(Ca–sequence)



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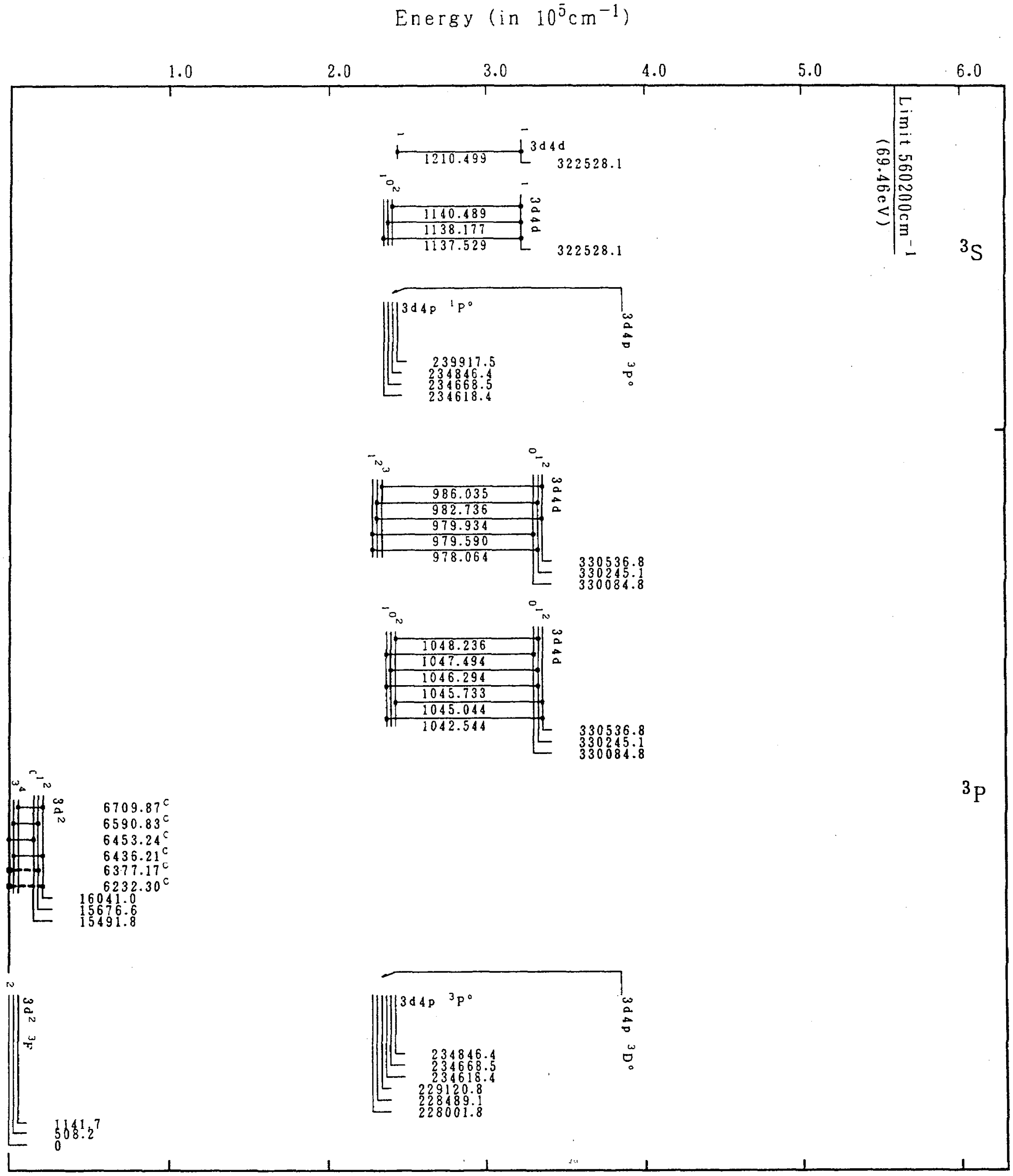

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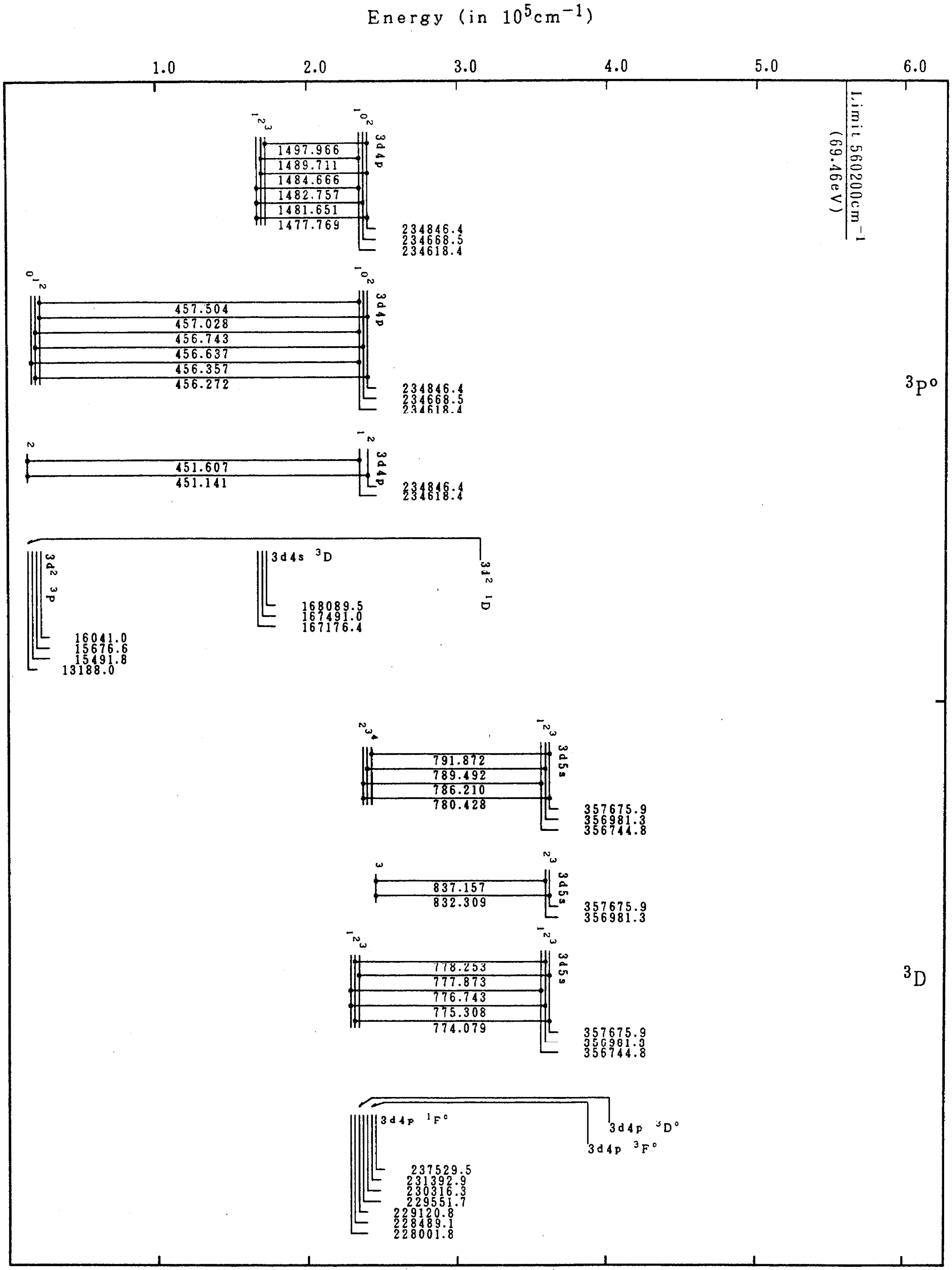

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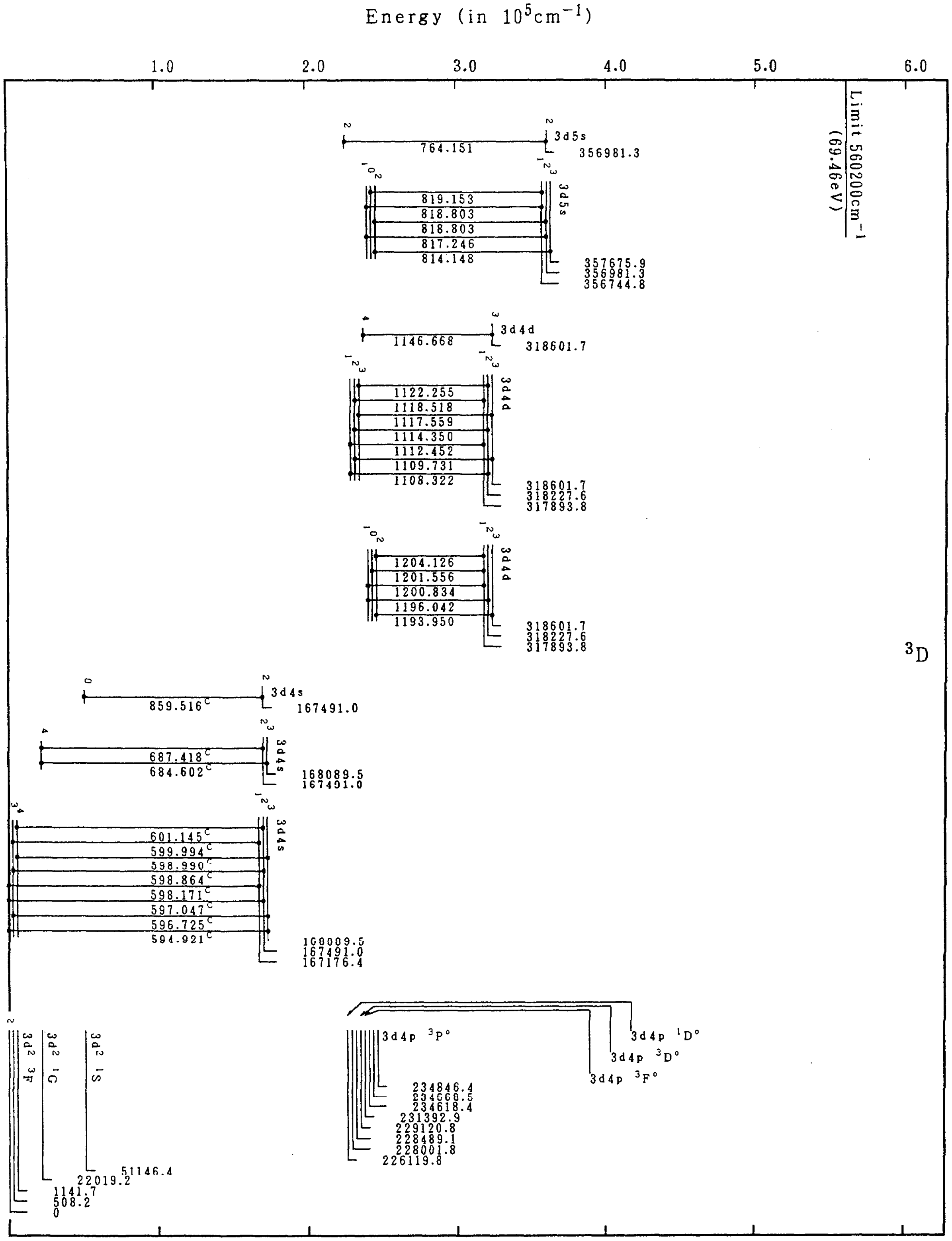

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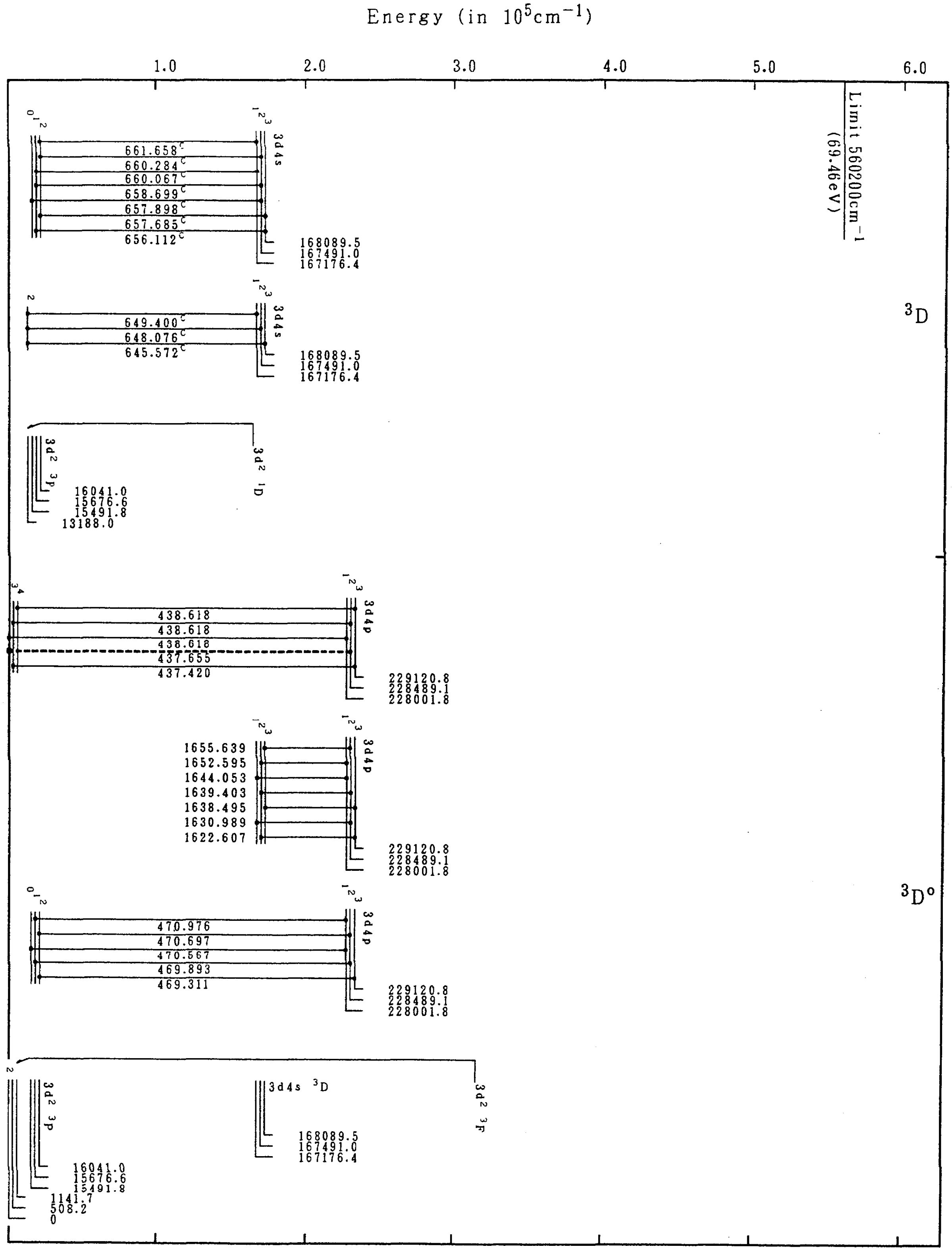

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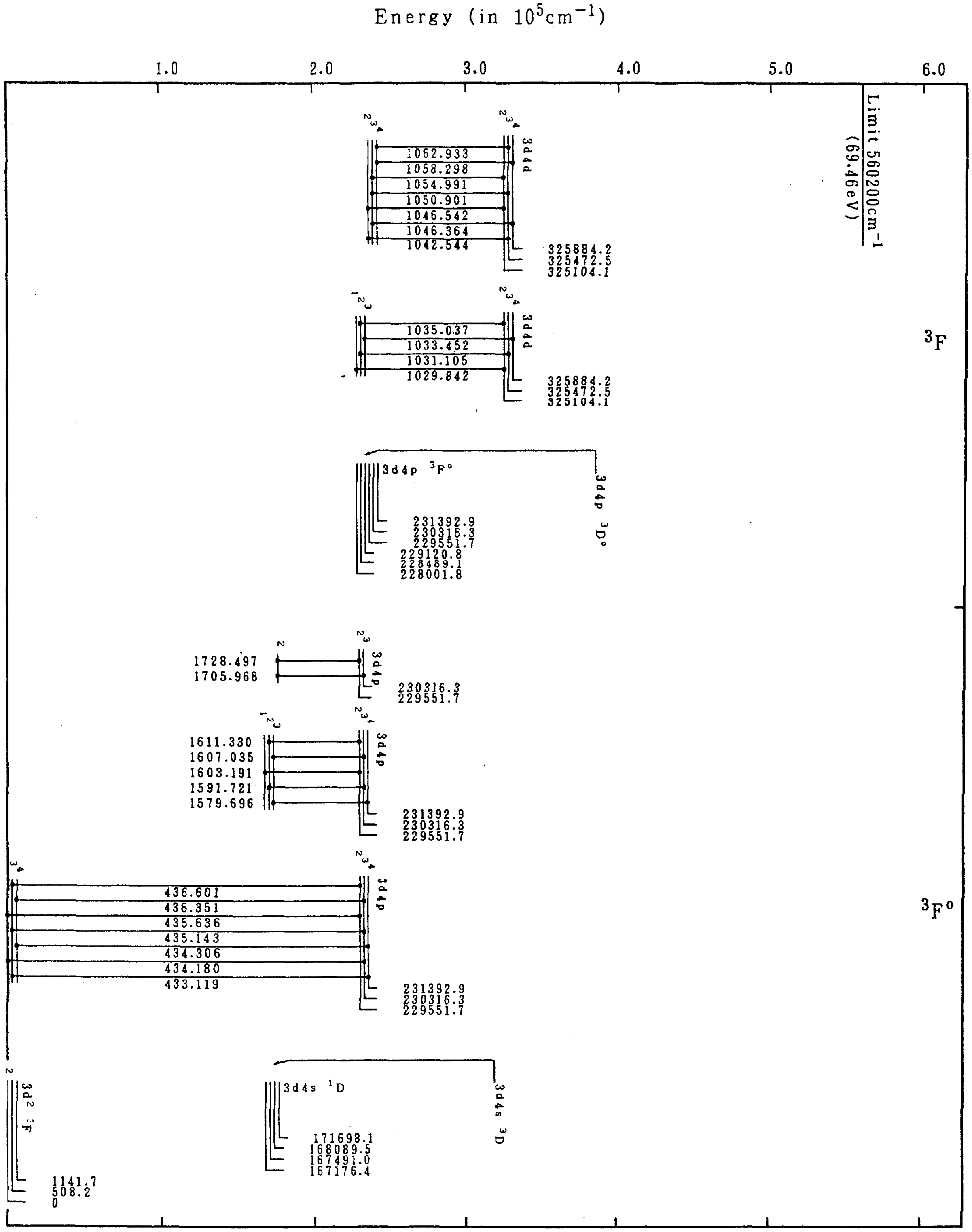

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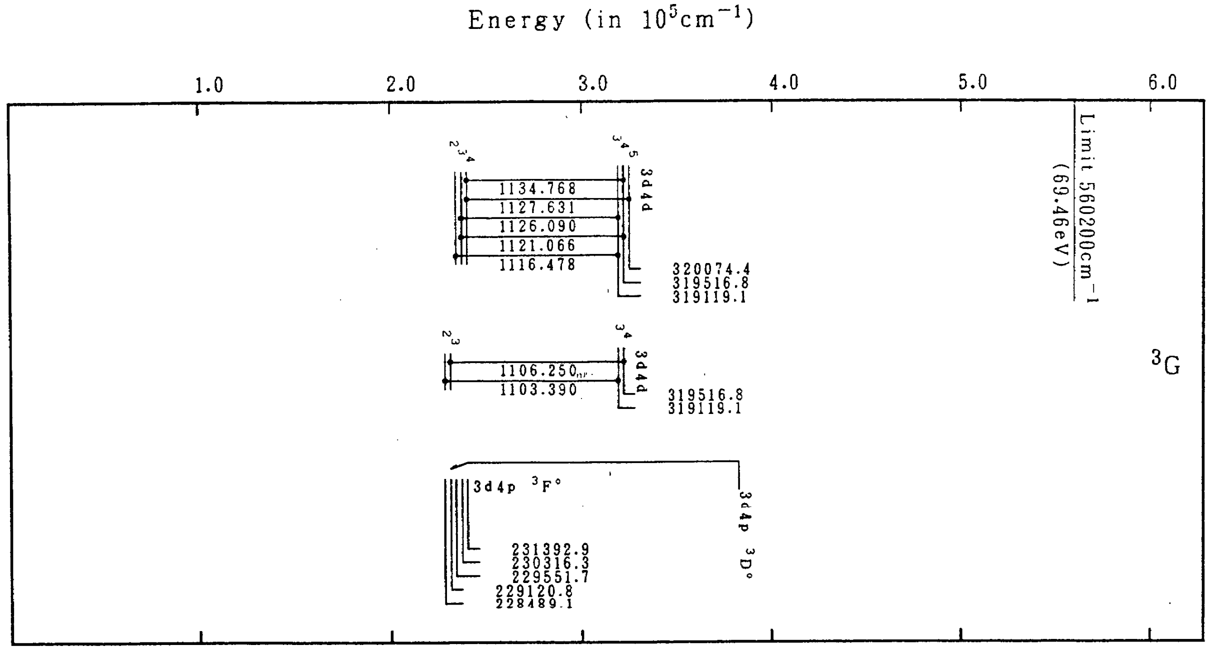

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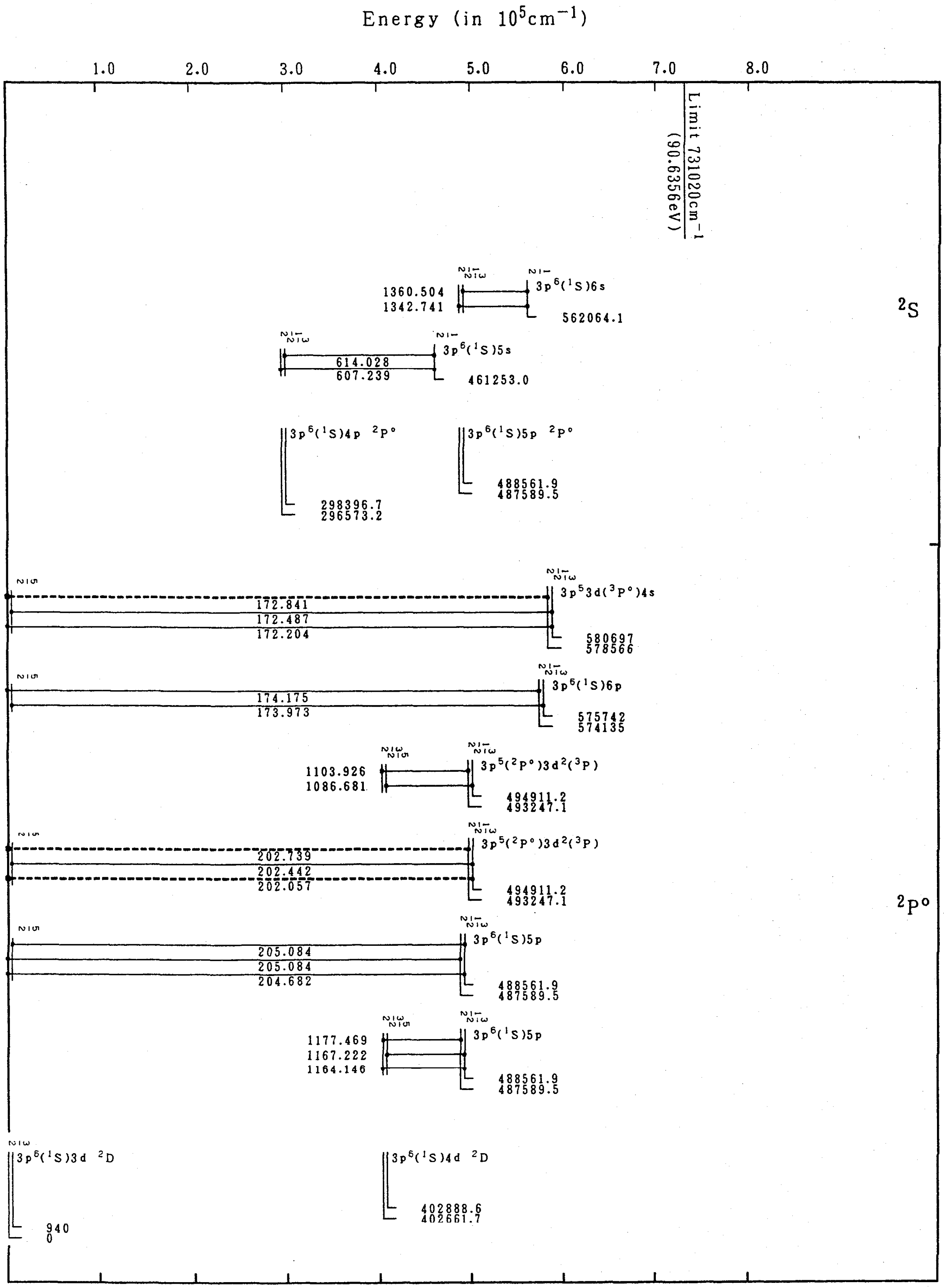
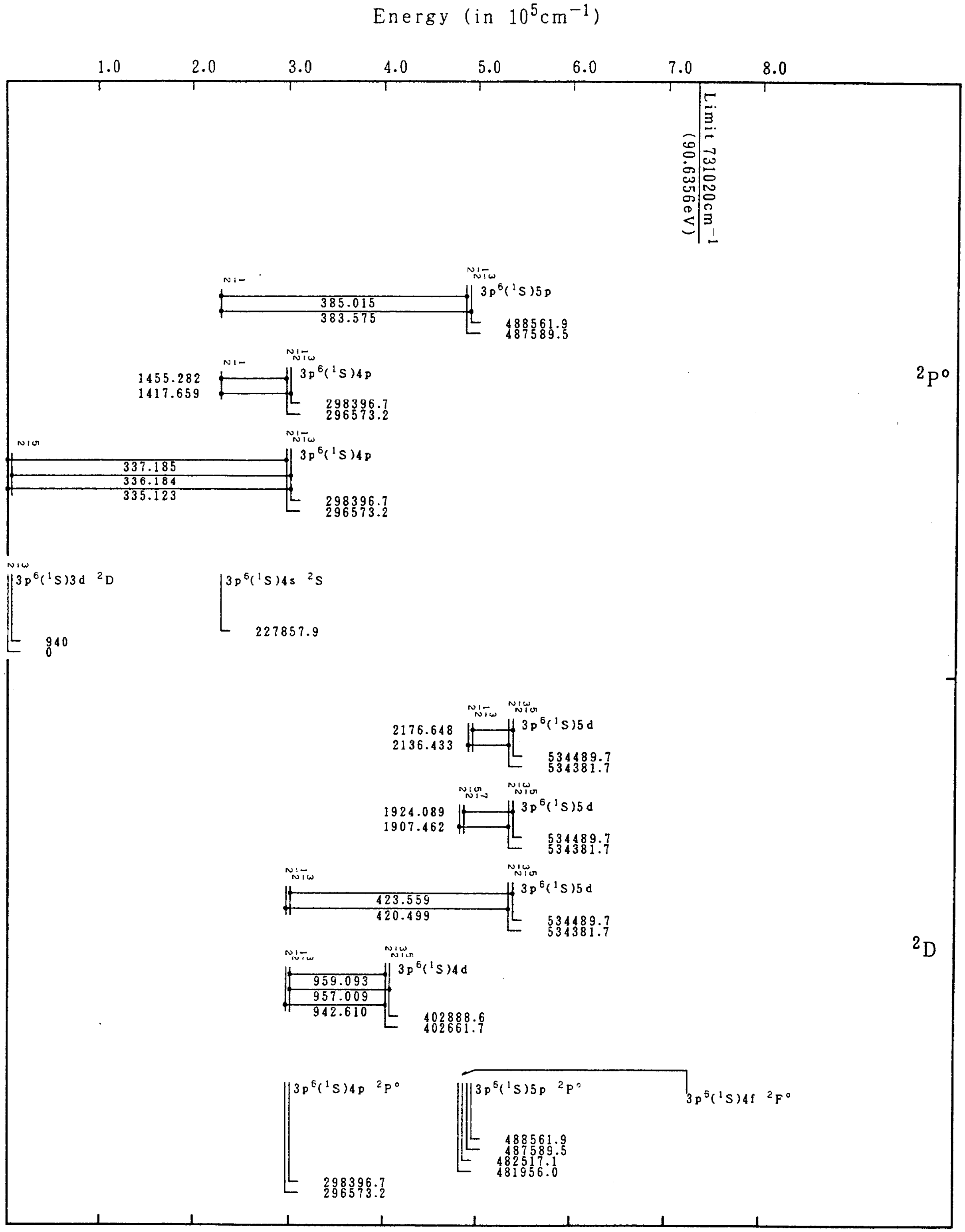


Cr VI(K–Sequence)



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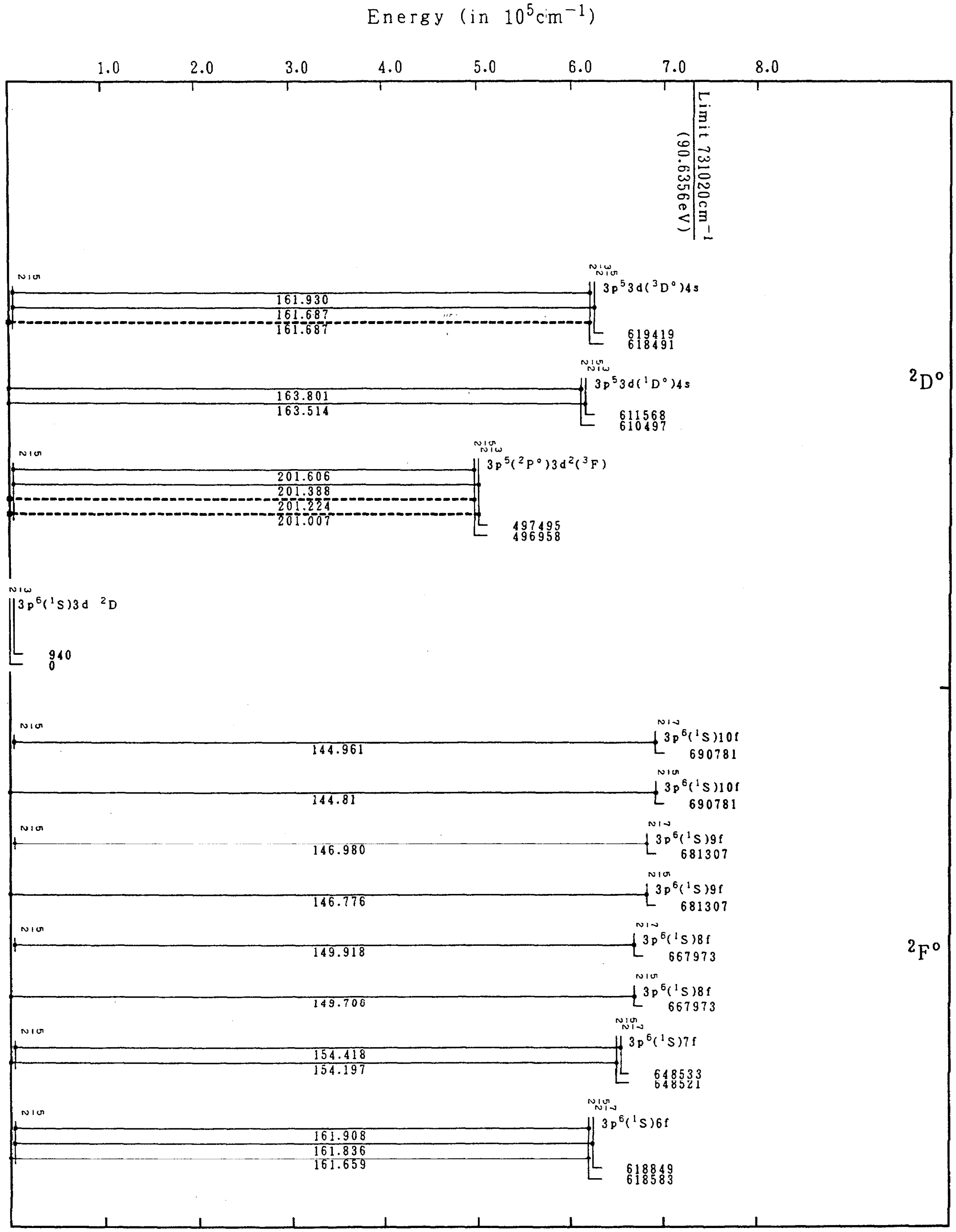

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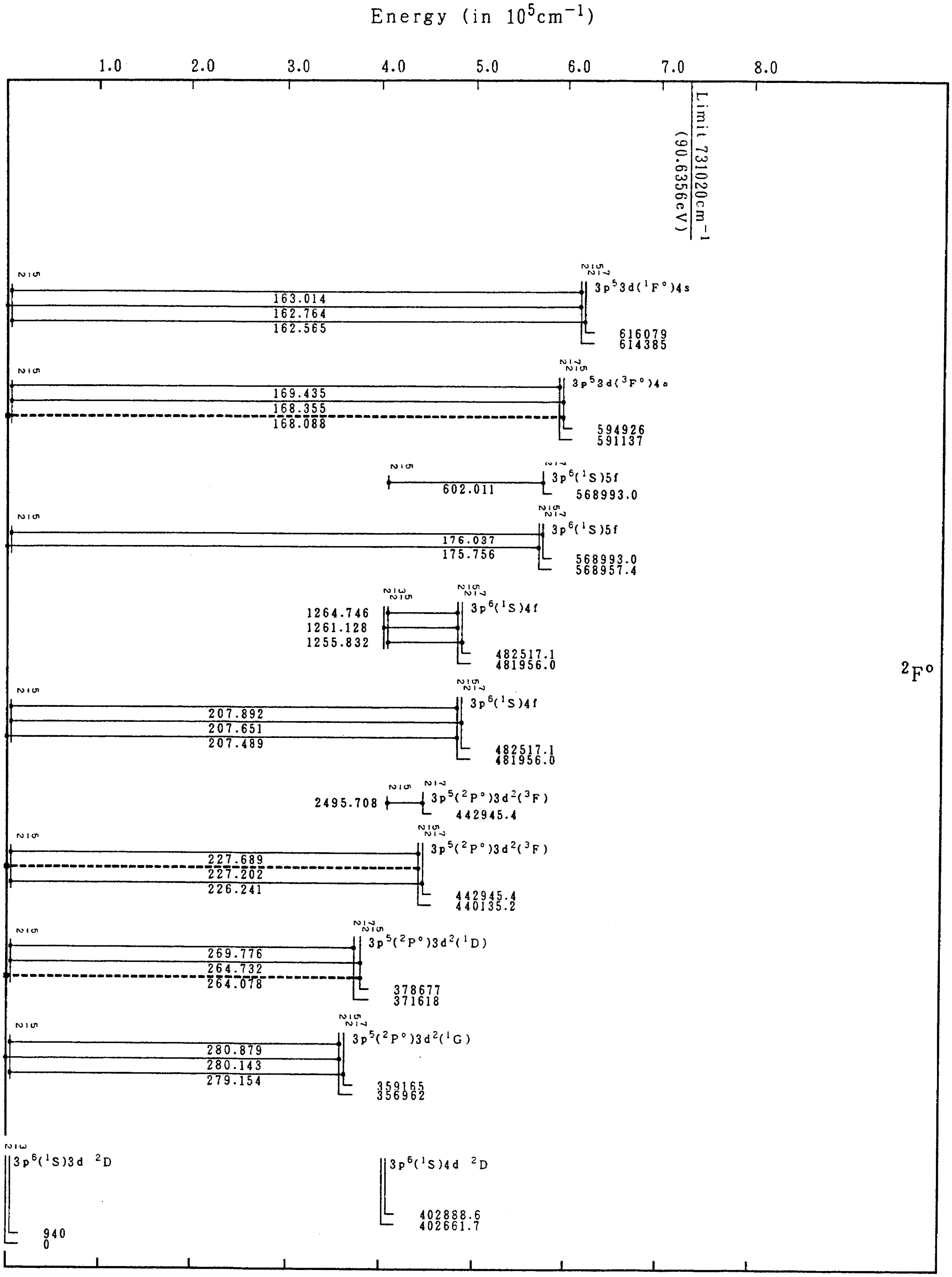

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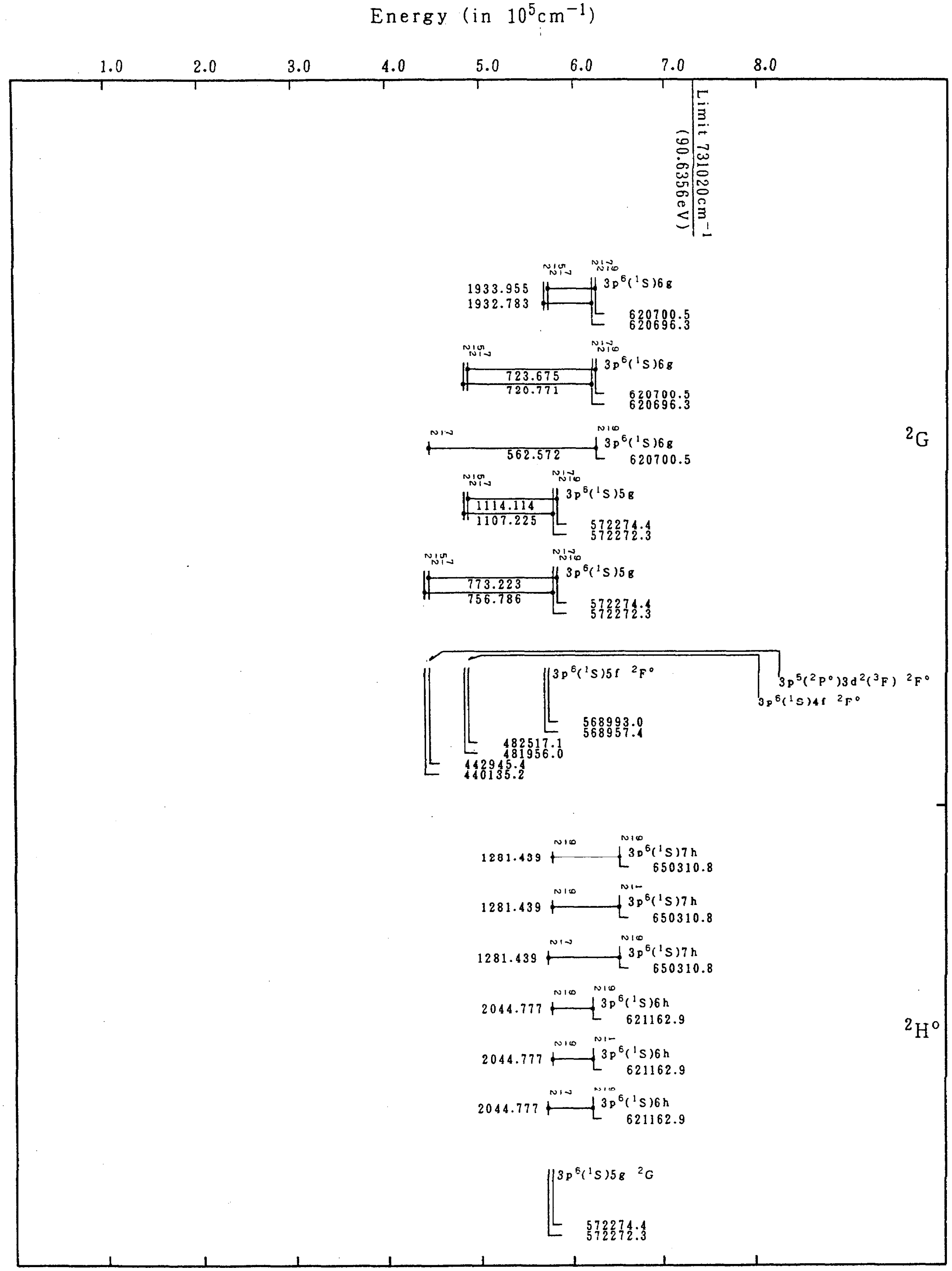

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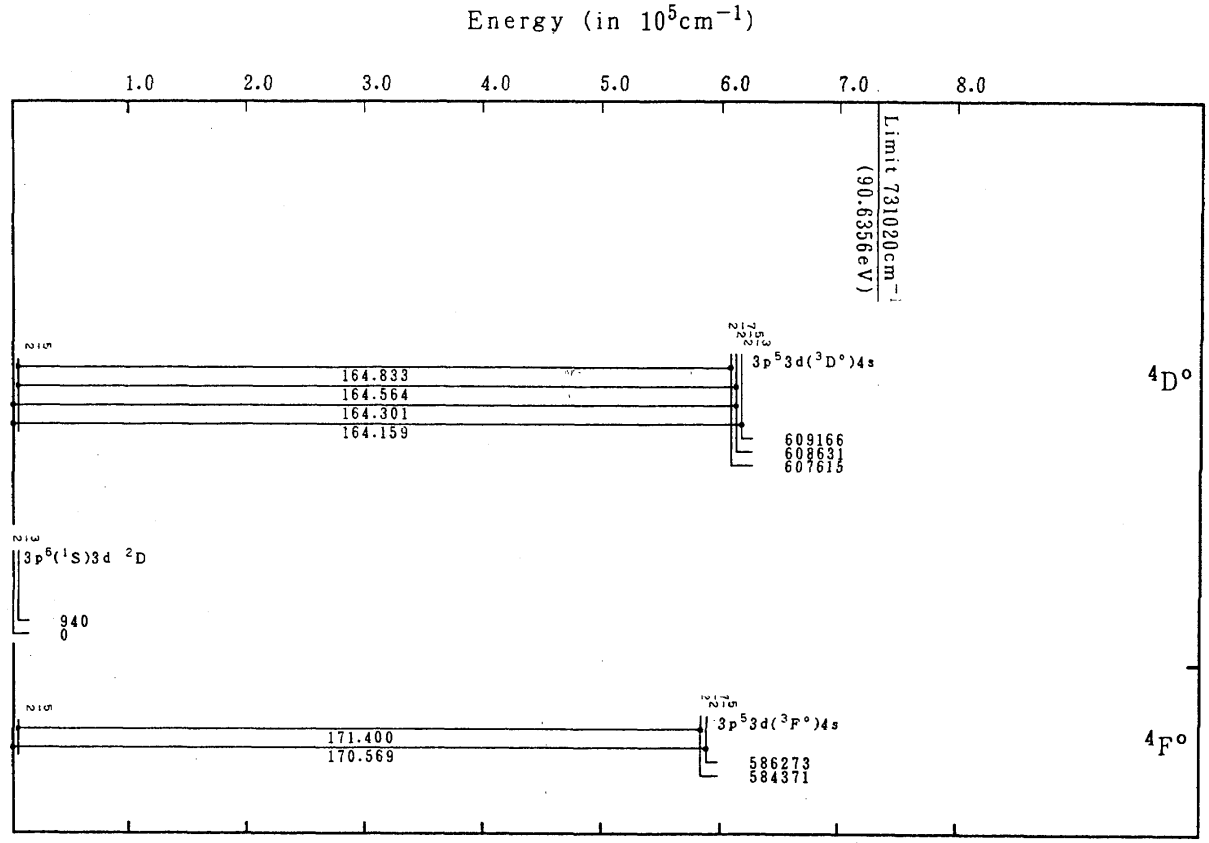

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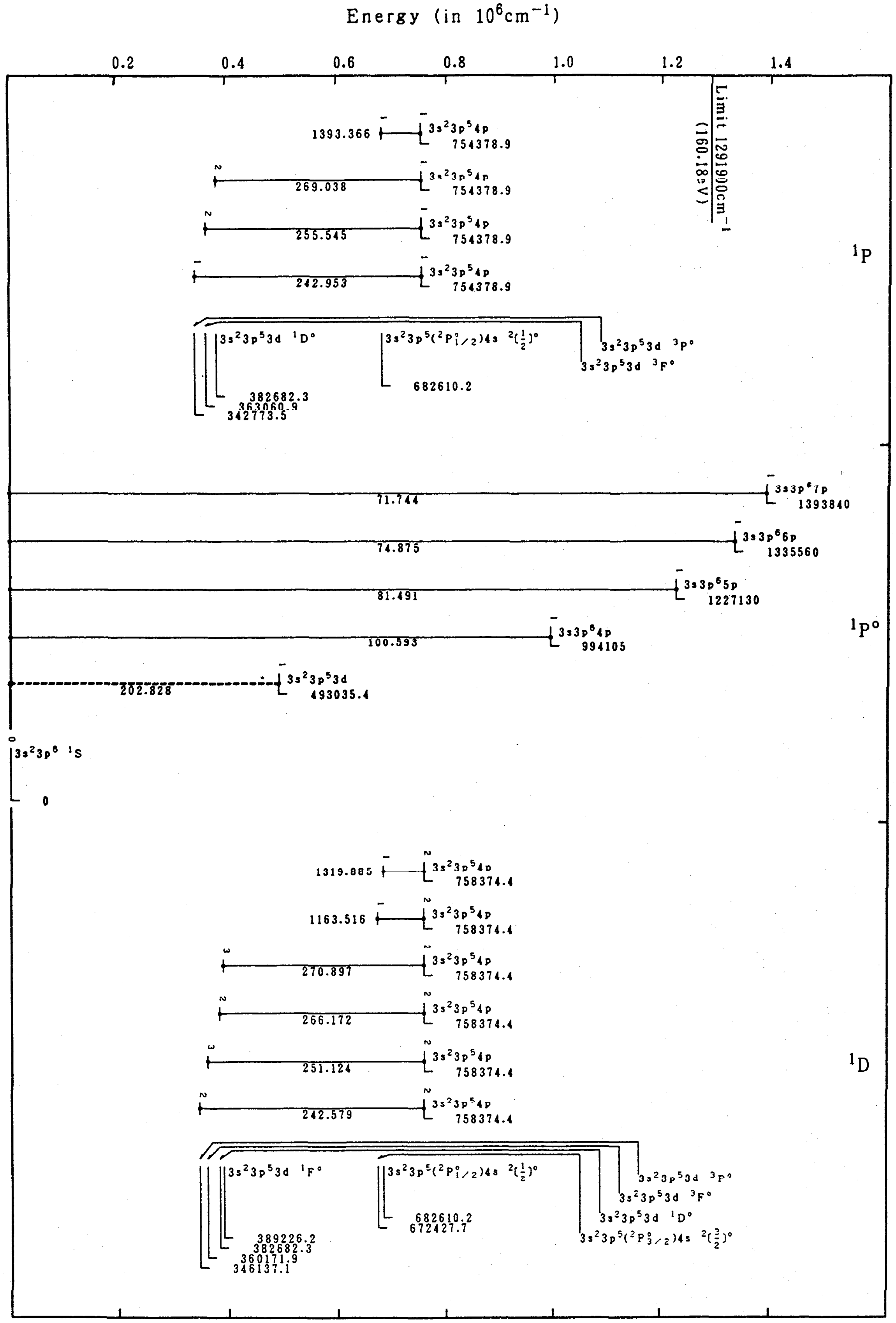
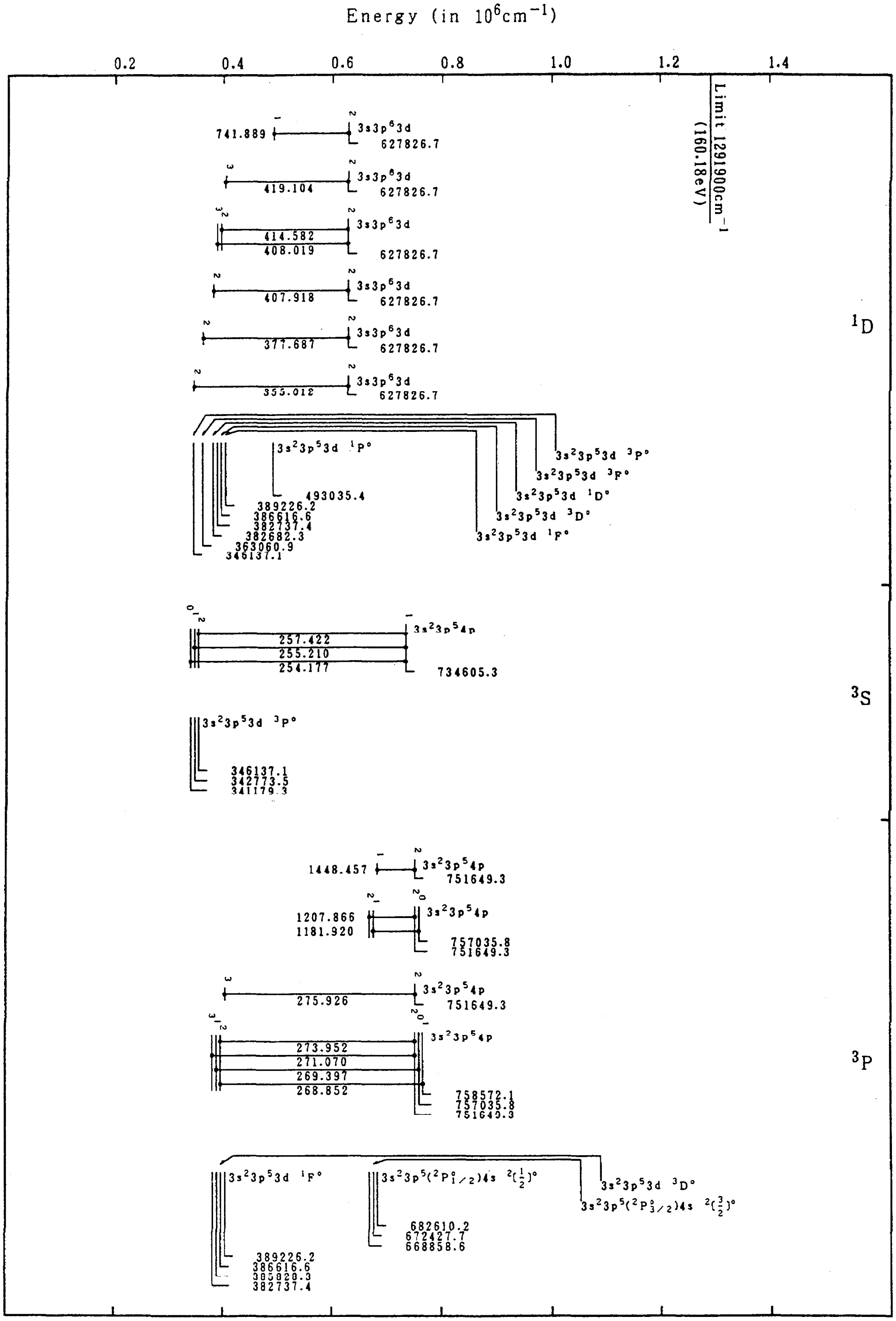


Cr VII(Ar-Sequence)



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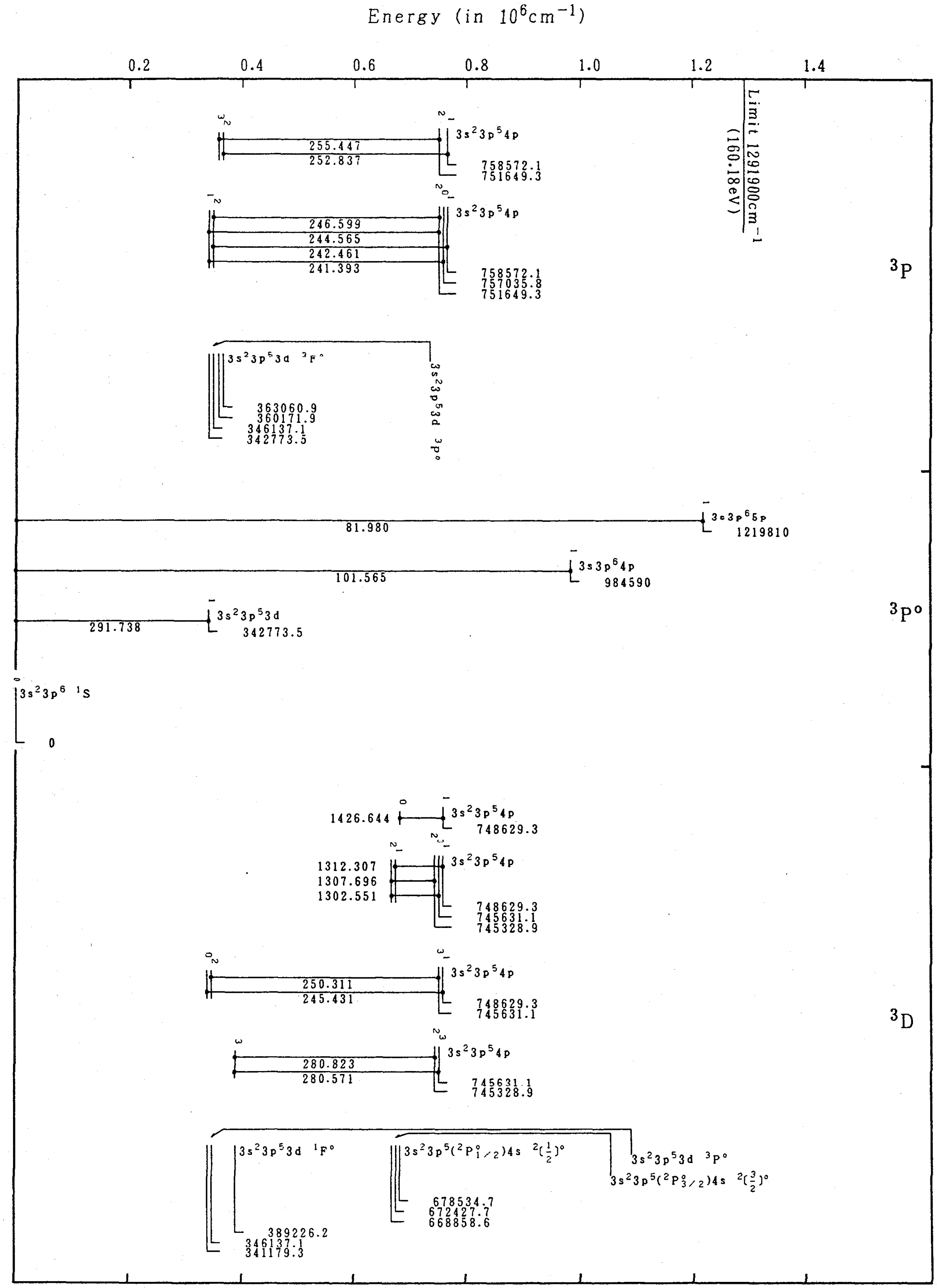

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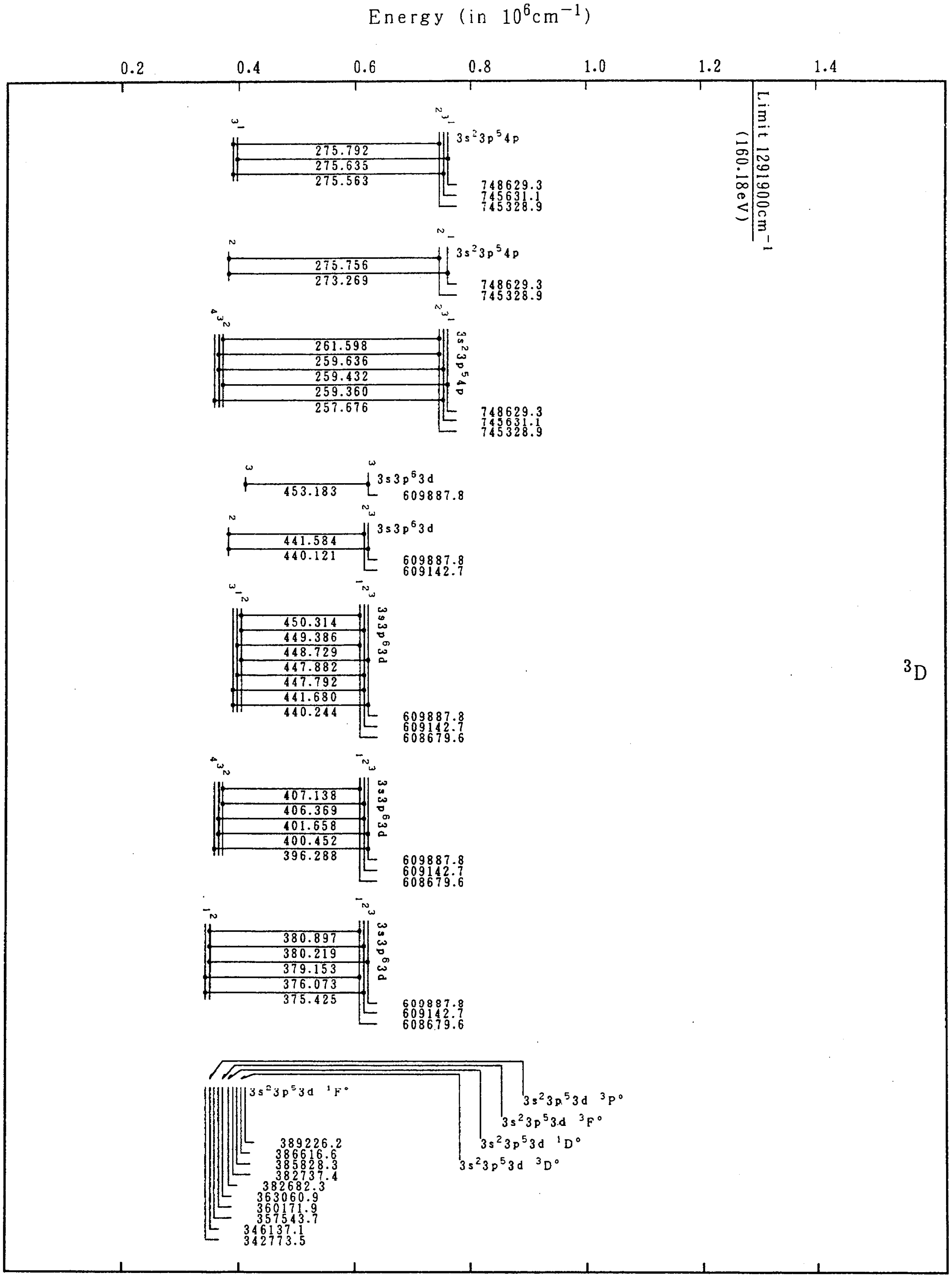

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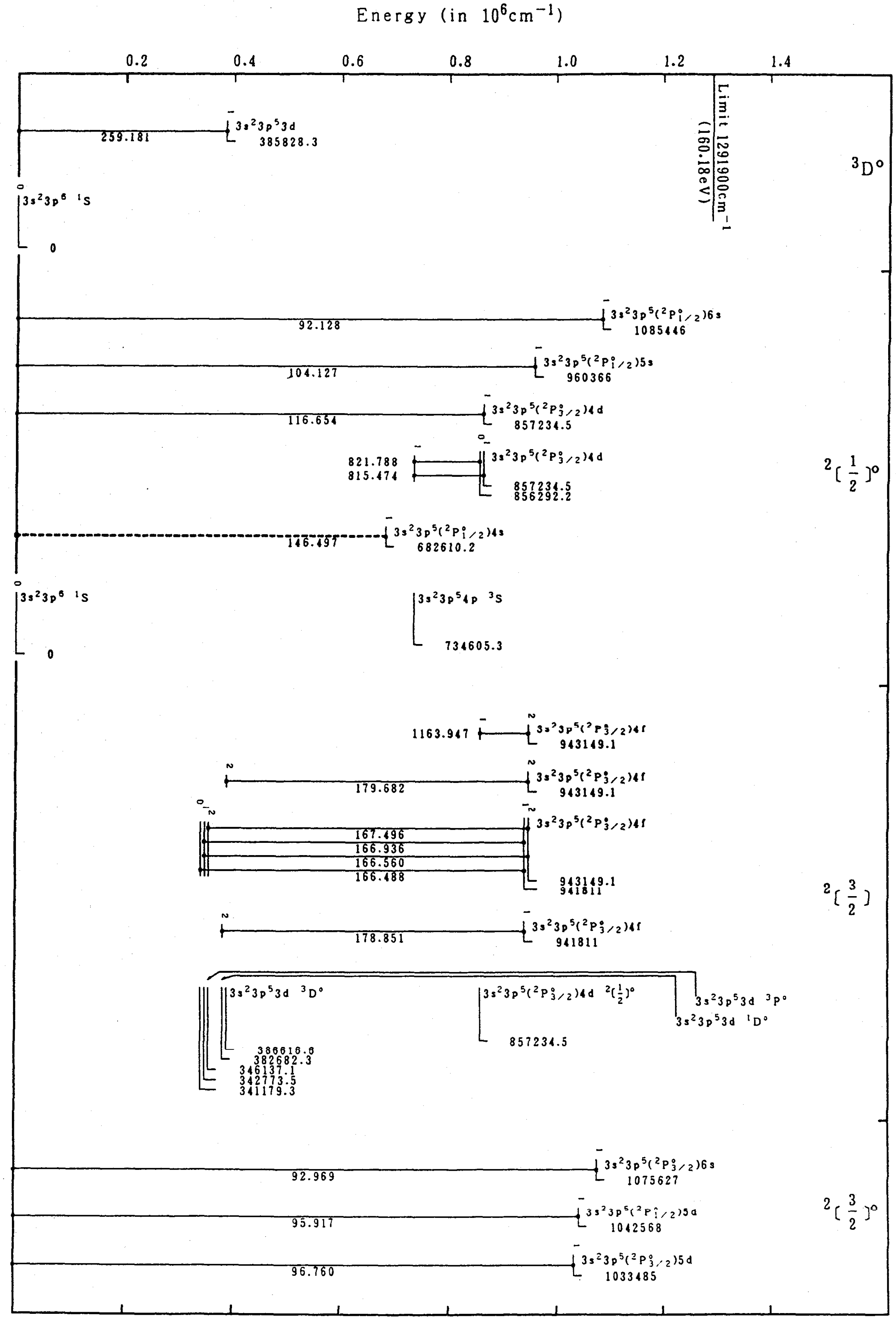

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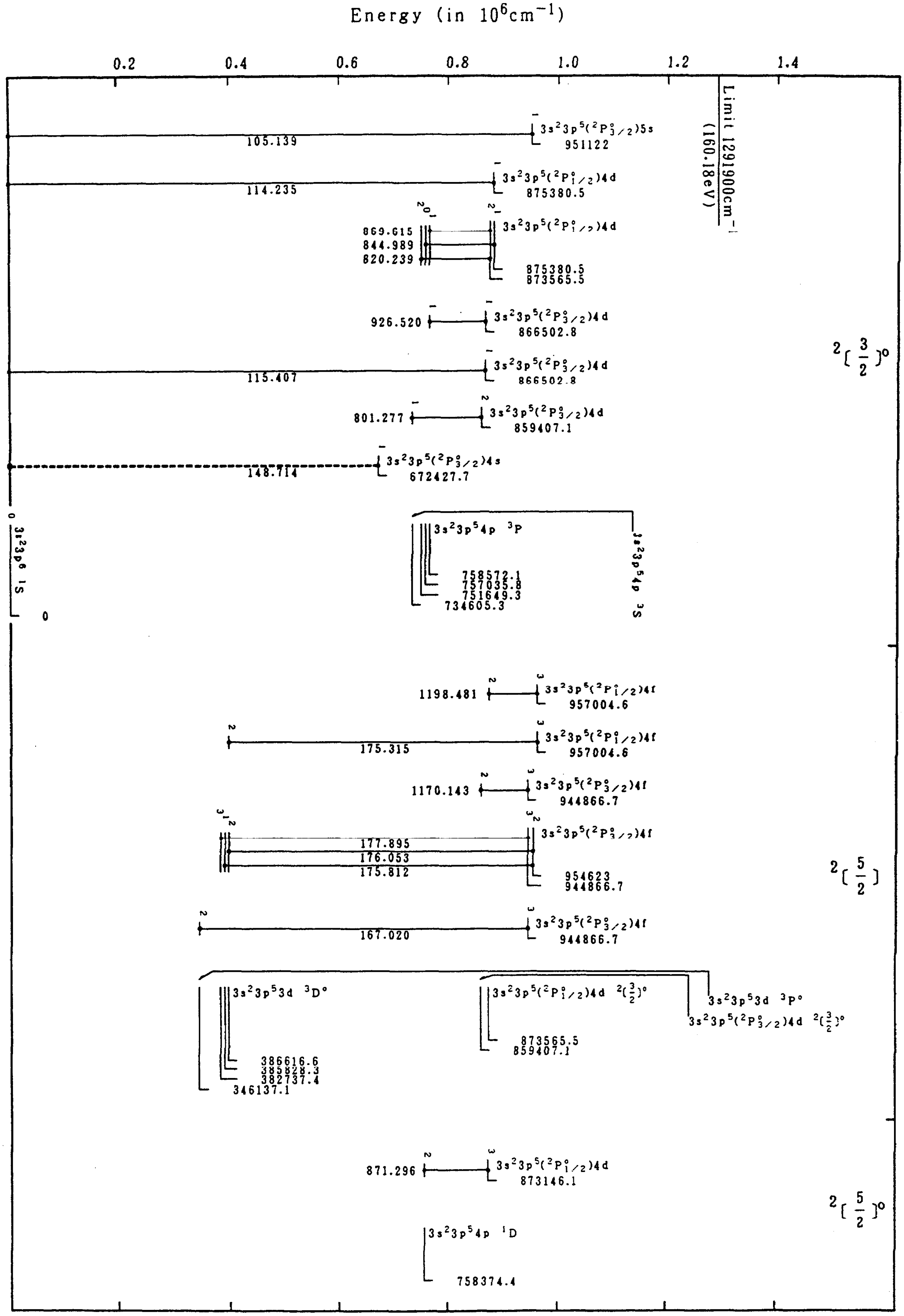

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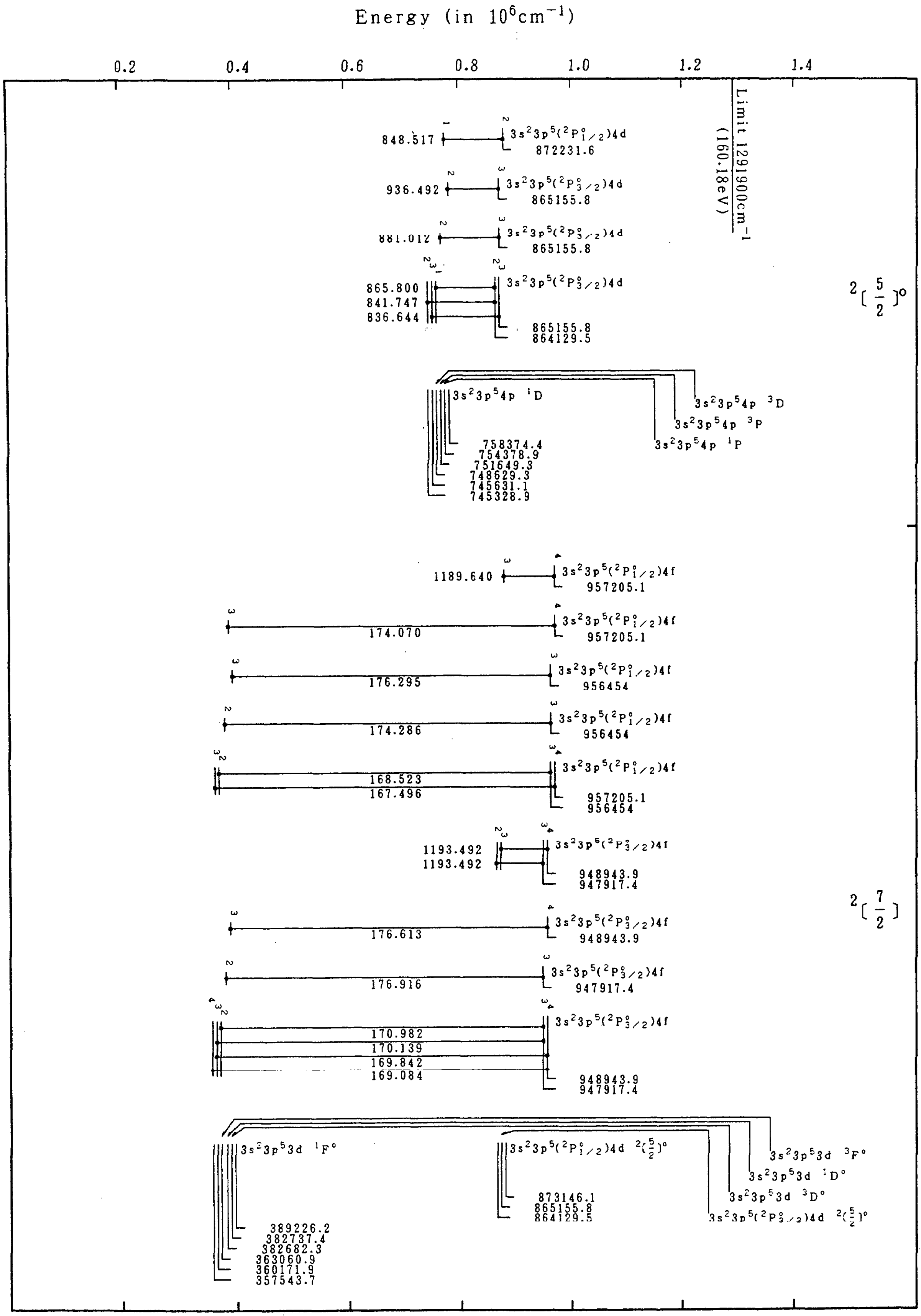

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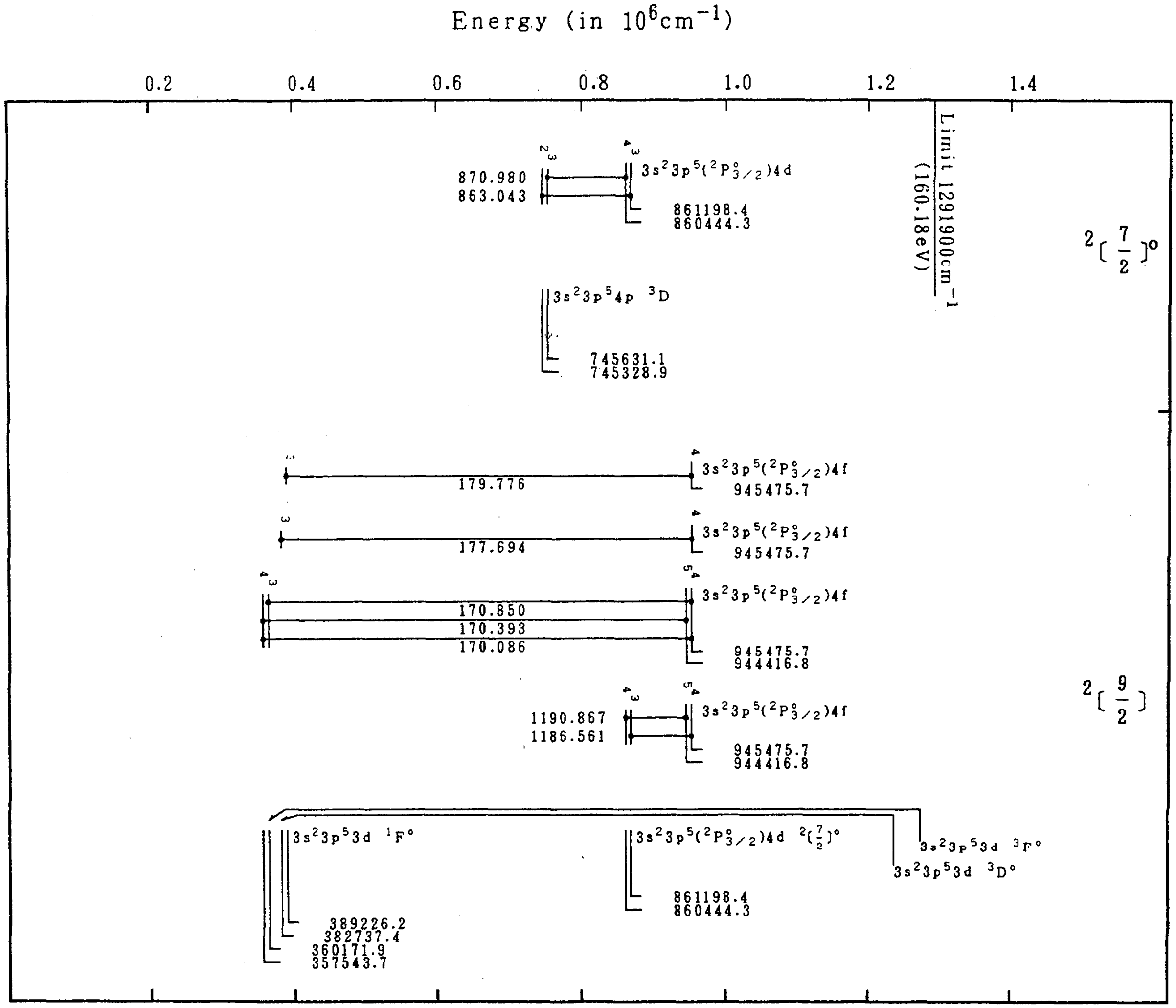

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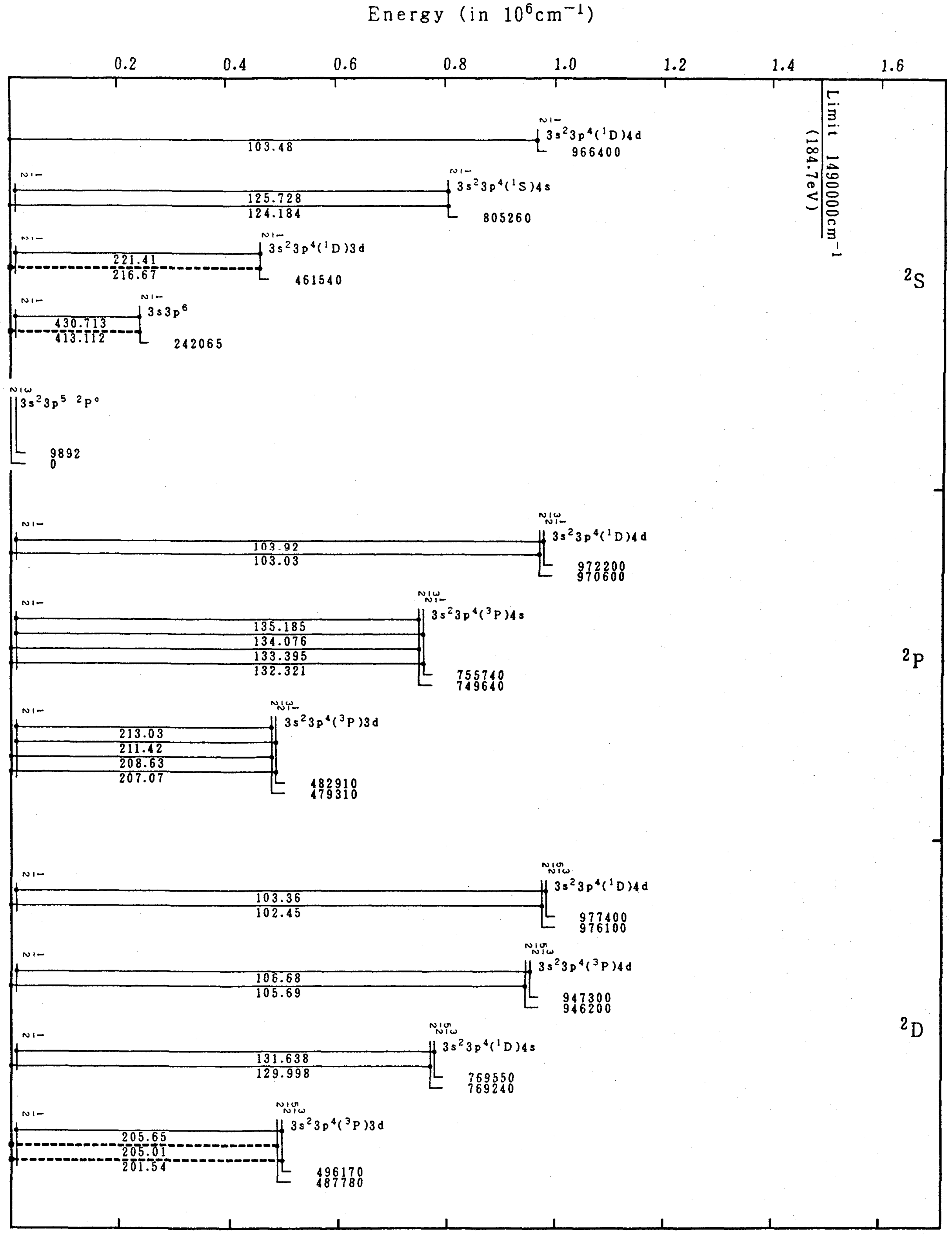
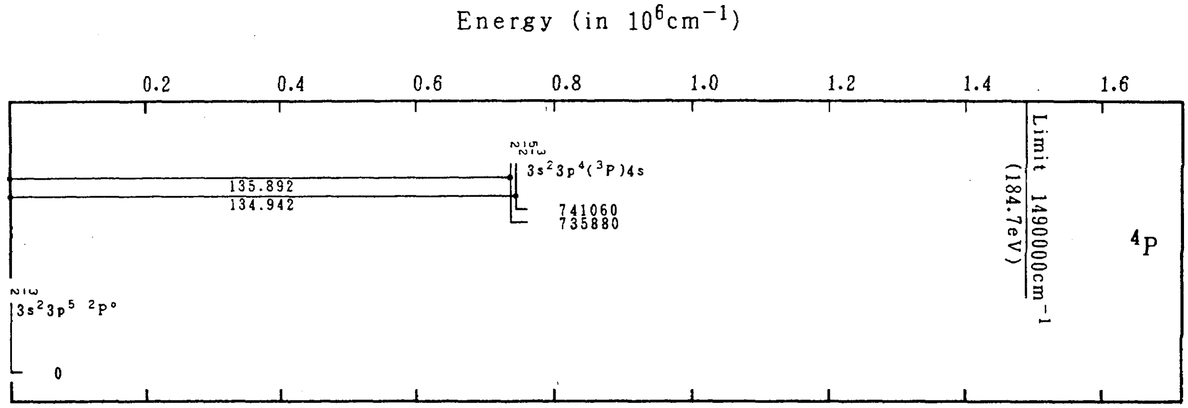
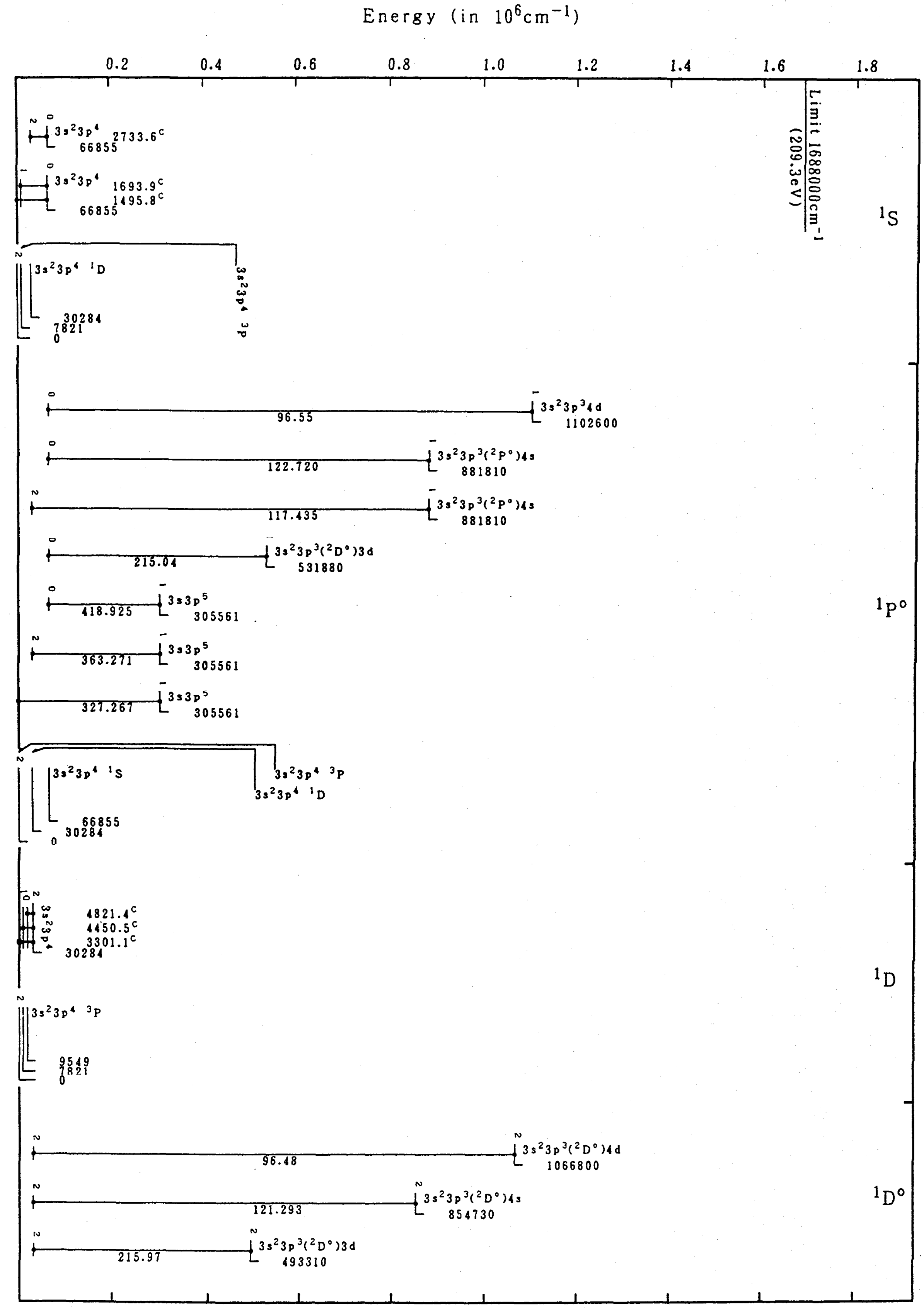


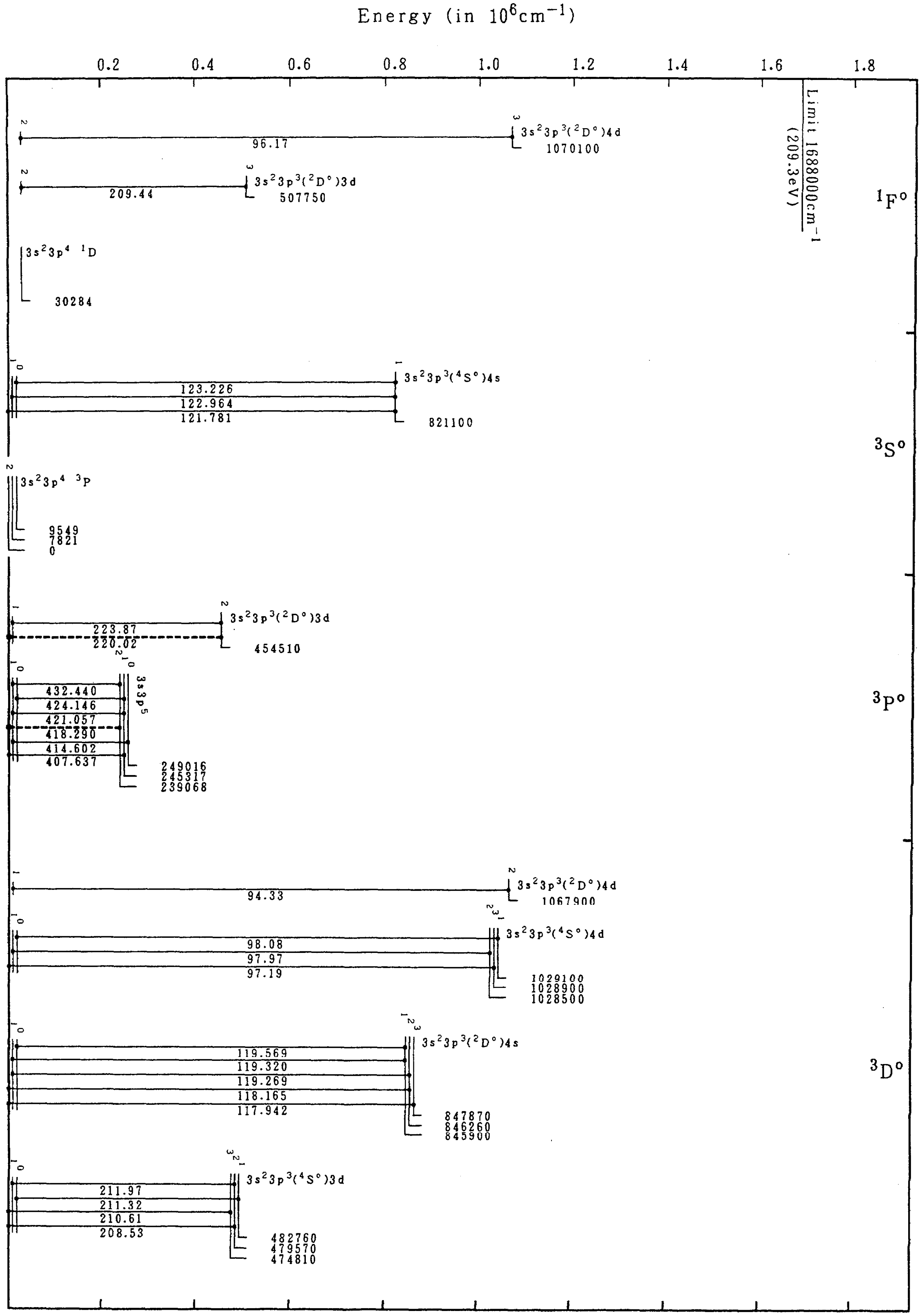
Cr VIII(Cl–Sequence)



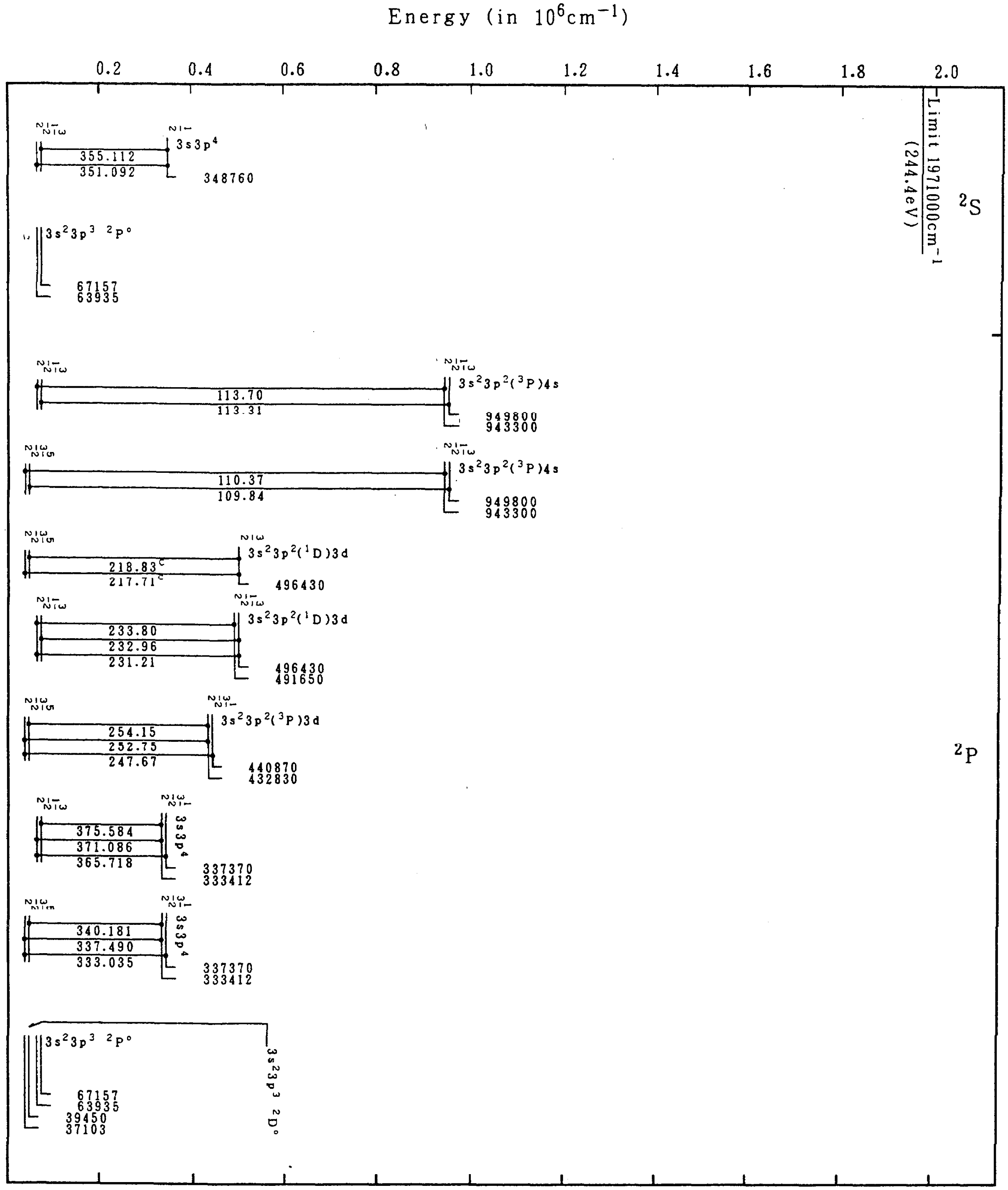
Cr VIII(Cl–Sequence)



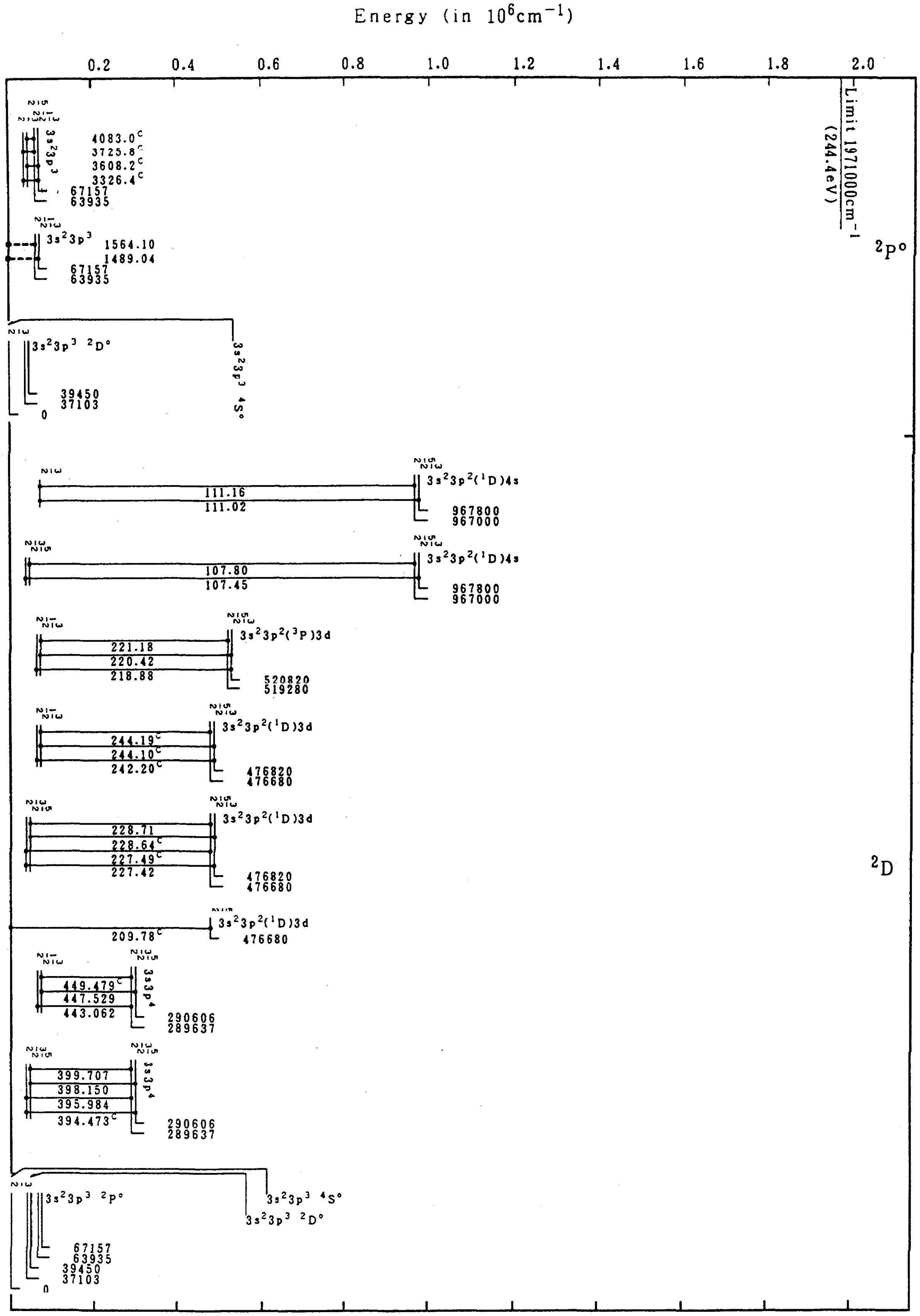
Cr IX(S–Sequence)



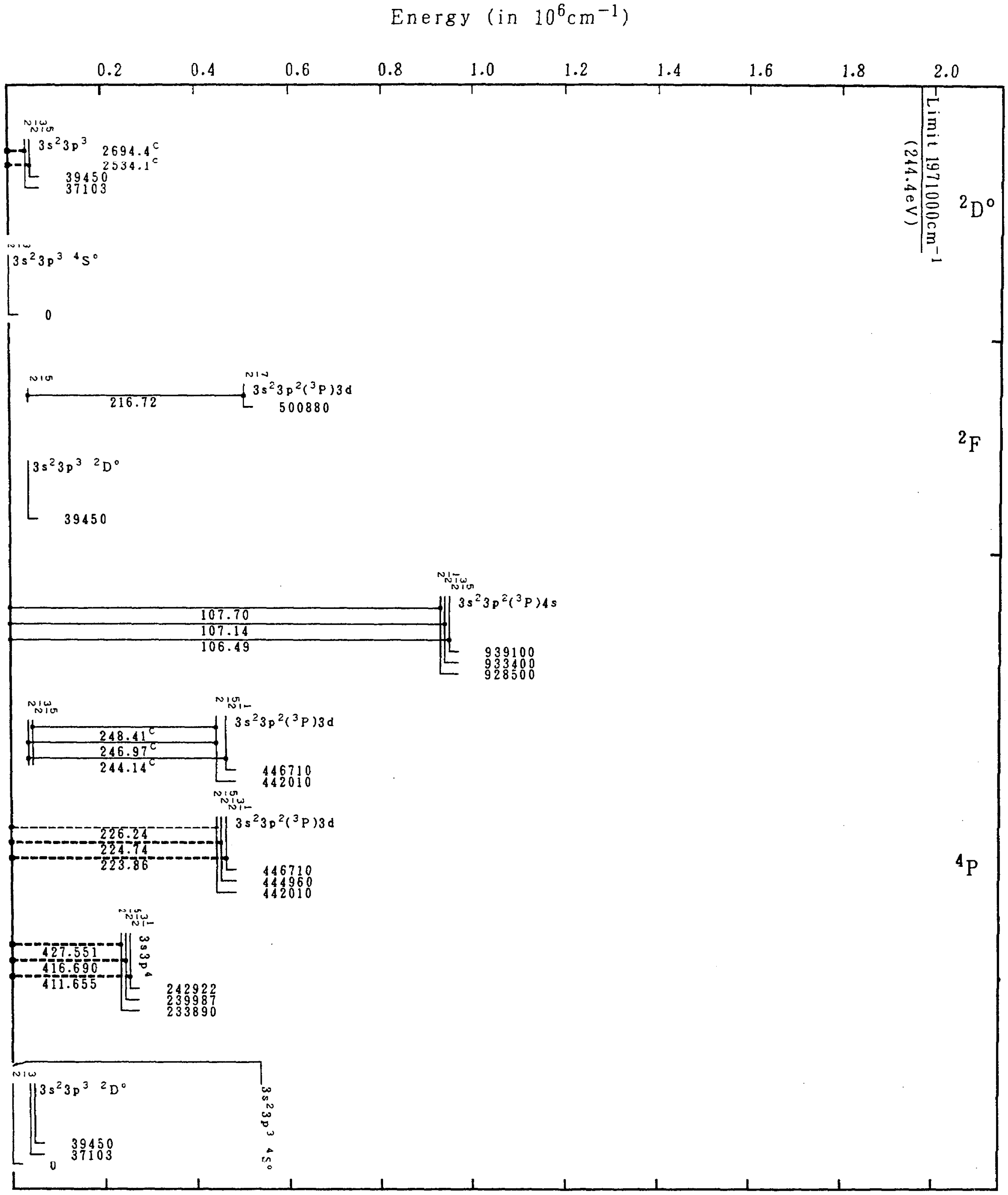
Cr IX(S–Sequence)



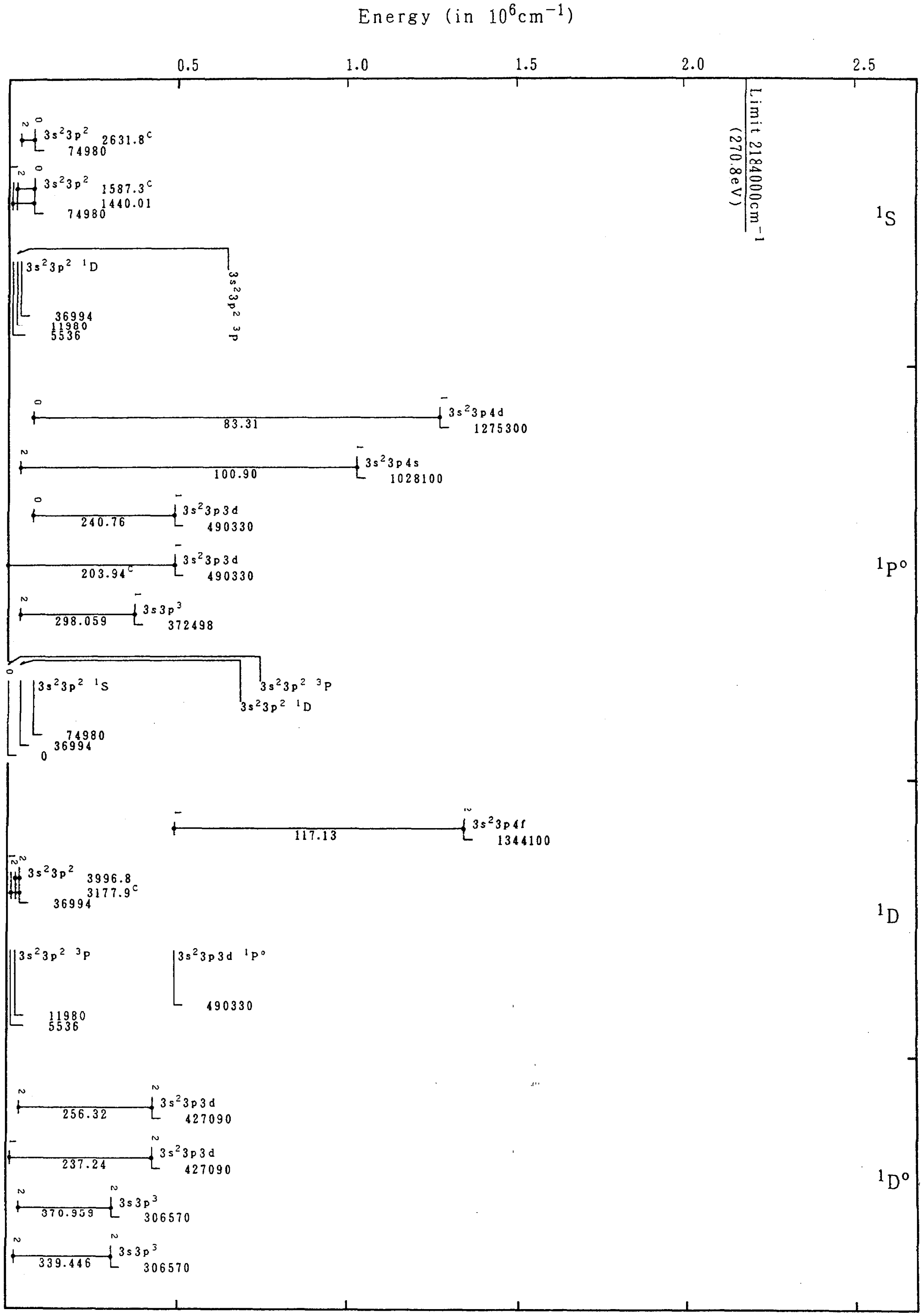
Cr X(P−Sequence)



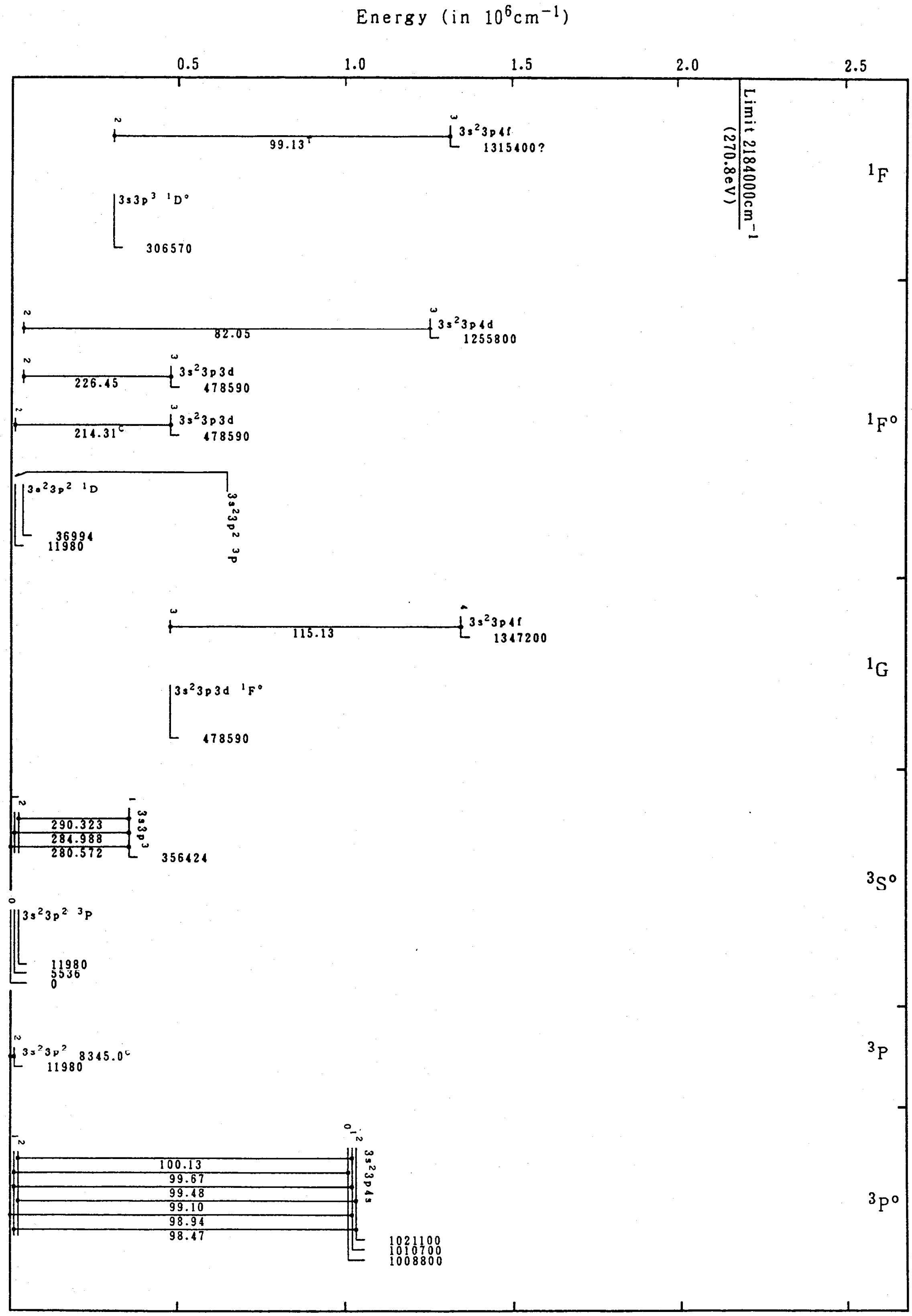
Cr X(P–Sequence)



Cr X(P−Sequence)



Cr XI(Si–Sequence)



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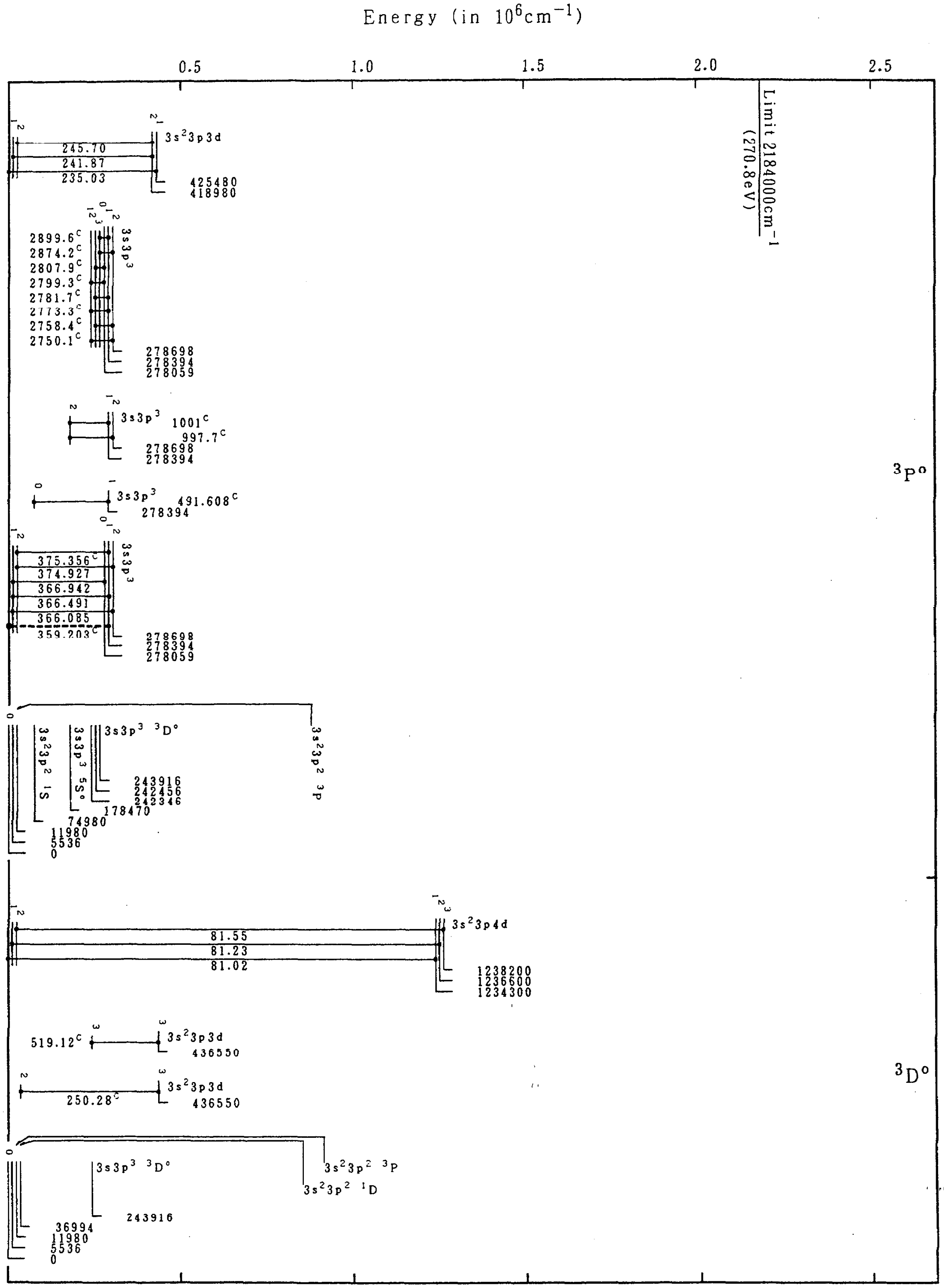

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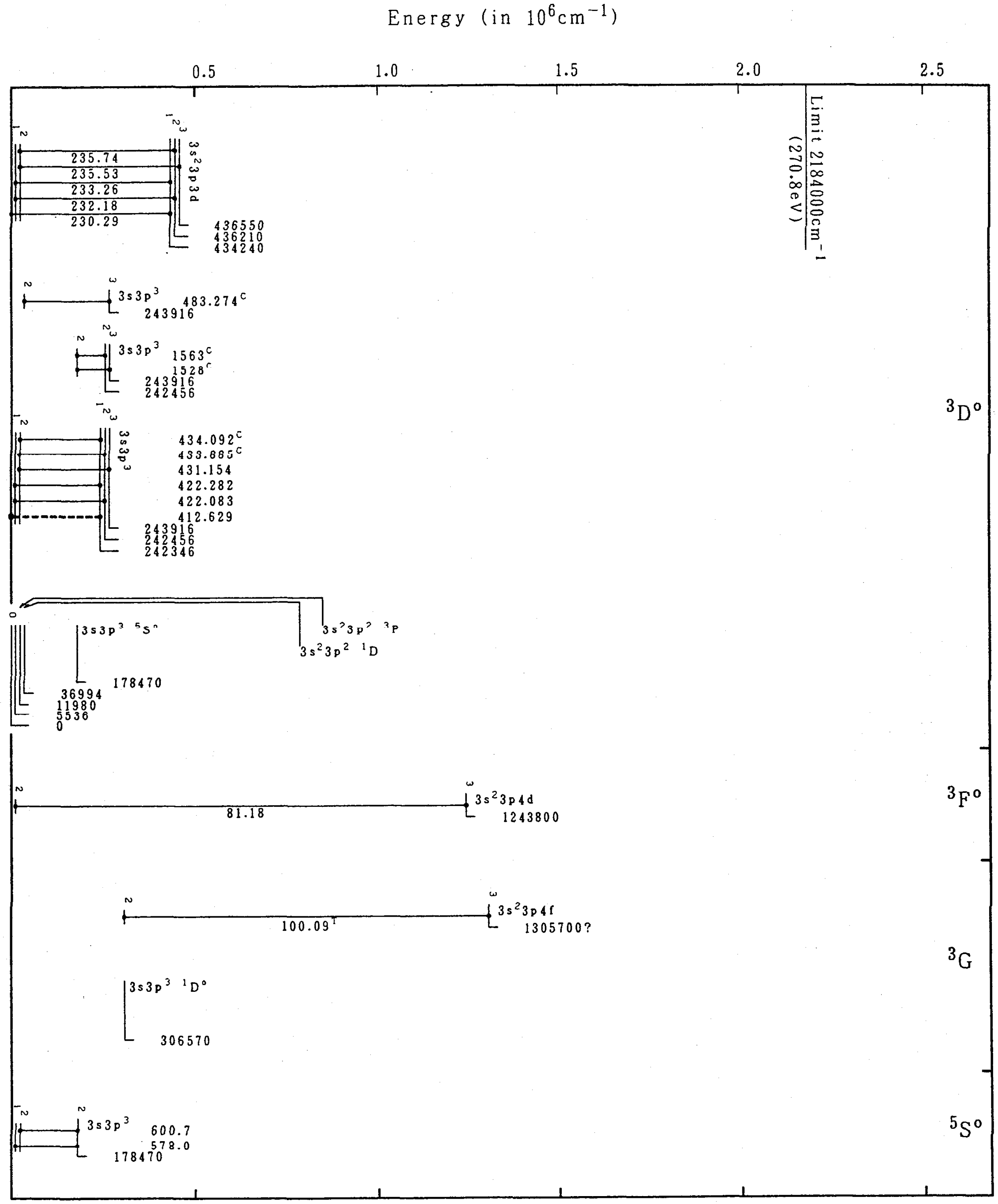

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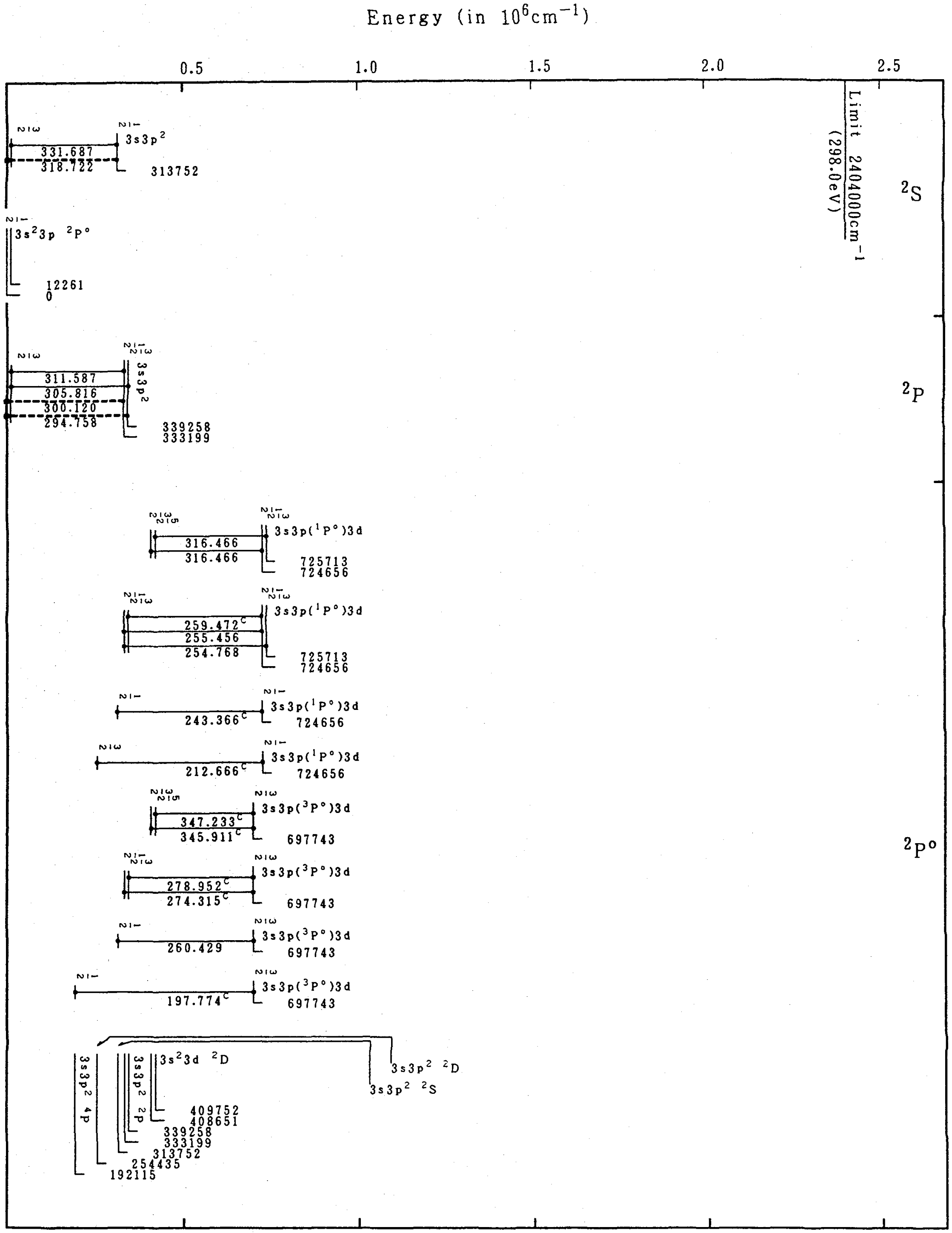
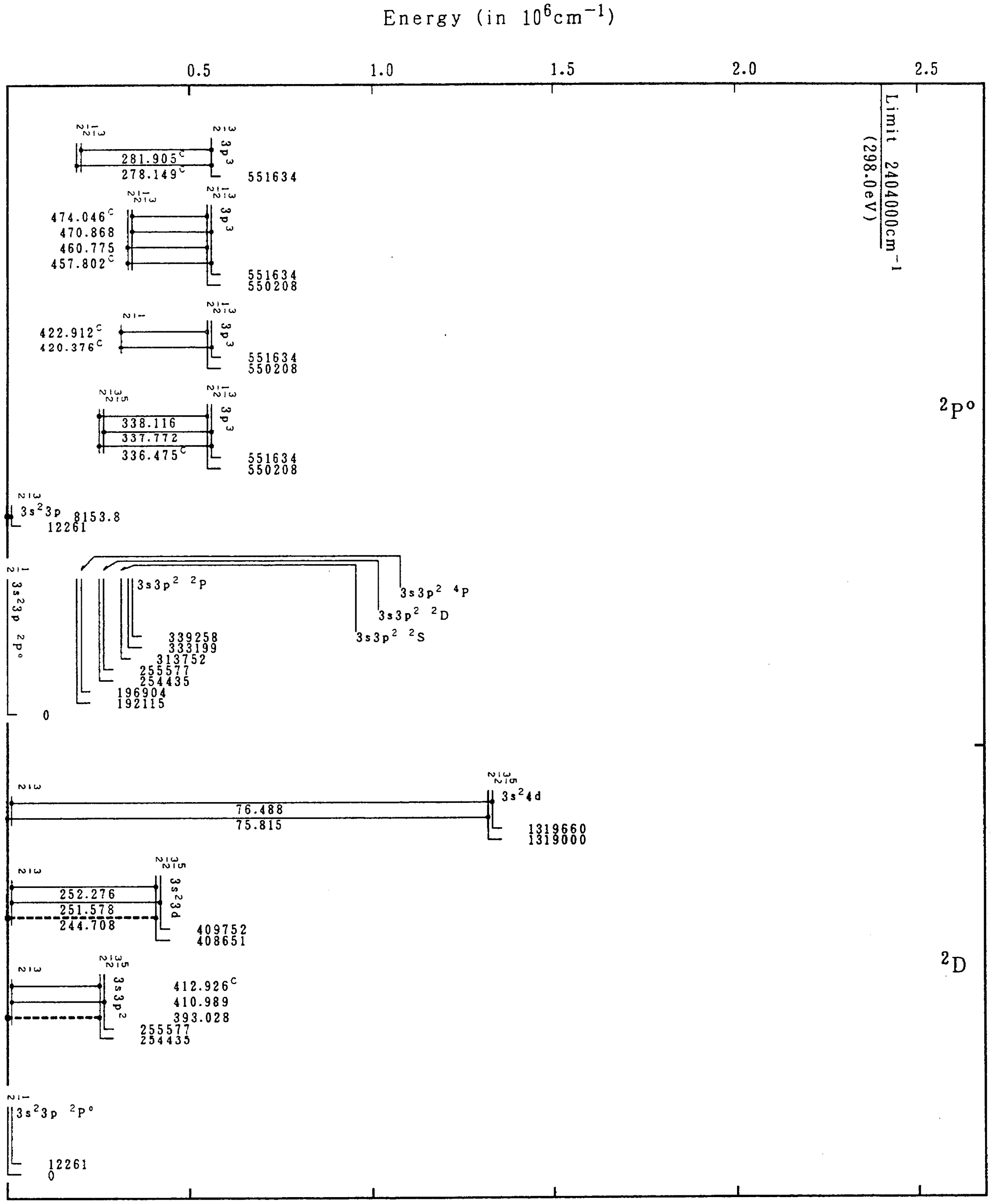


Cr XII(Al–Sequence)



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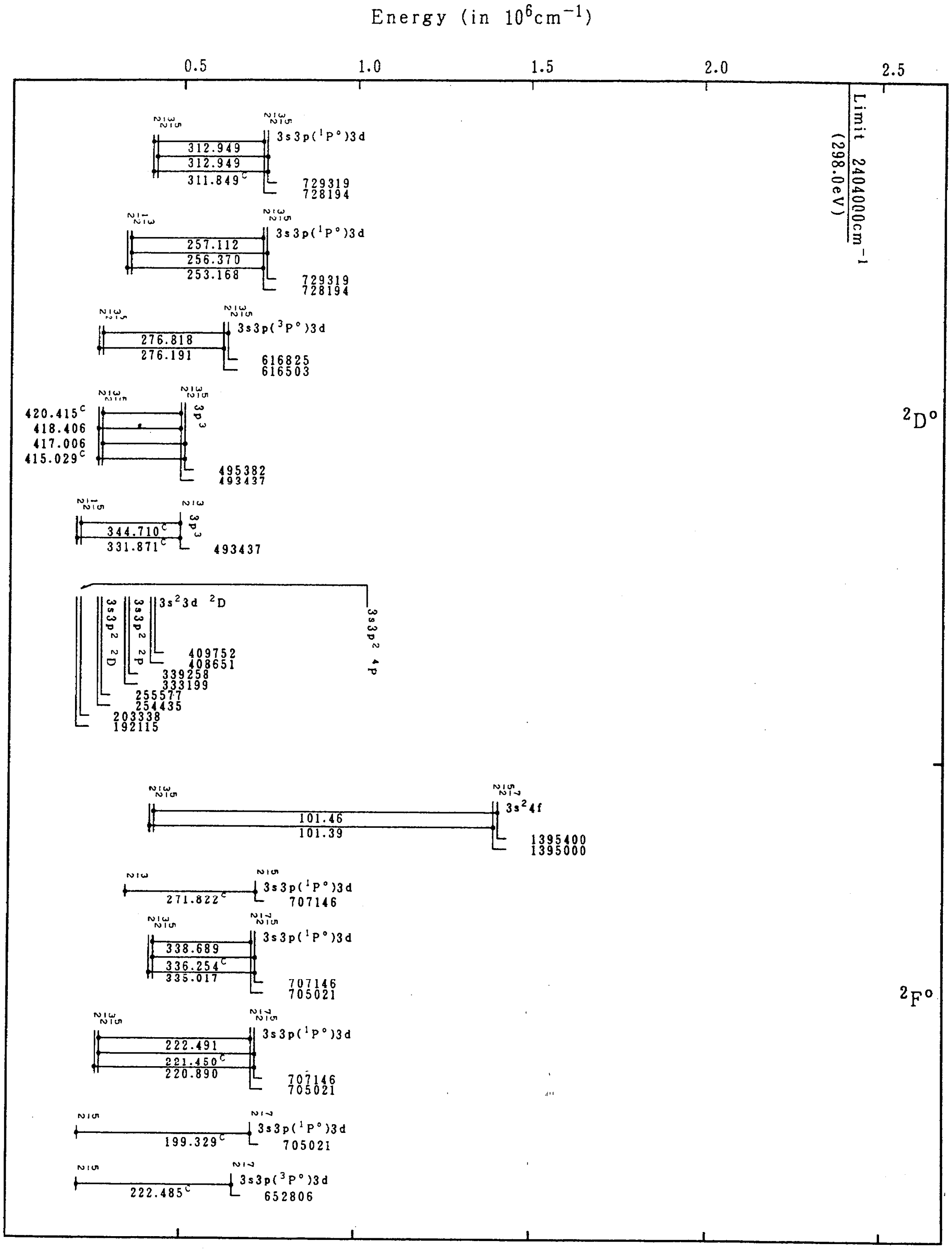

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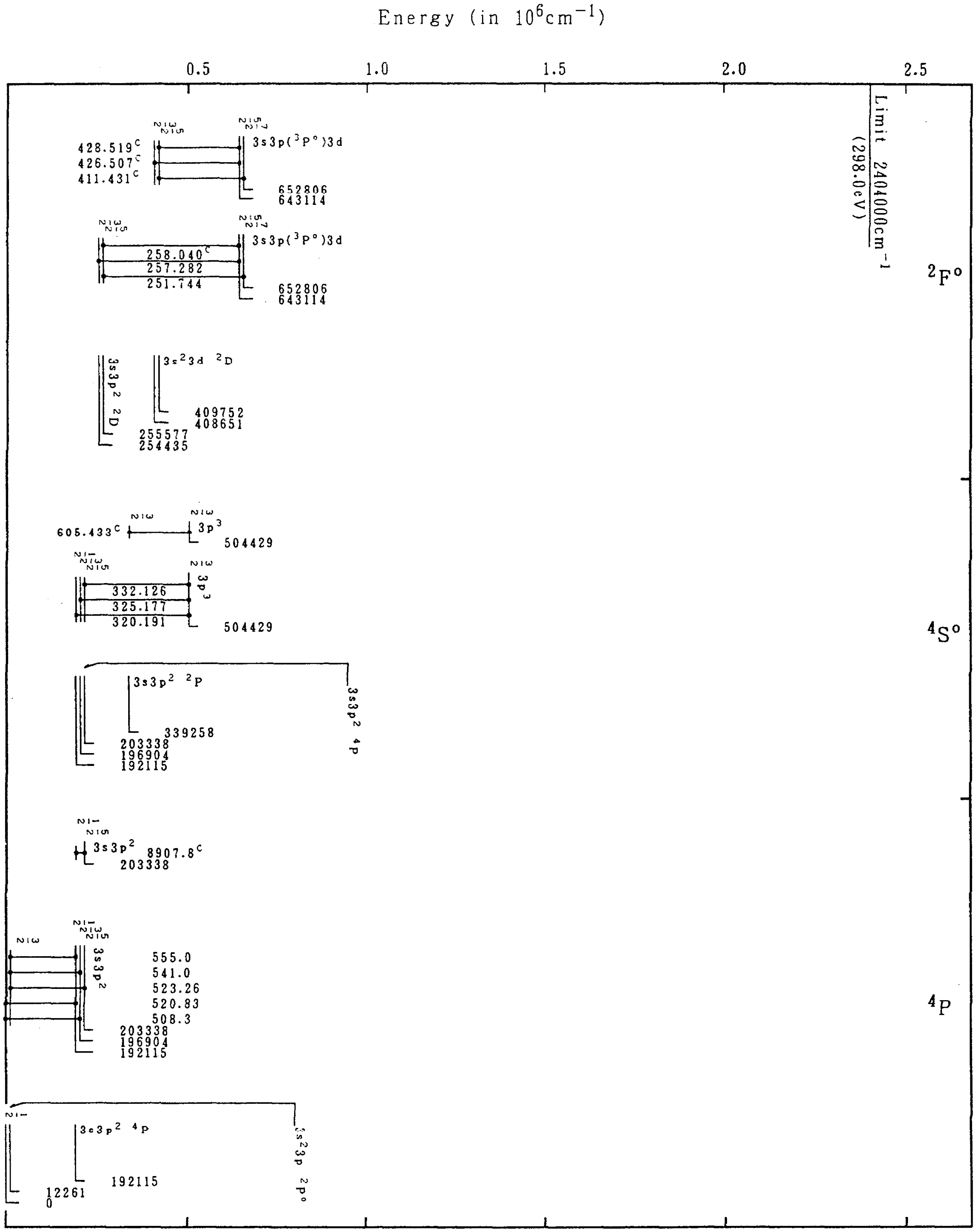

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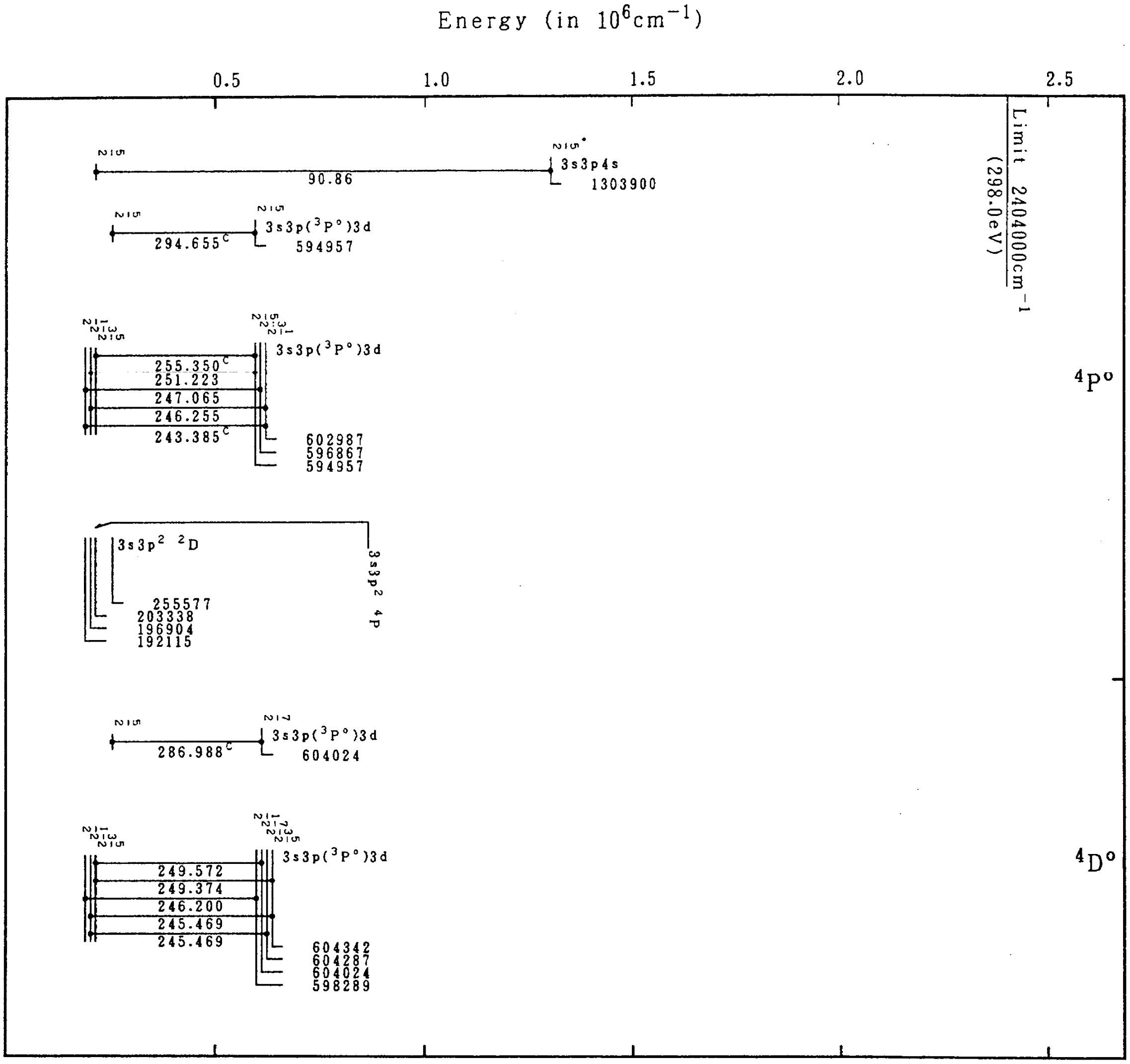

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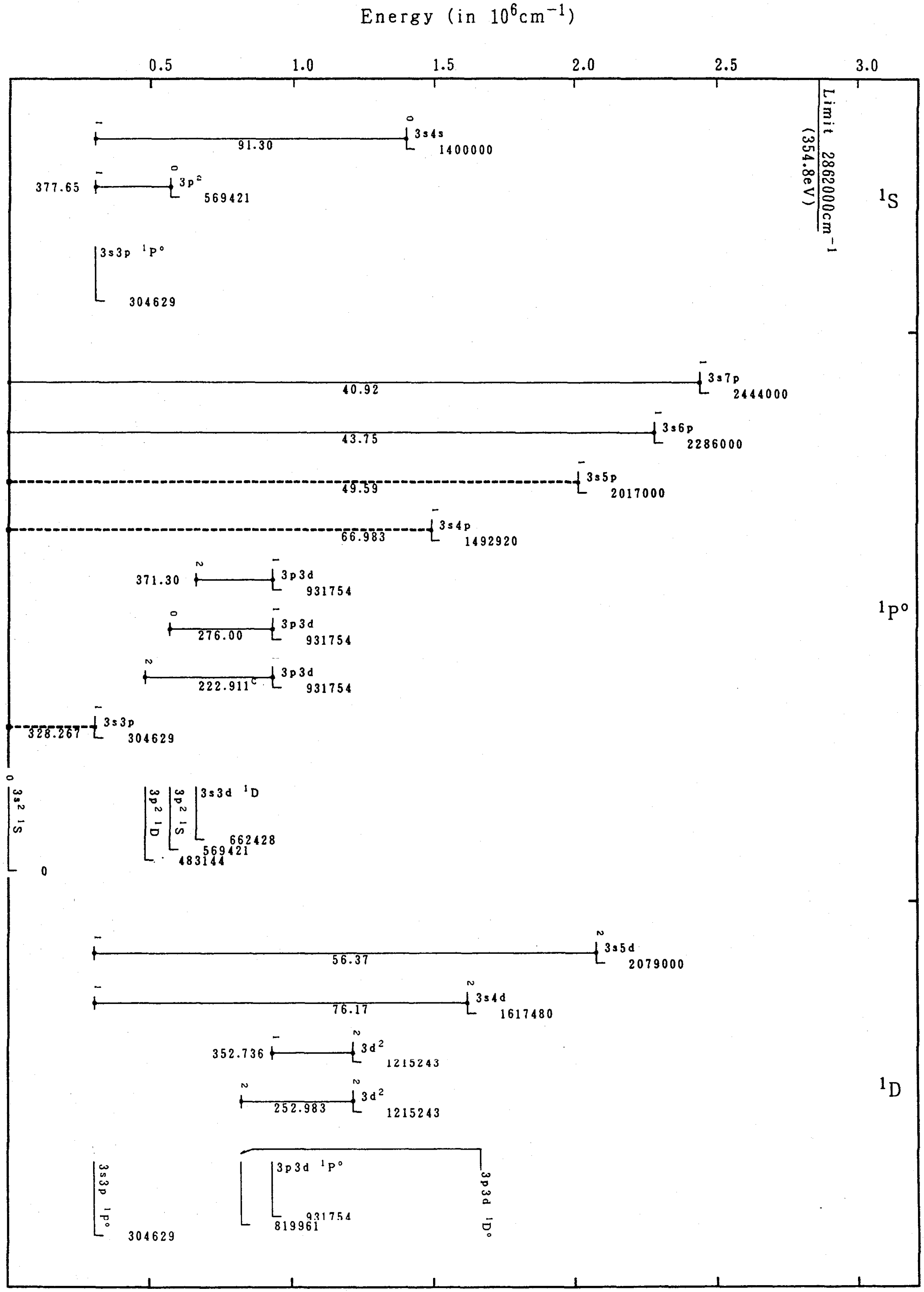
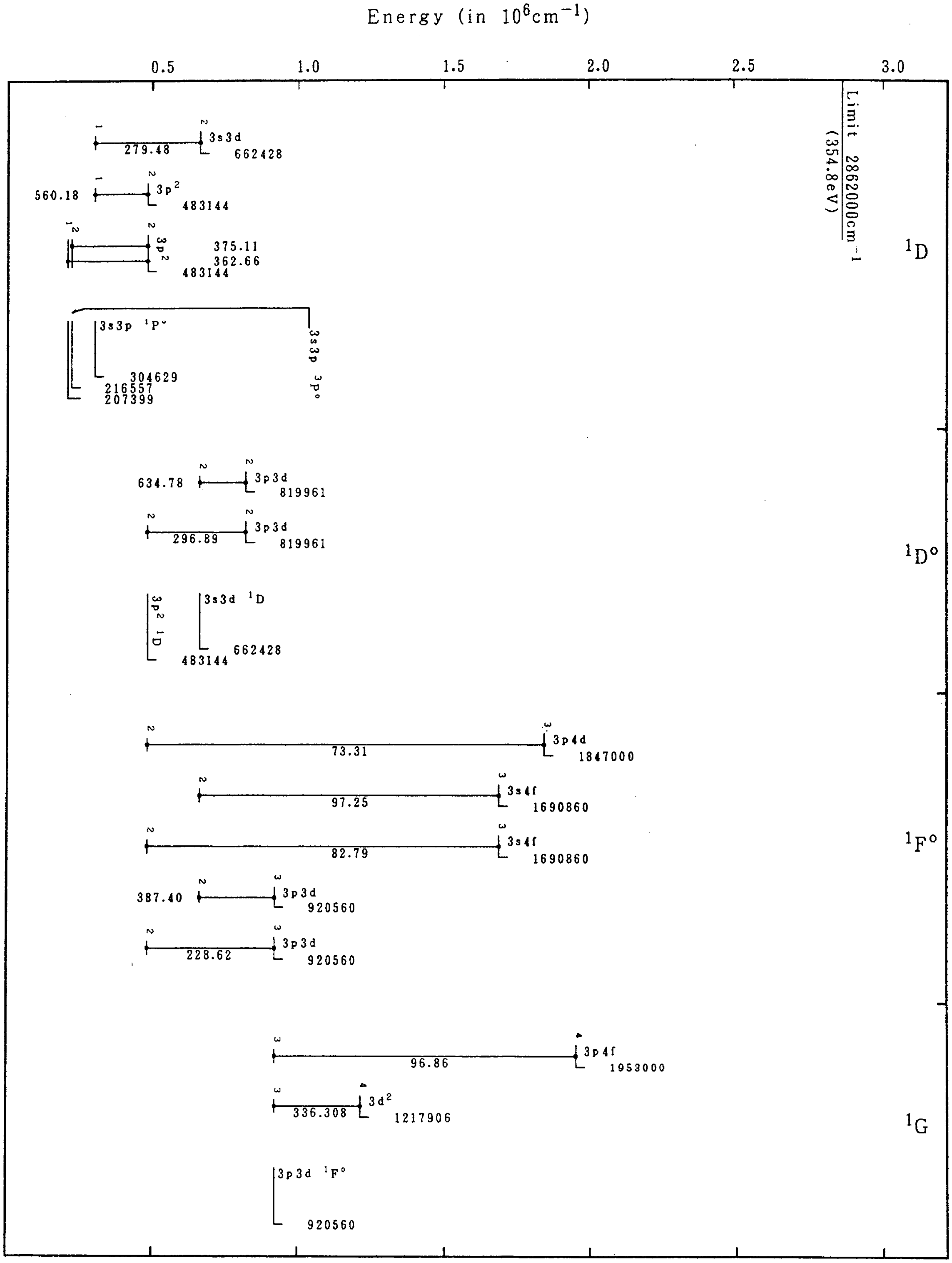


Cr XIII(Mg–Sequence)



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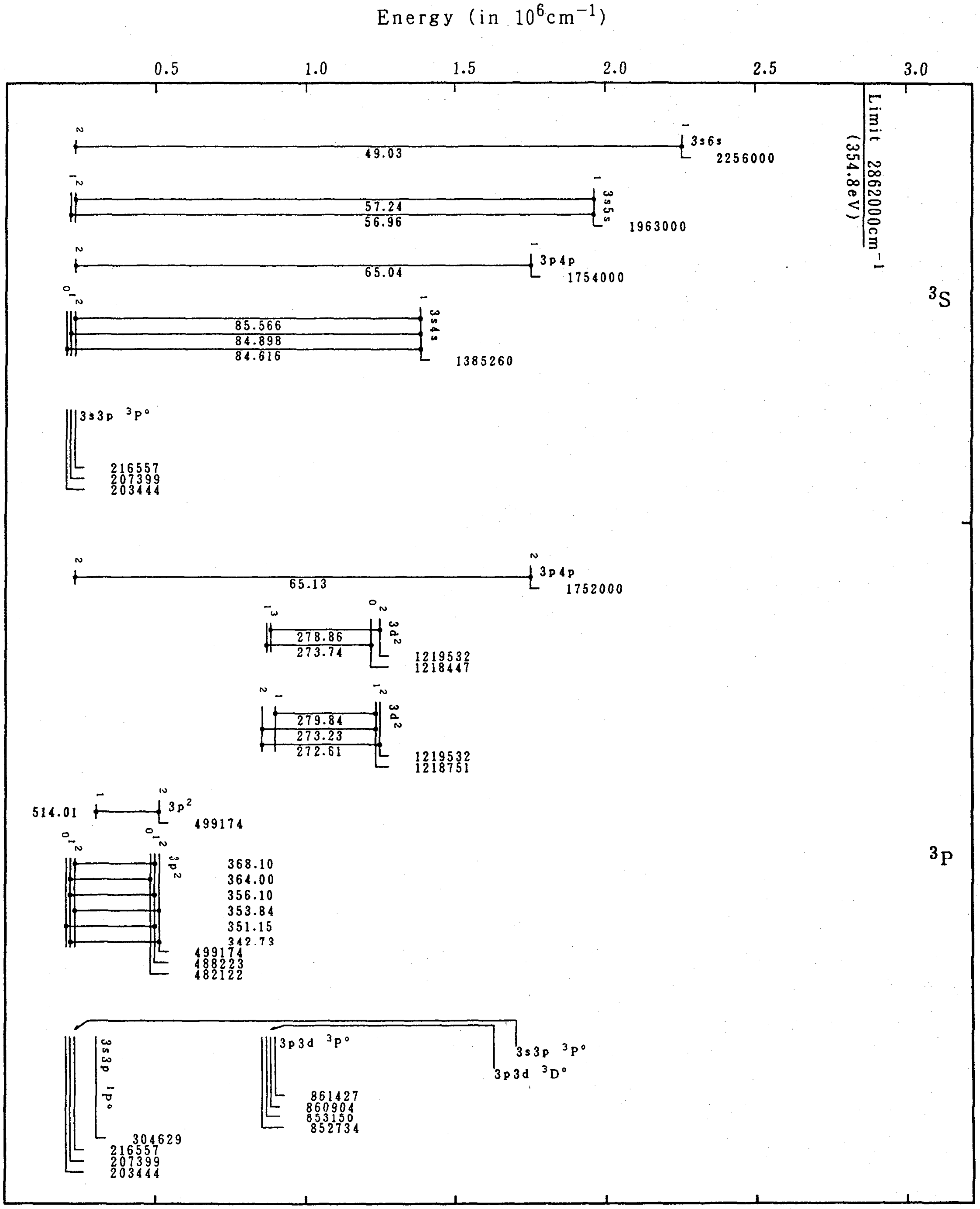

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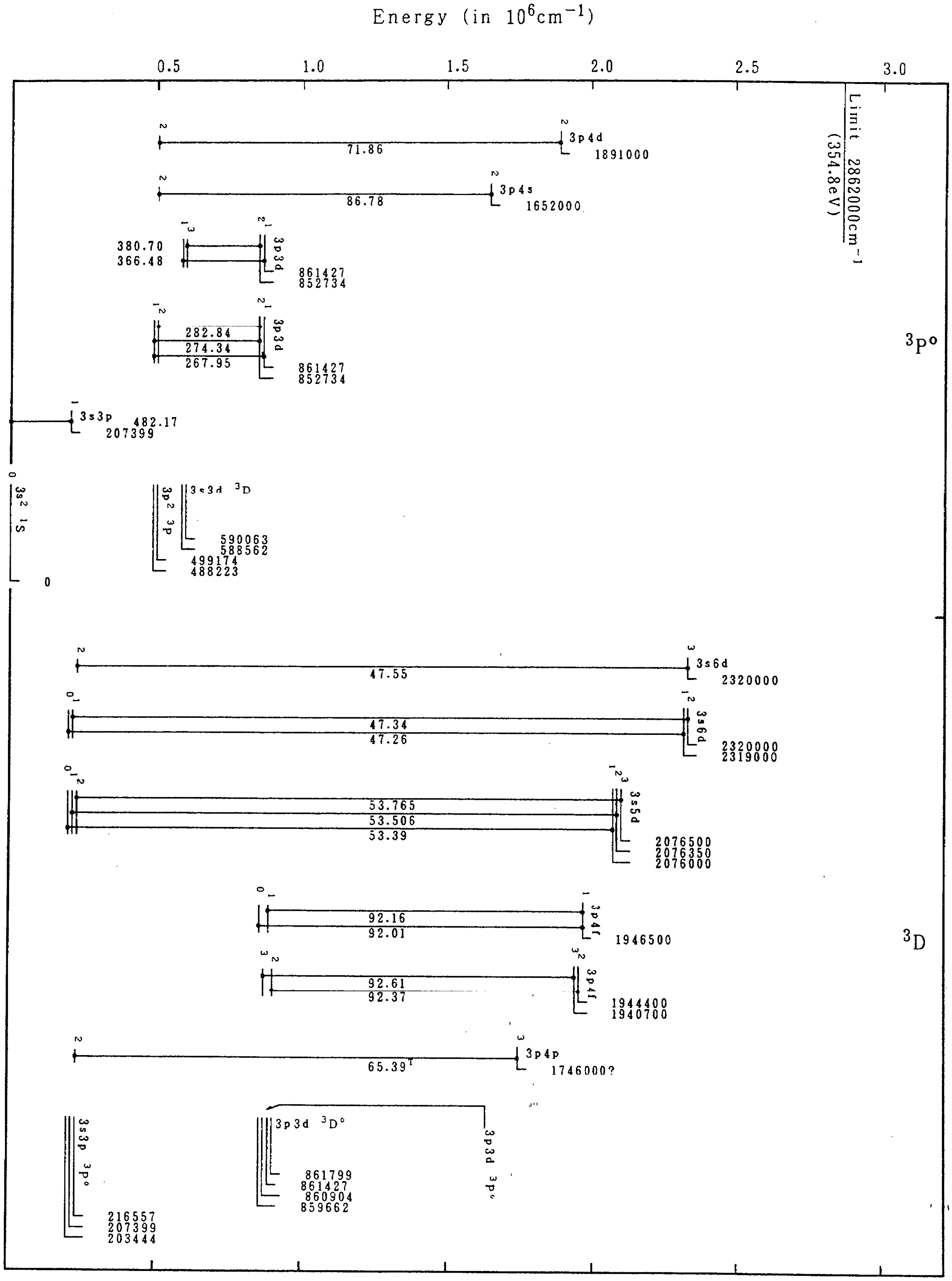

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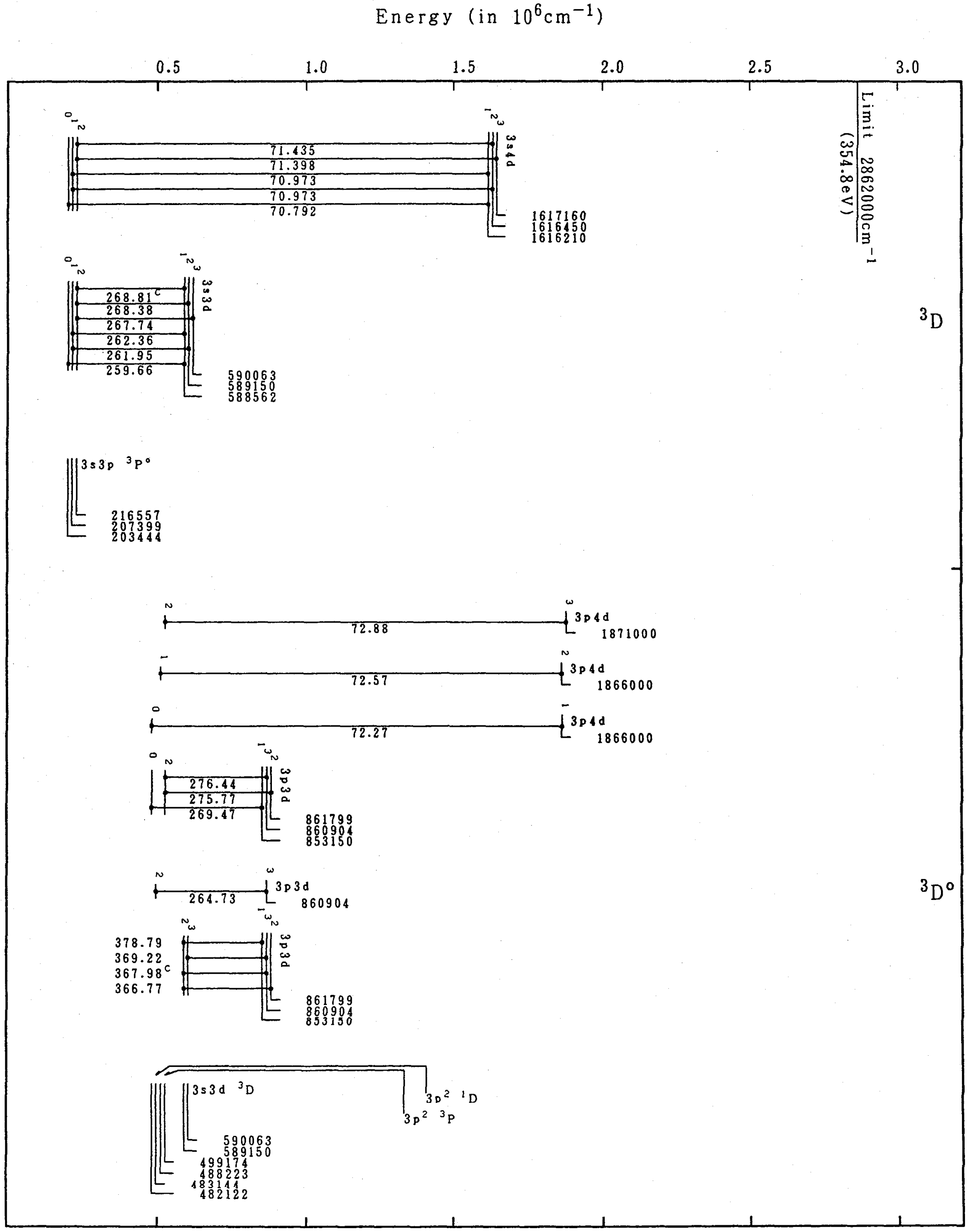

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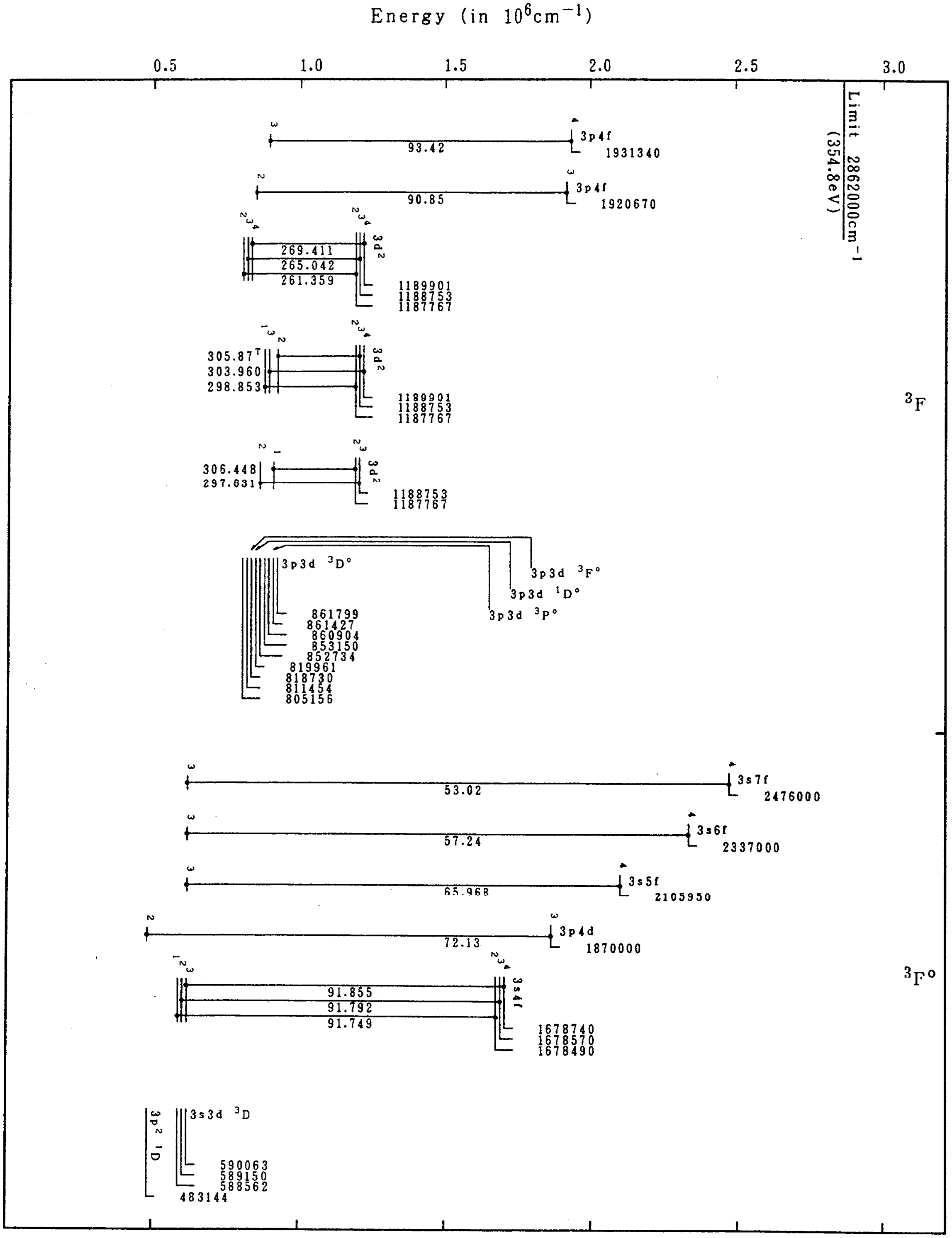

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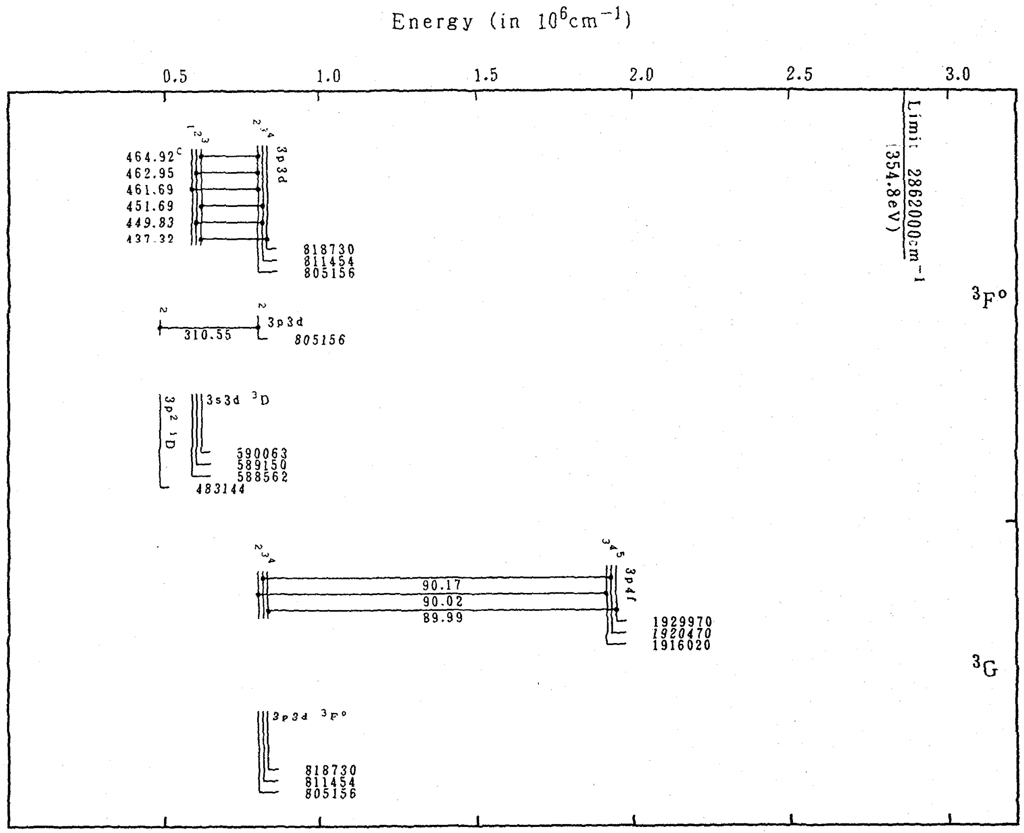

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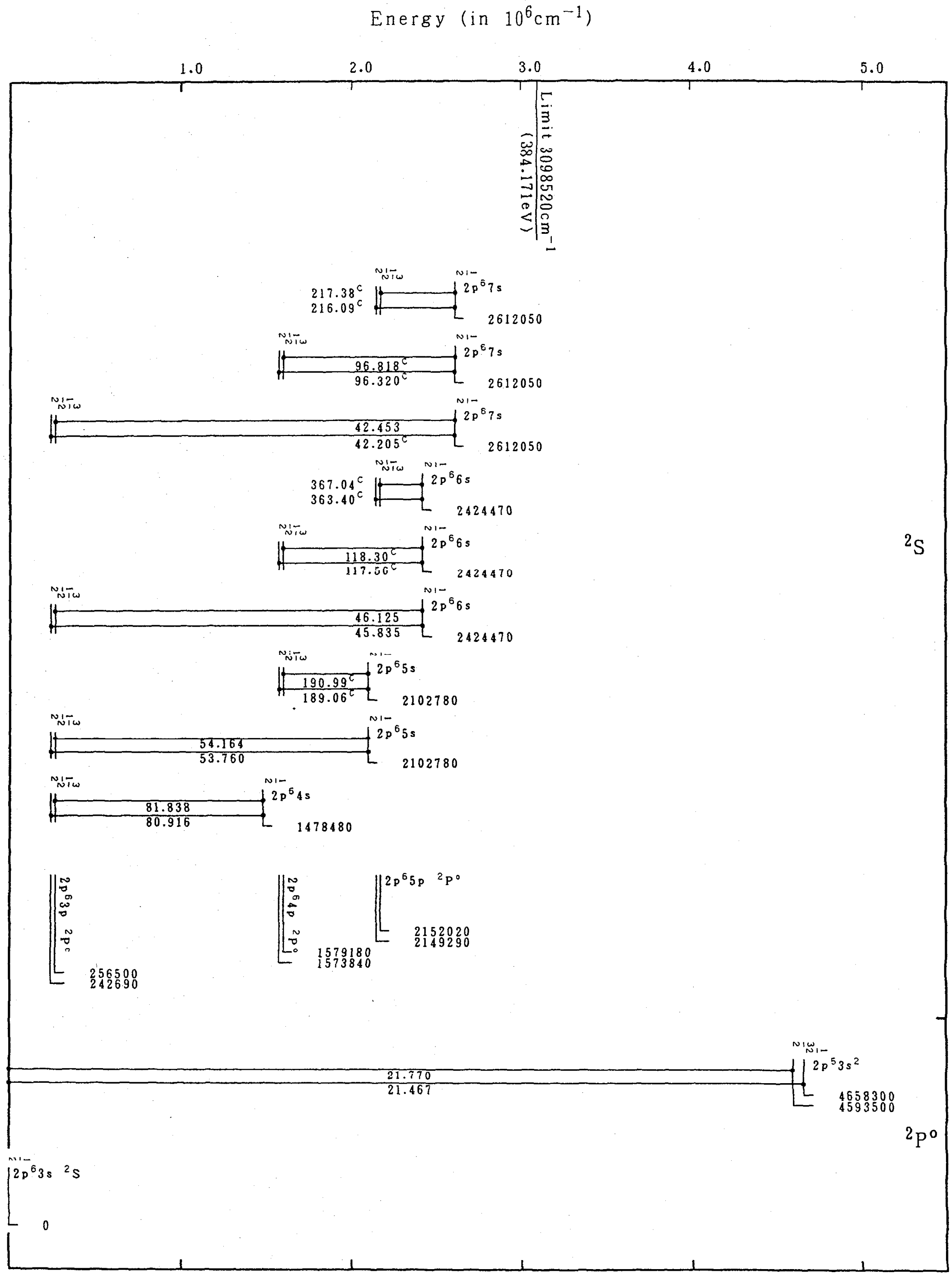
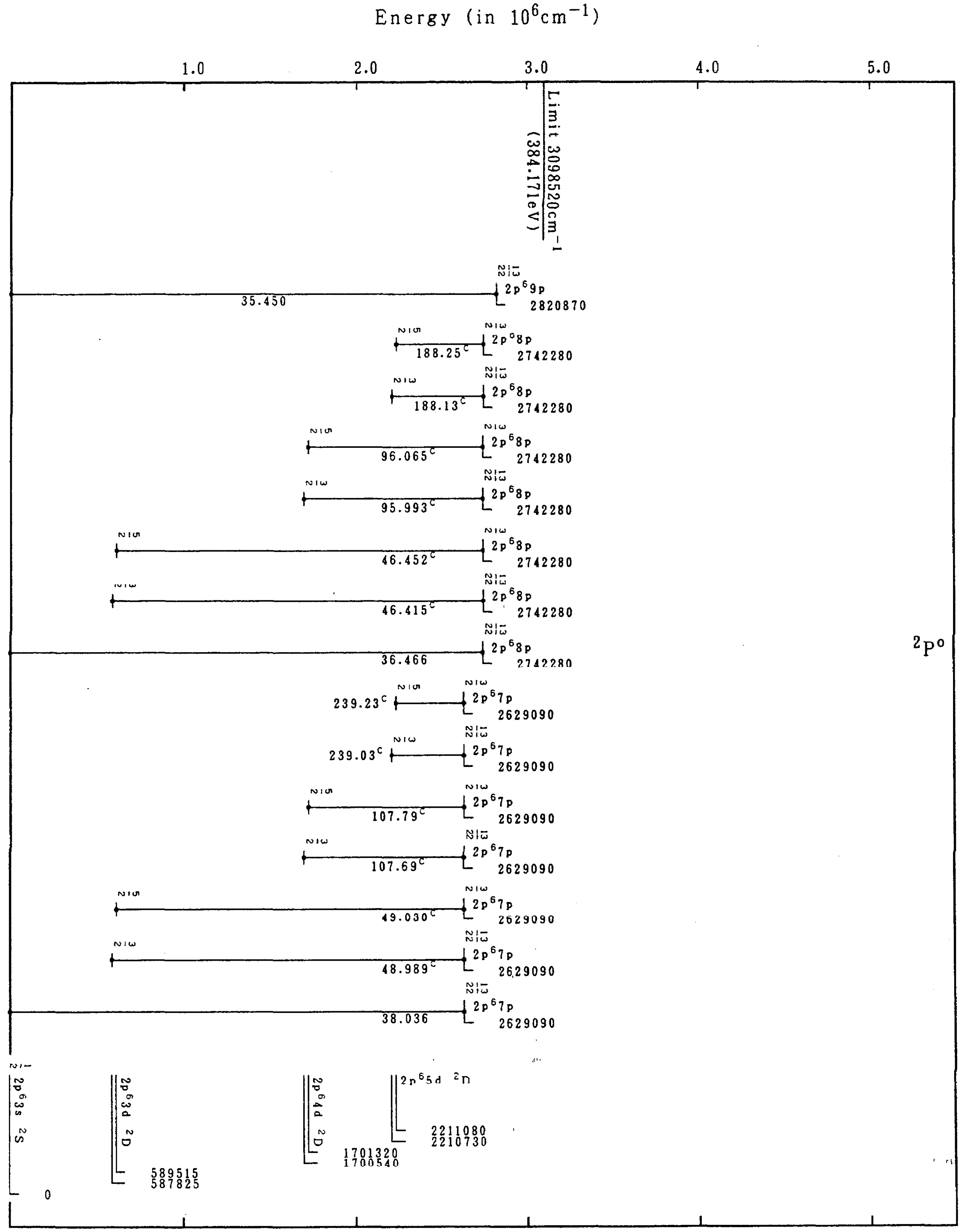


Cr XIV(Na–Sequence)



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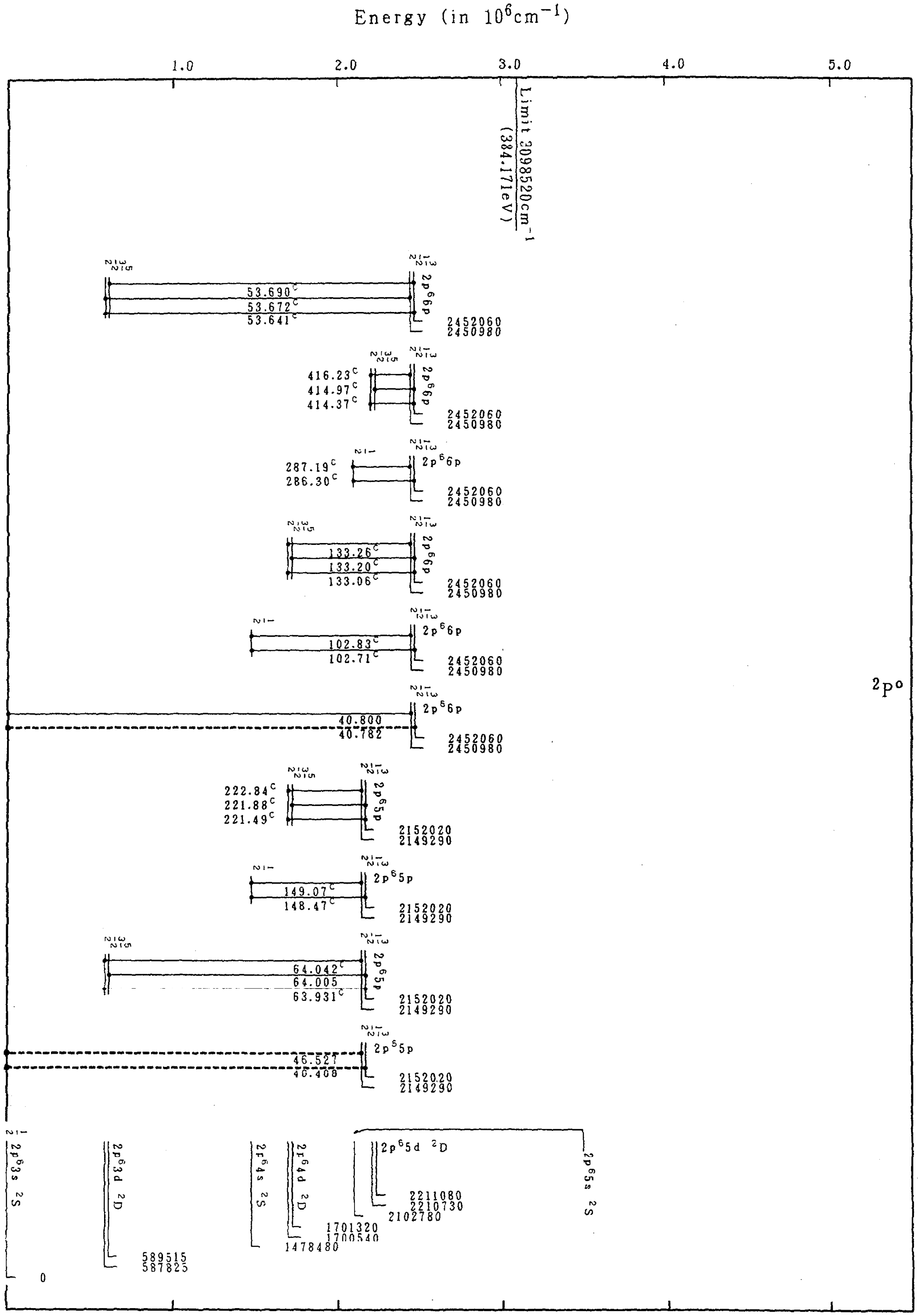

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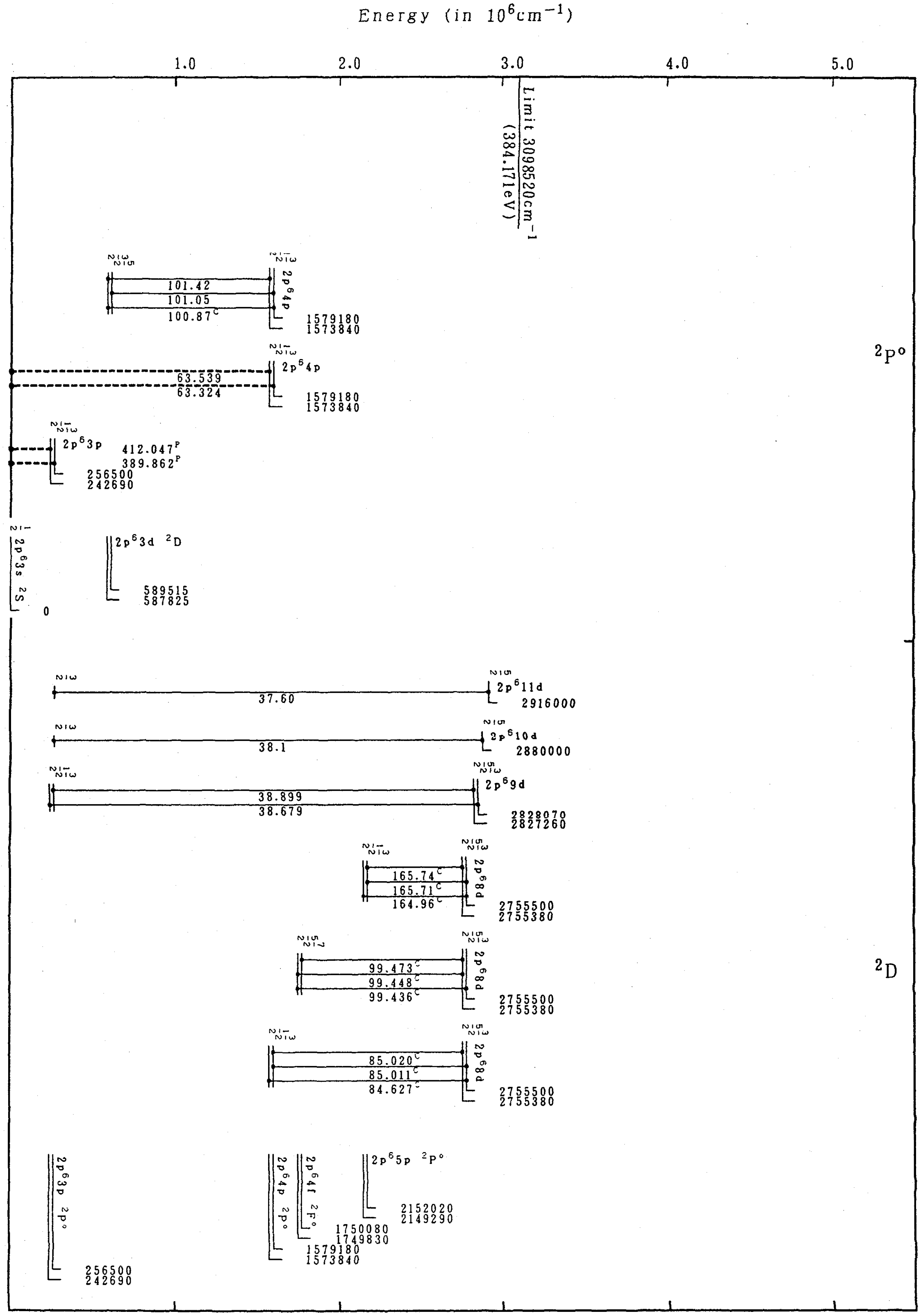

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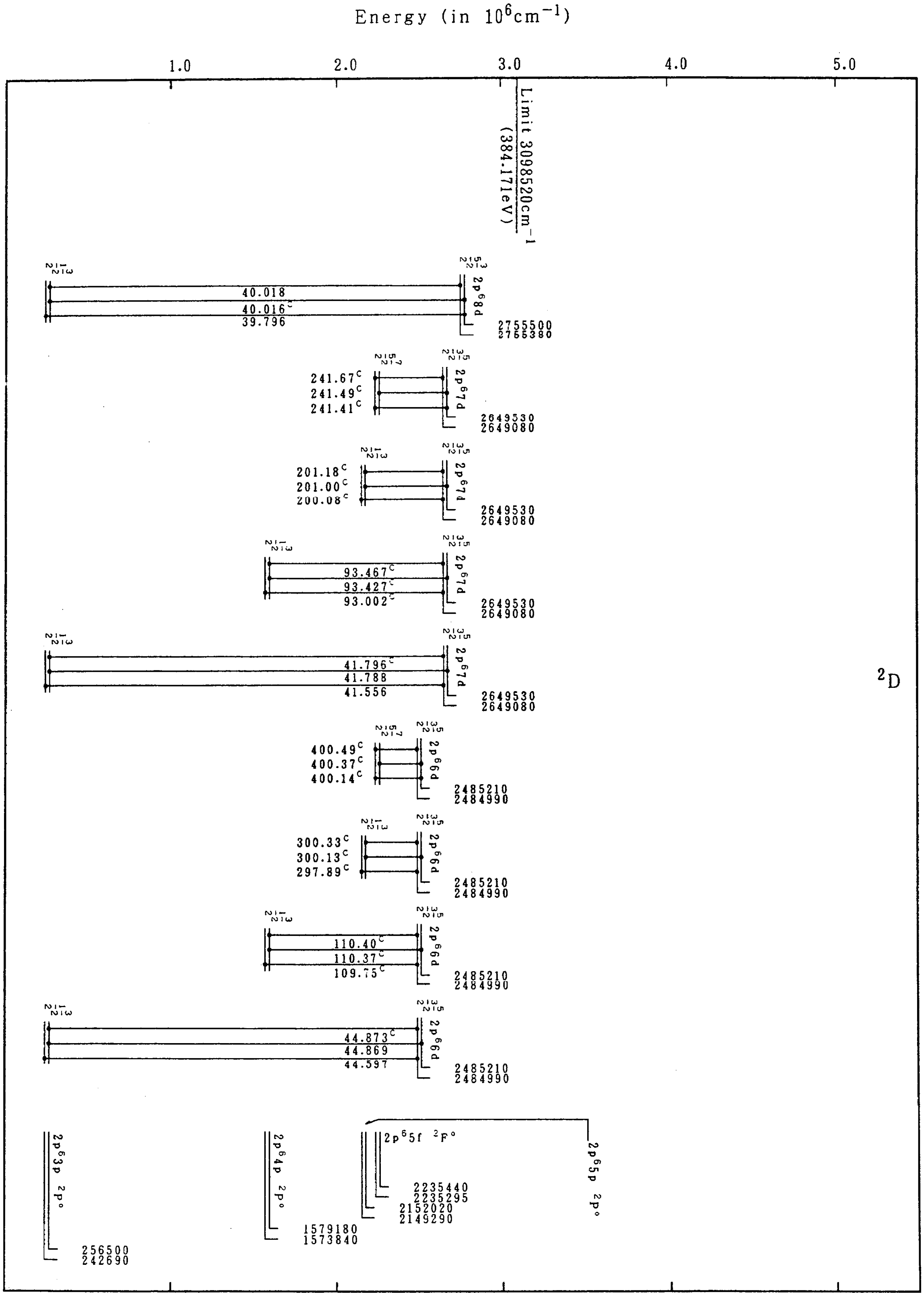

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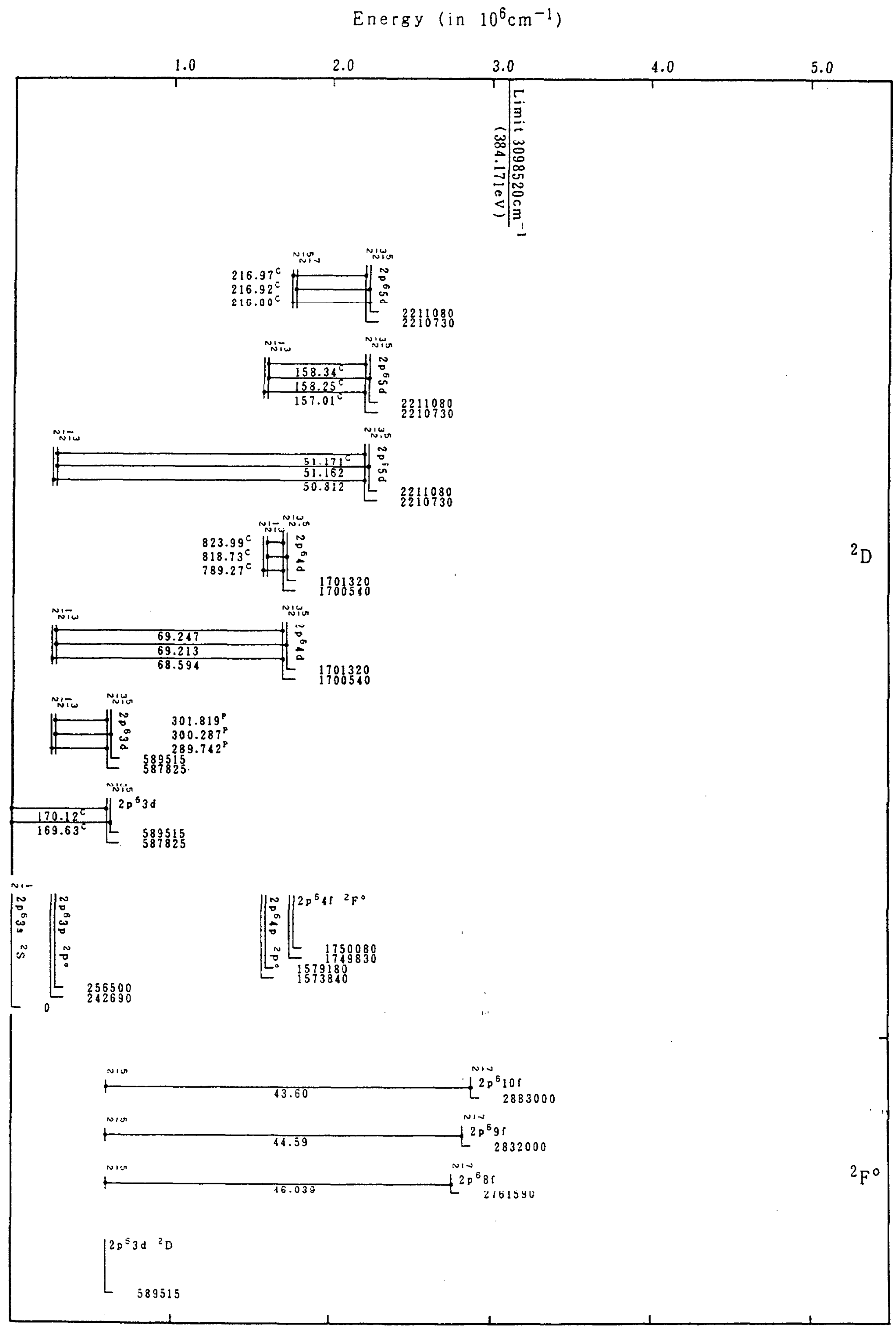

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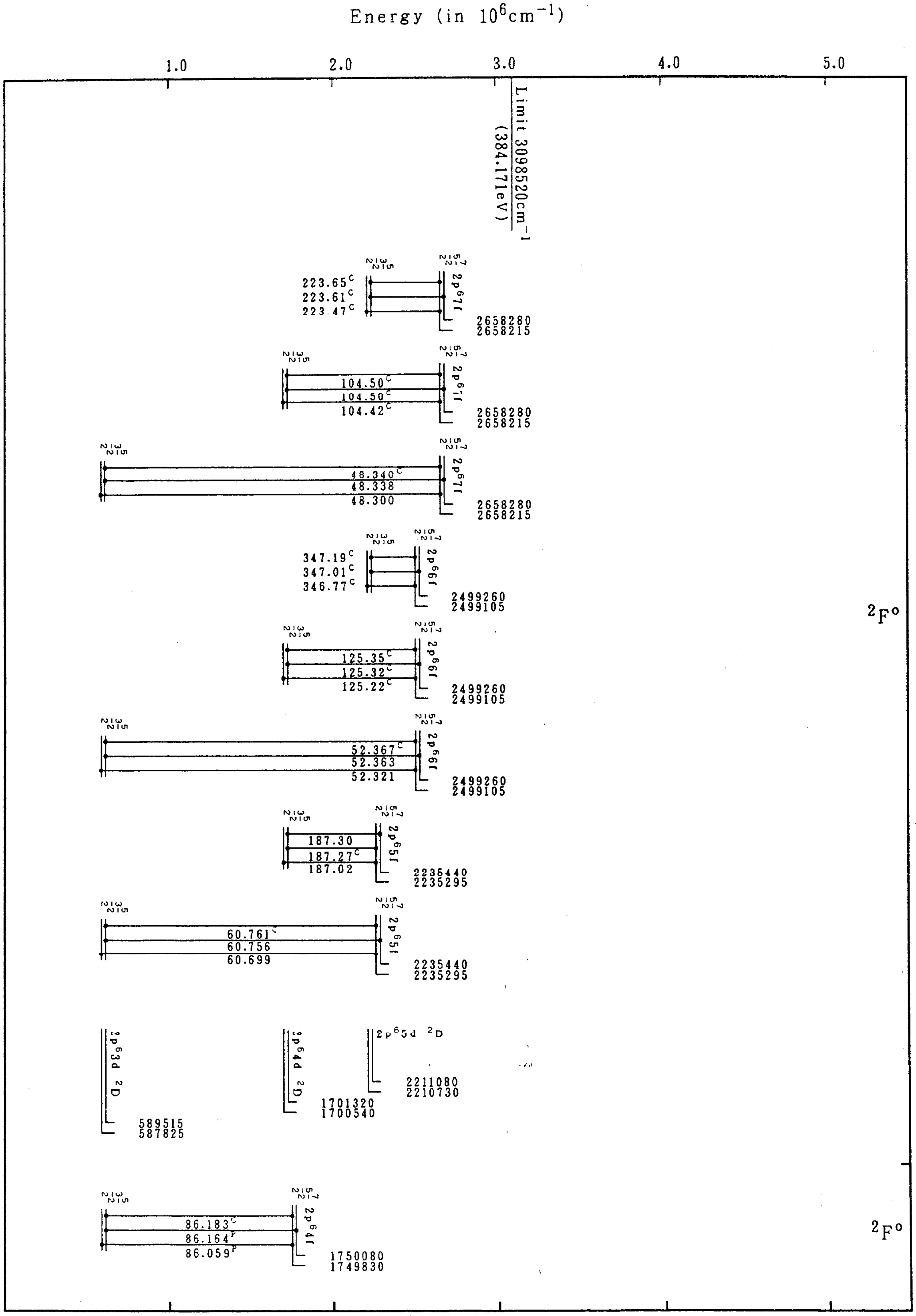

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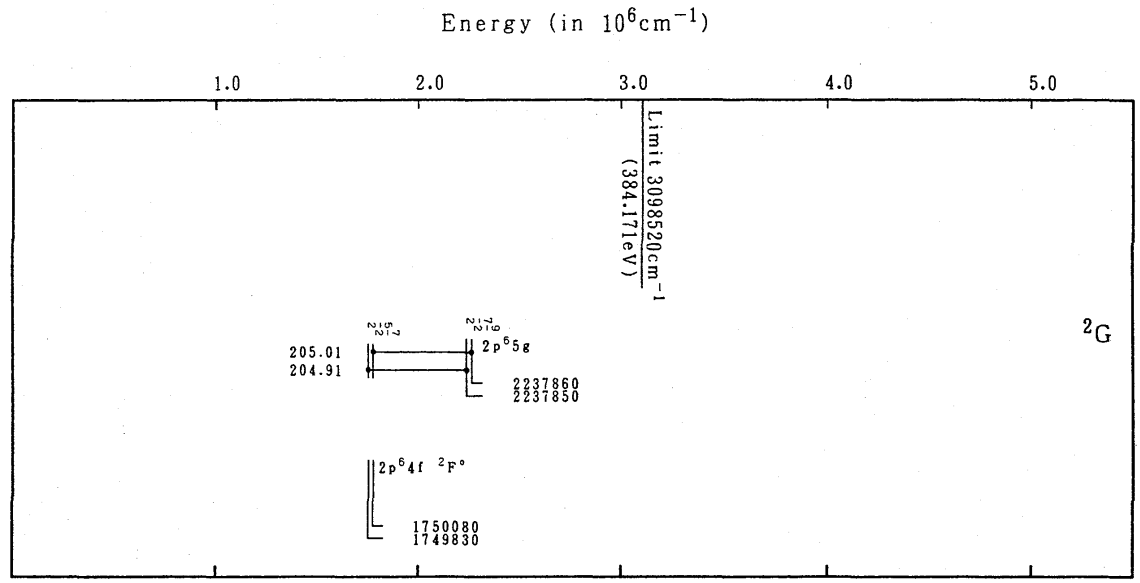

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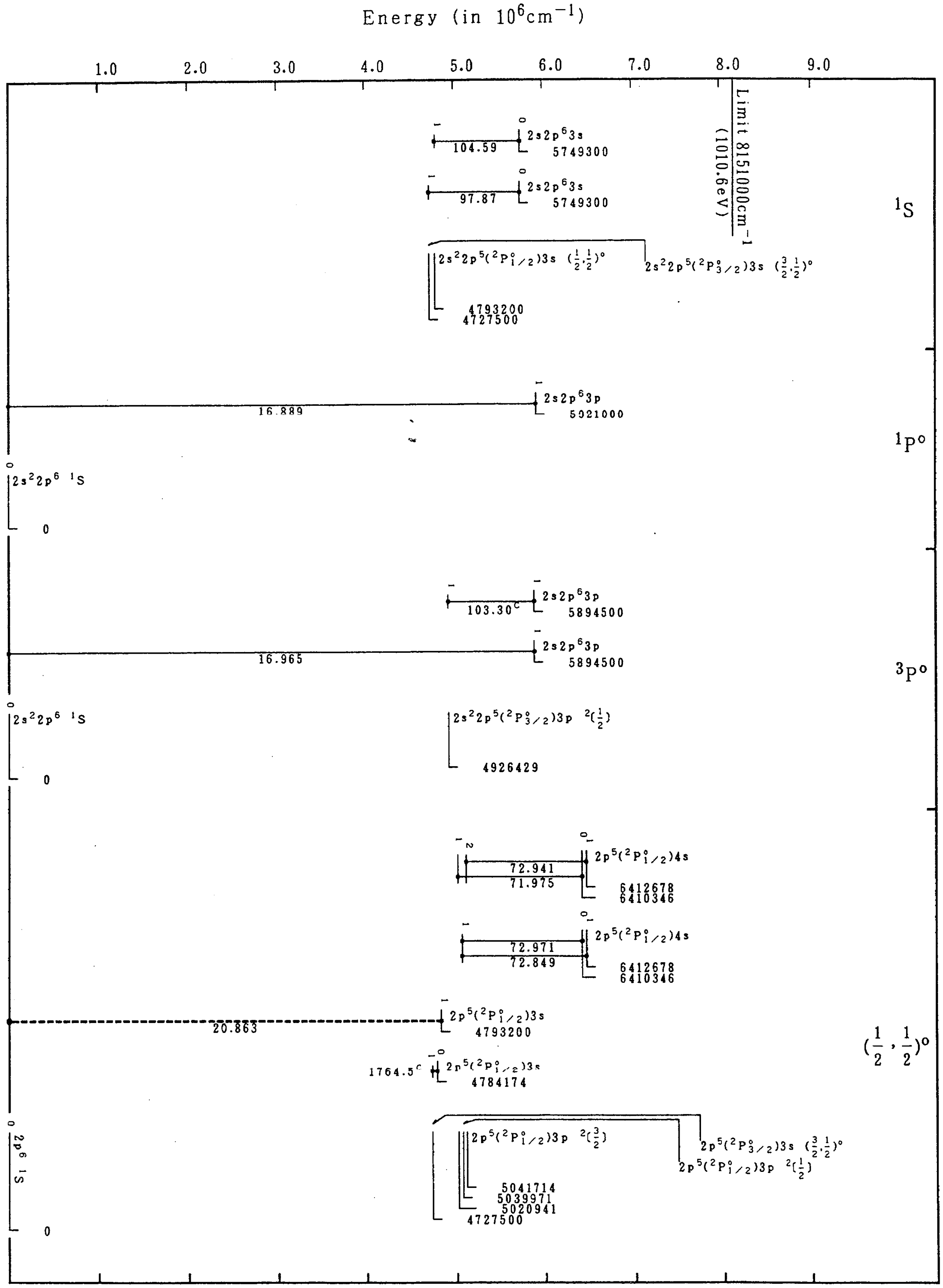
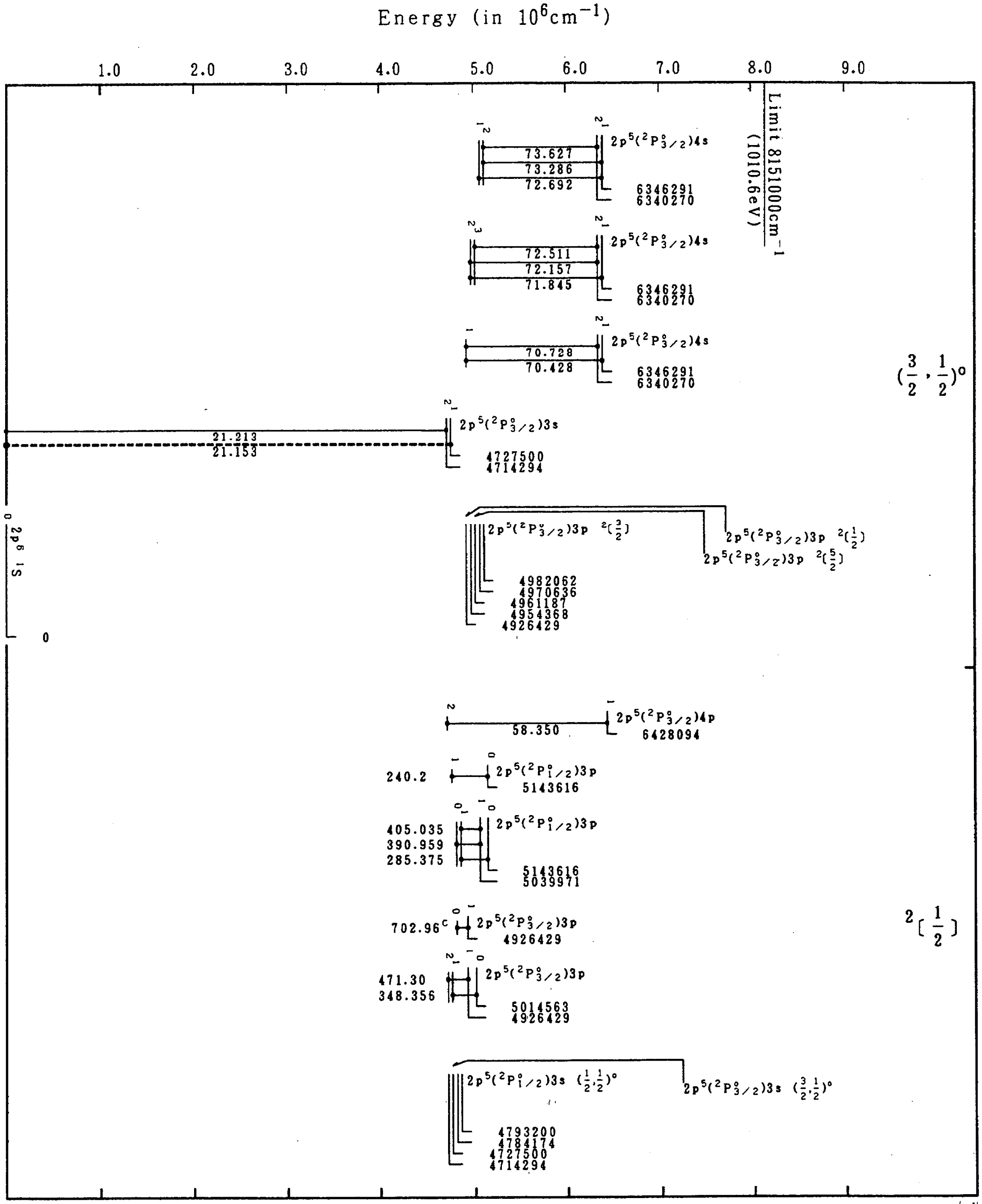
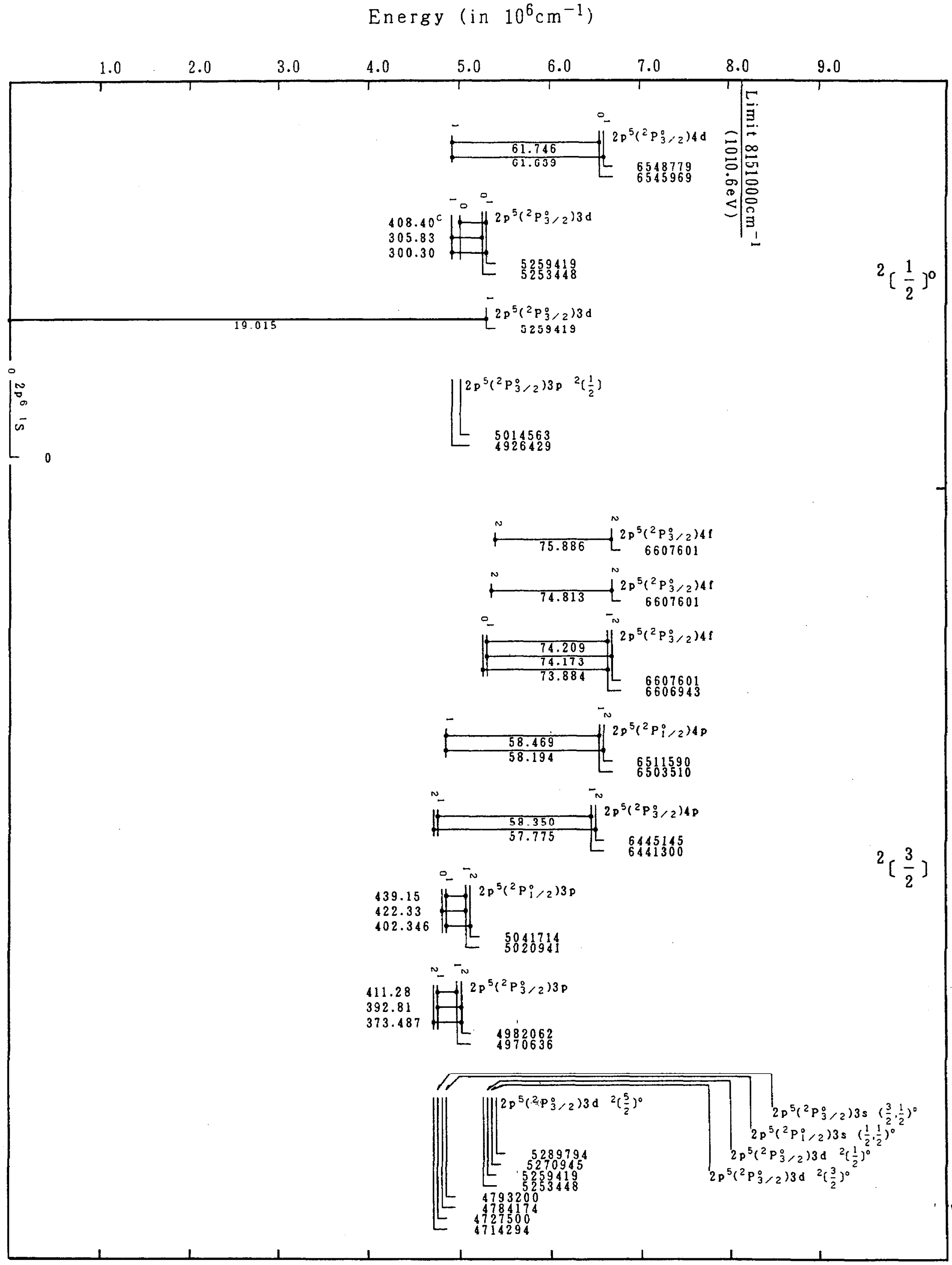


Cr XV(Ne–Sequence)



Cr XV(Ne–Sequence)



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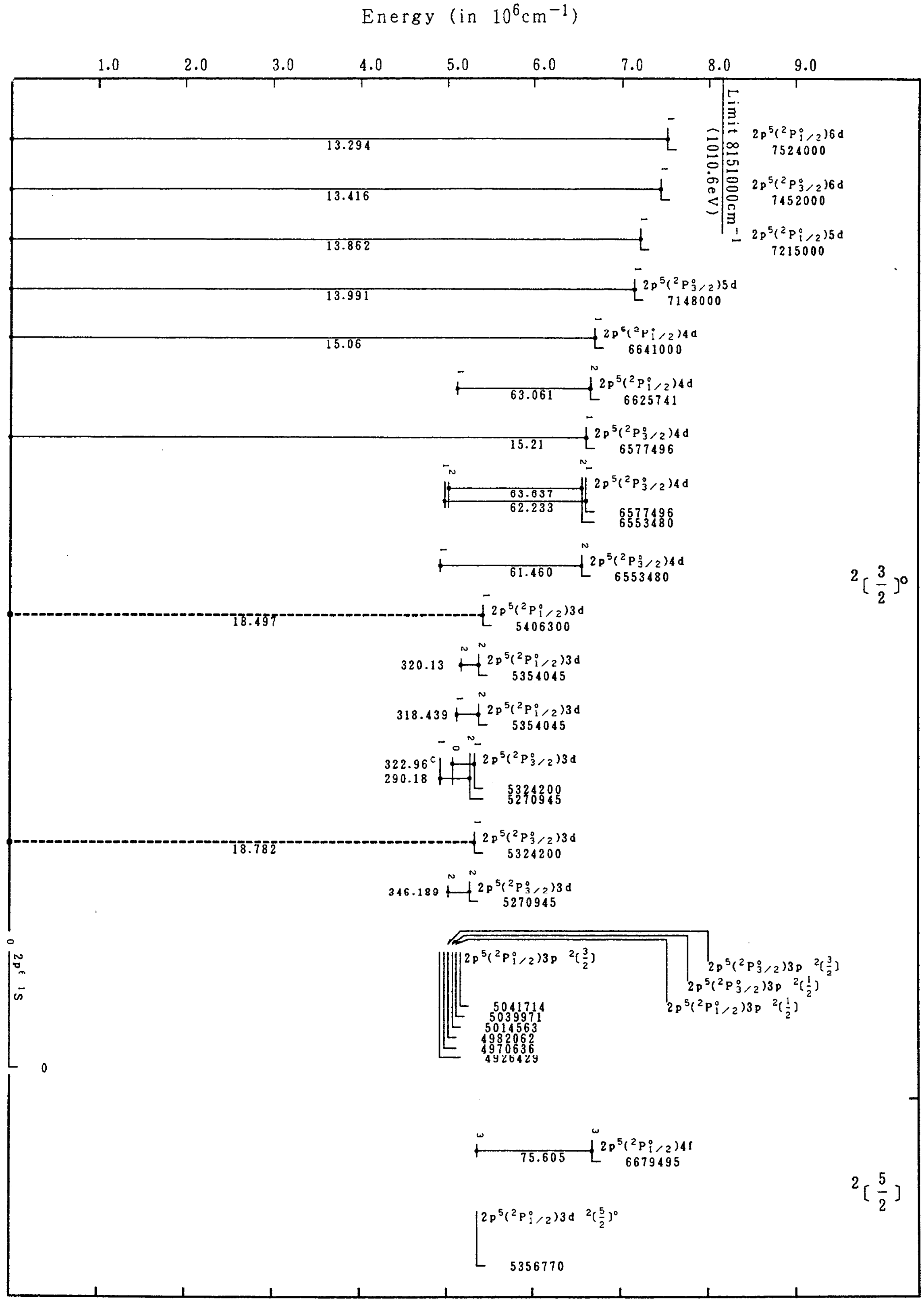

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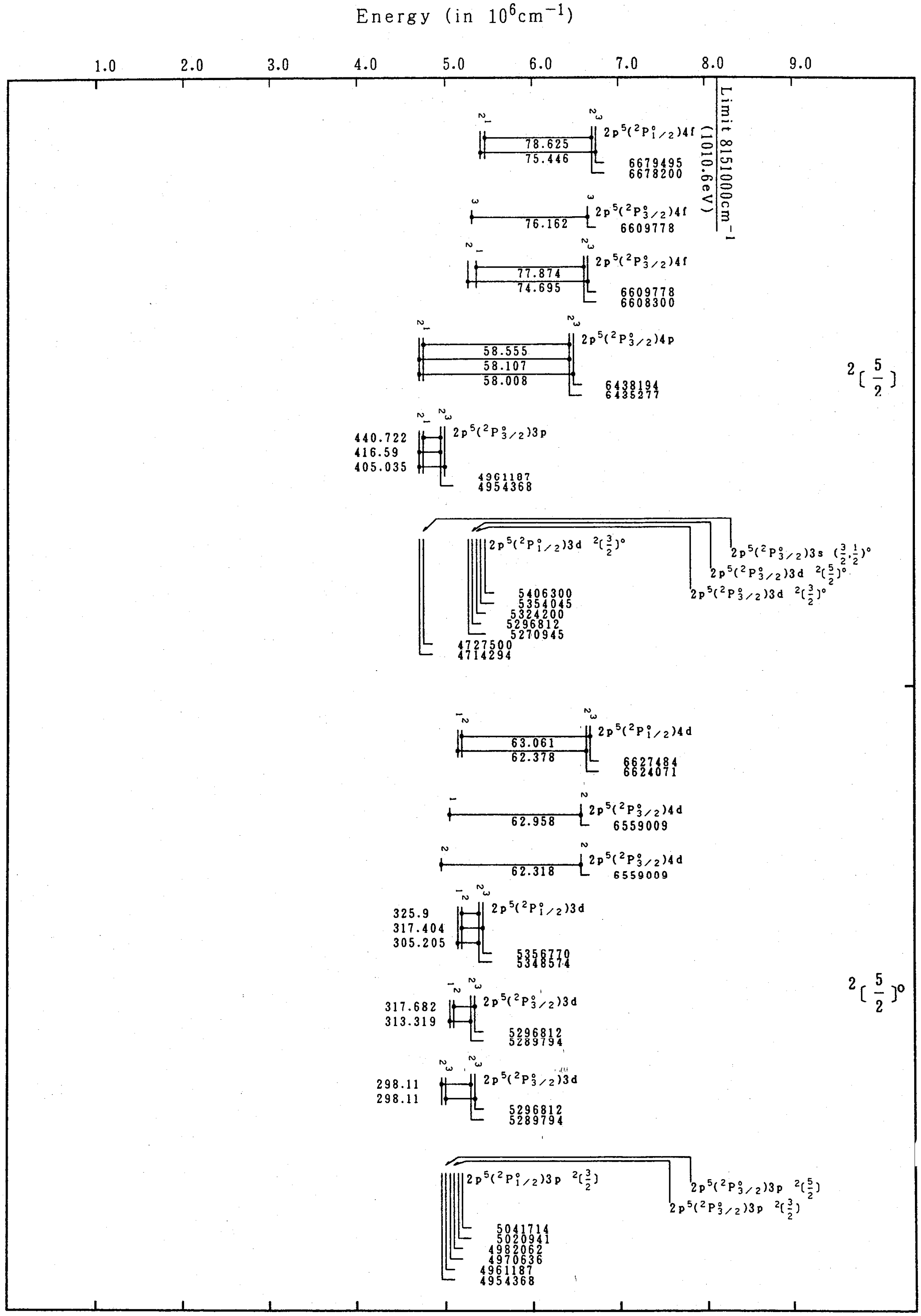
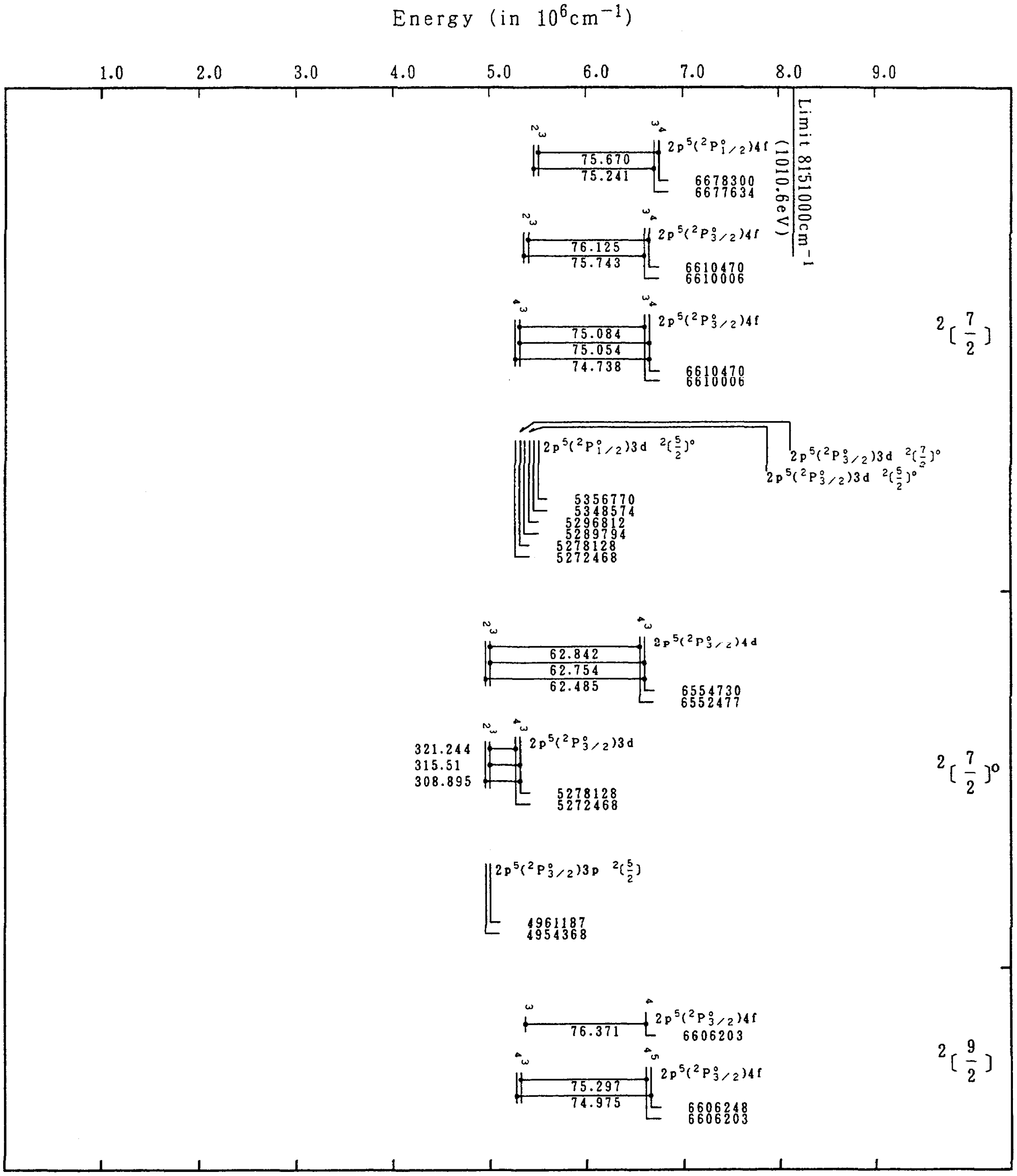
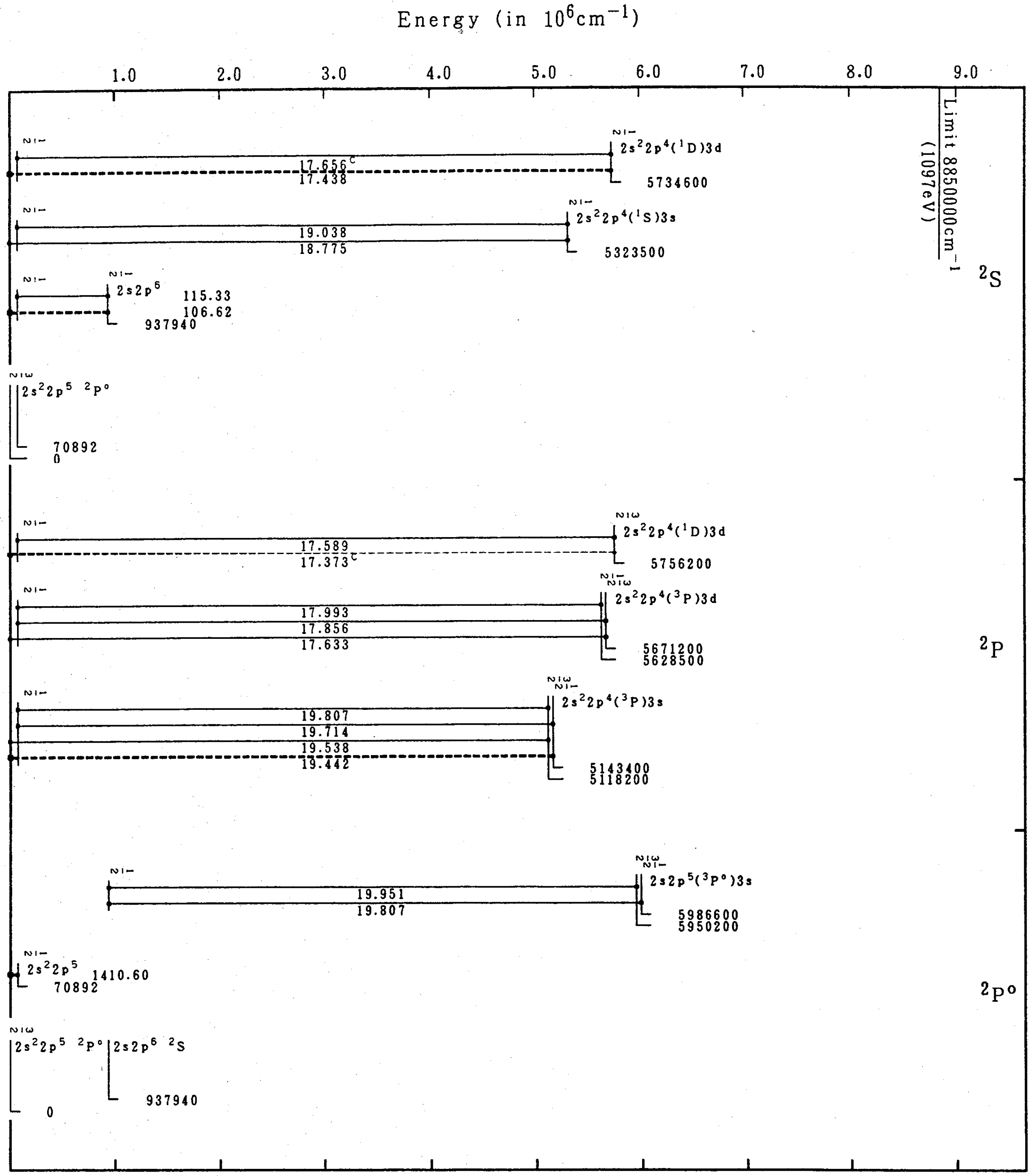


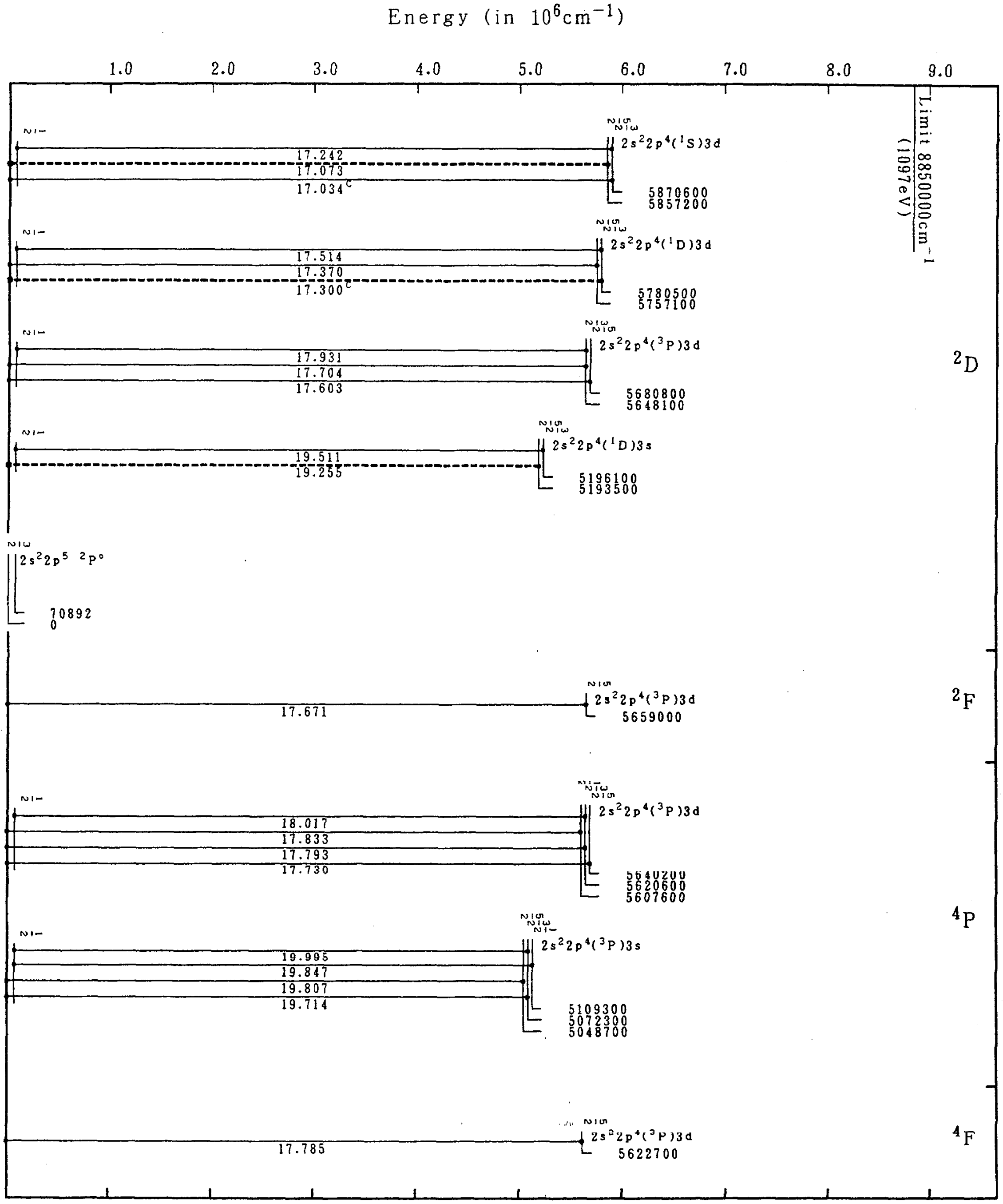
Cr XV(Ne–Sequence)



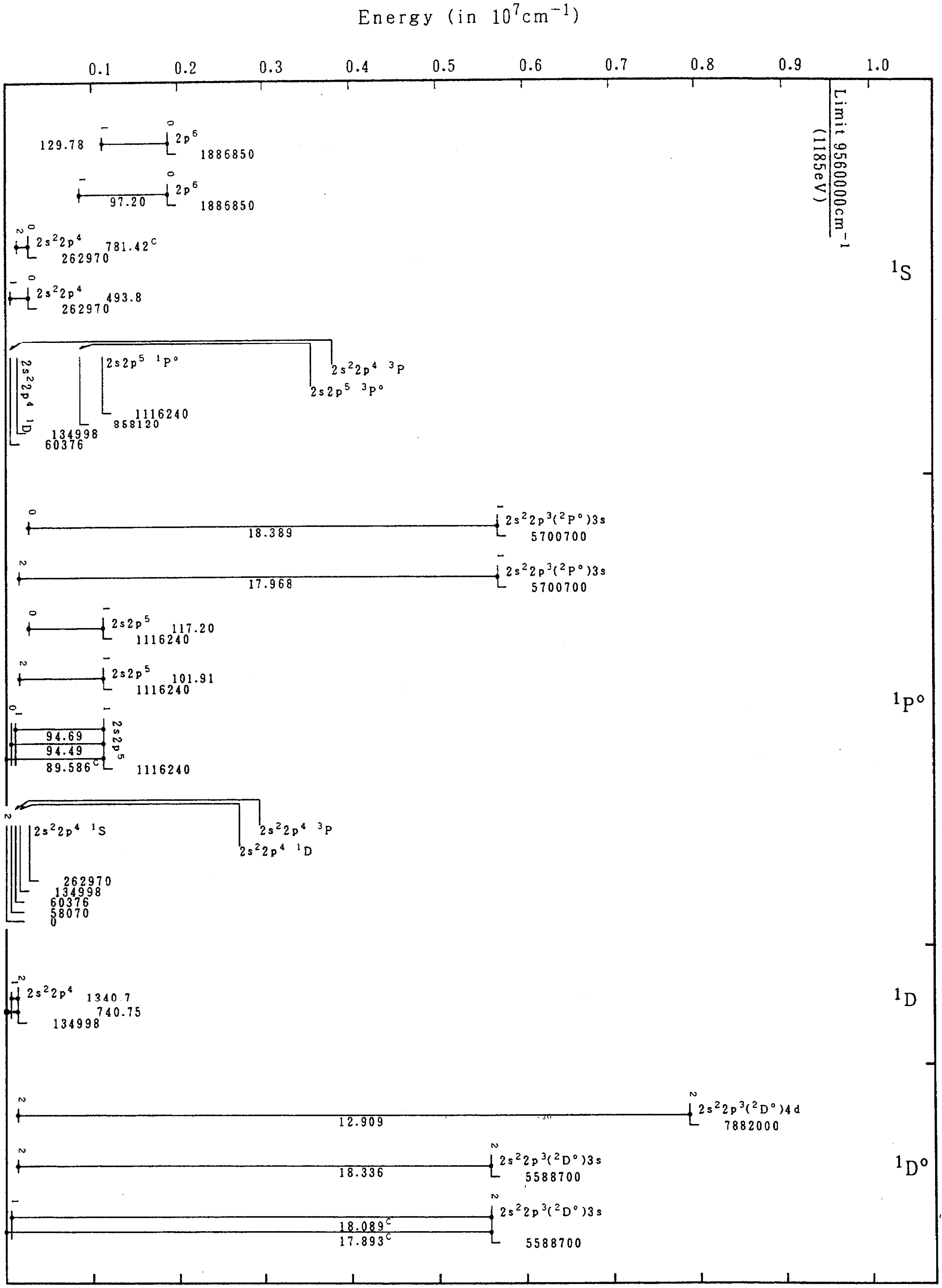
Cr XV(Ne–Sequence)



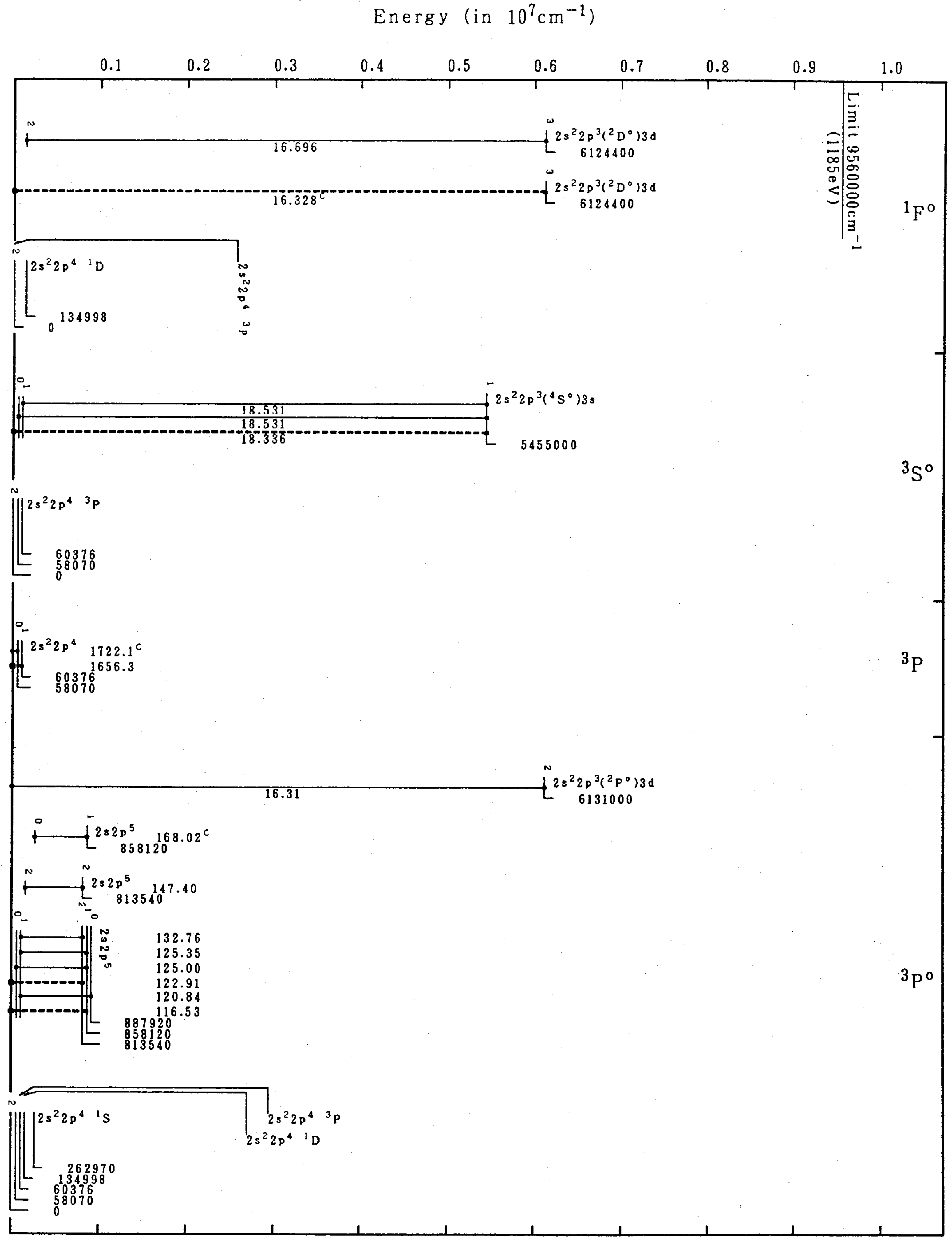
Cr XVI(F−Sequence)



Cr XVI(F−Sequence)



Cr XVII(O–Sequence)



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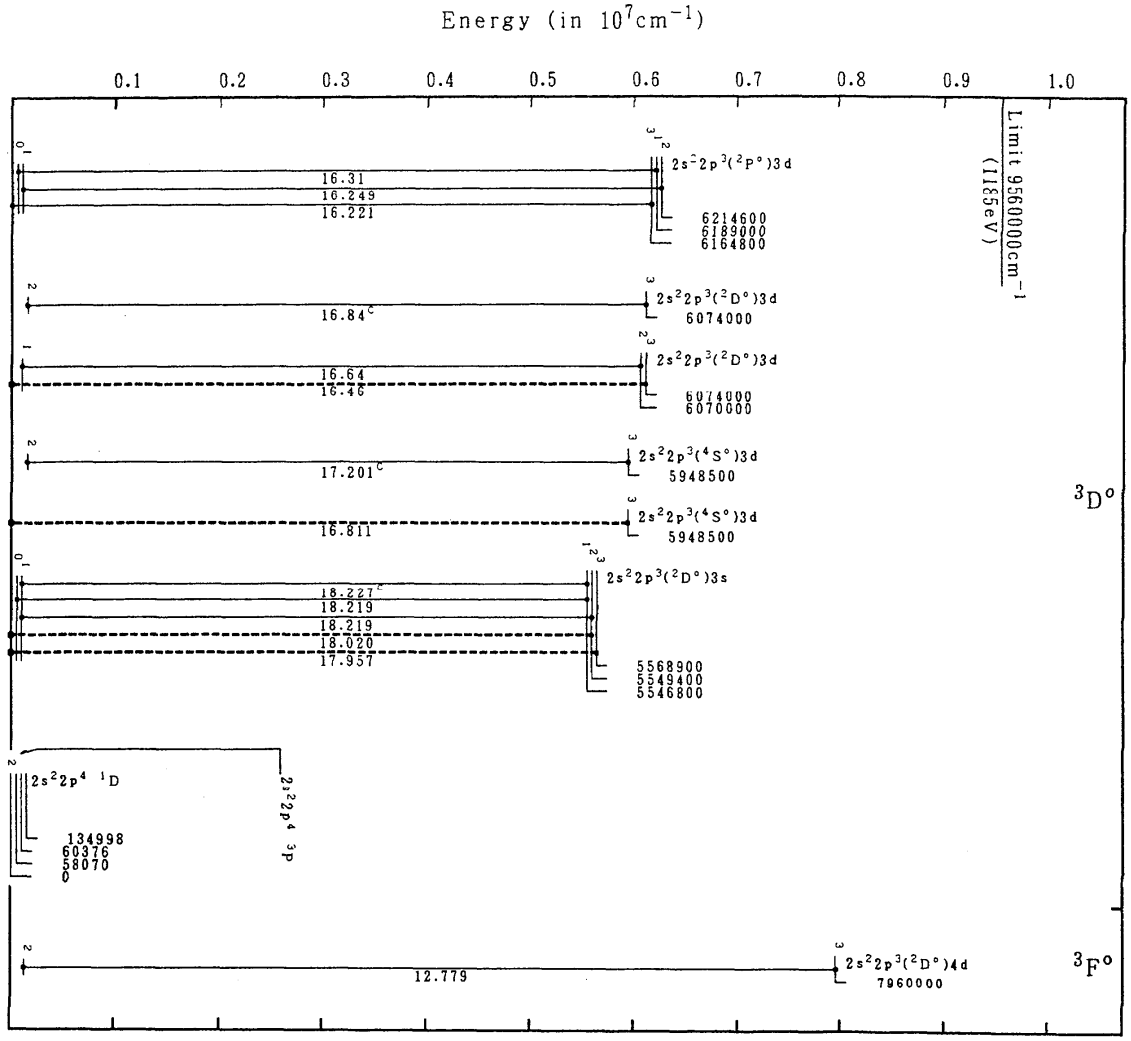

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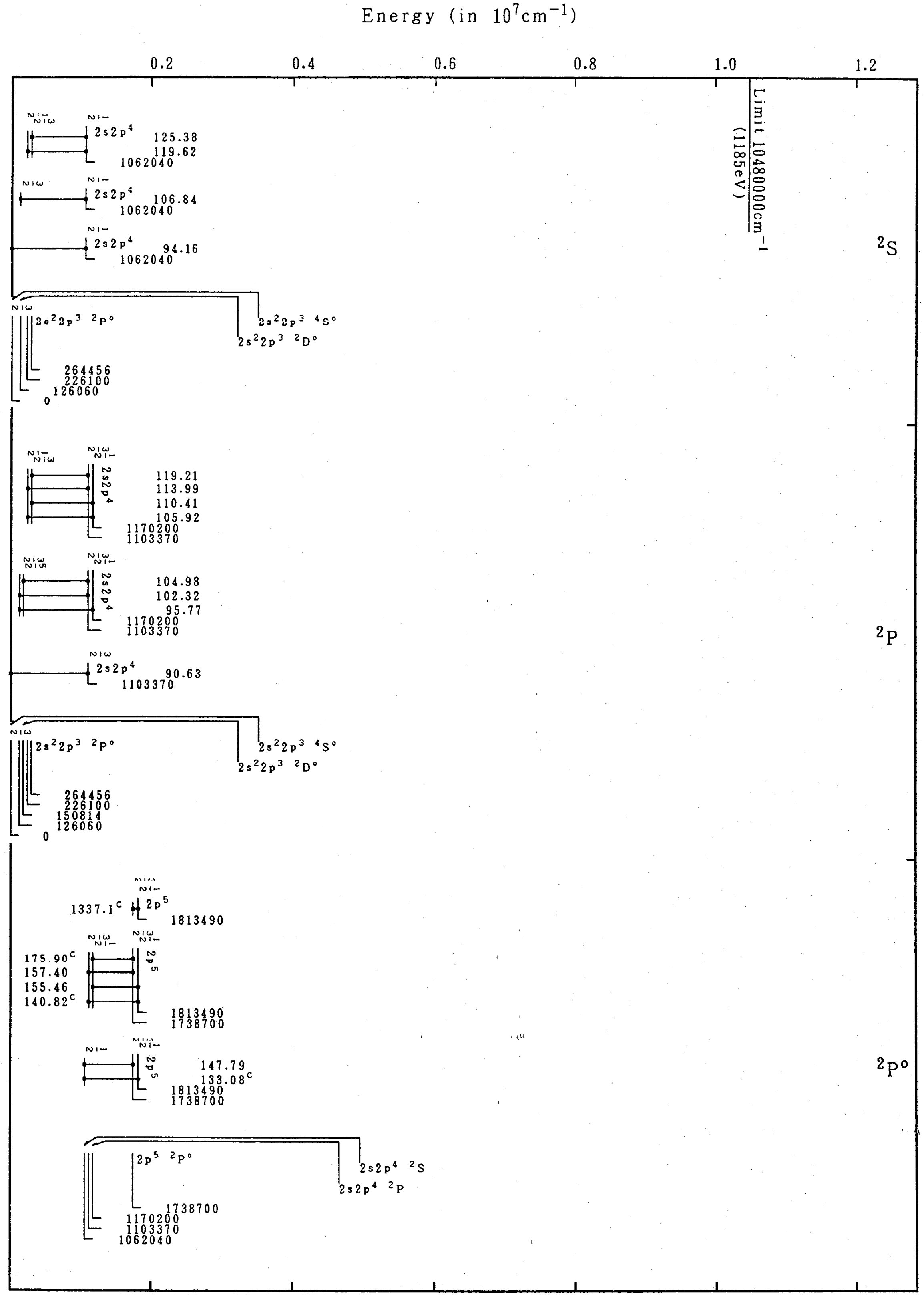
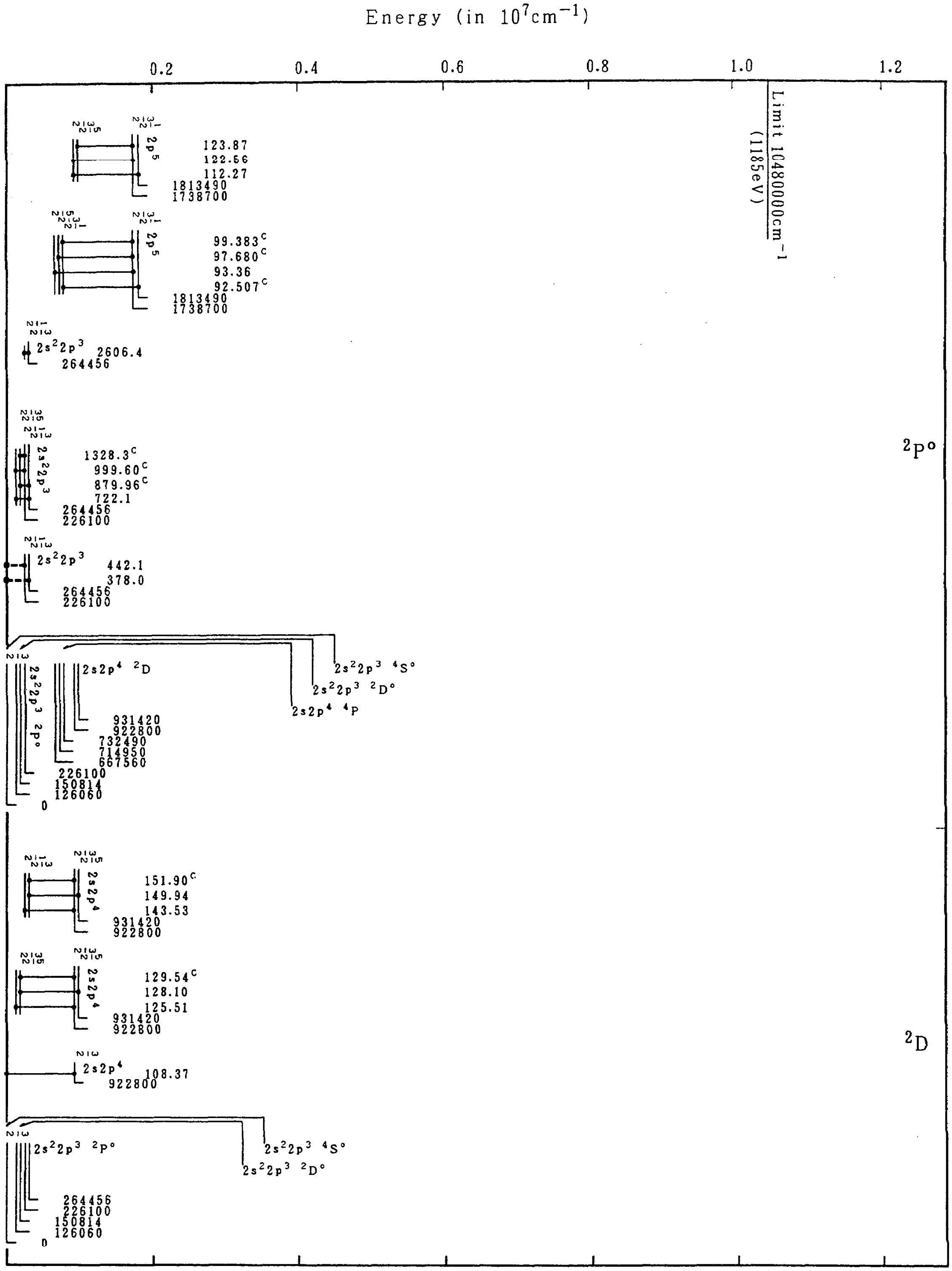


Cr XVIII(N−Sequence)



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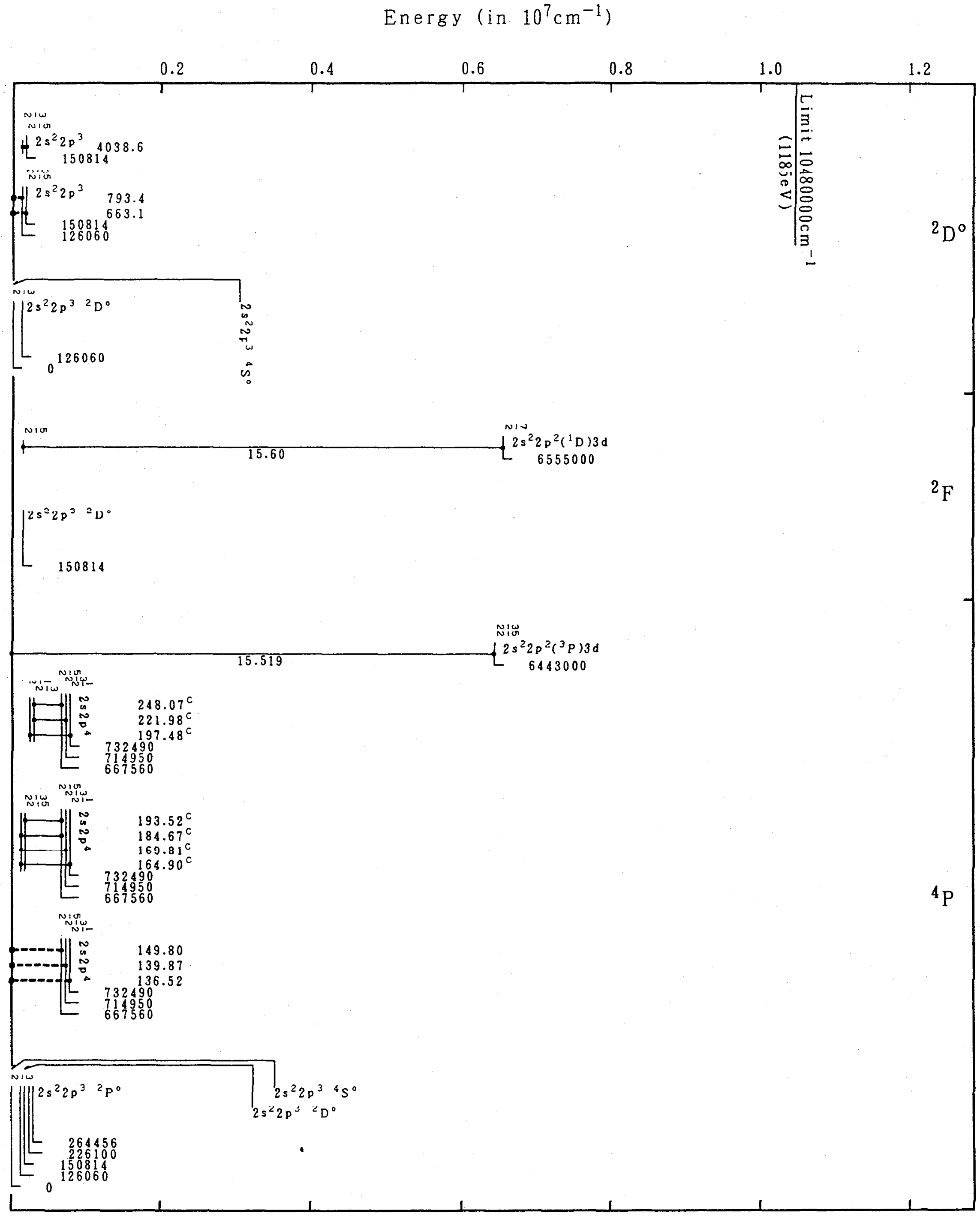

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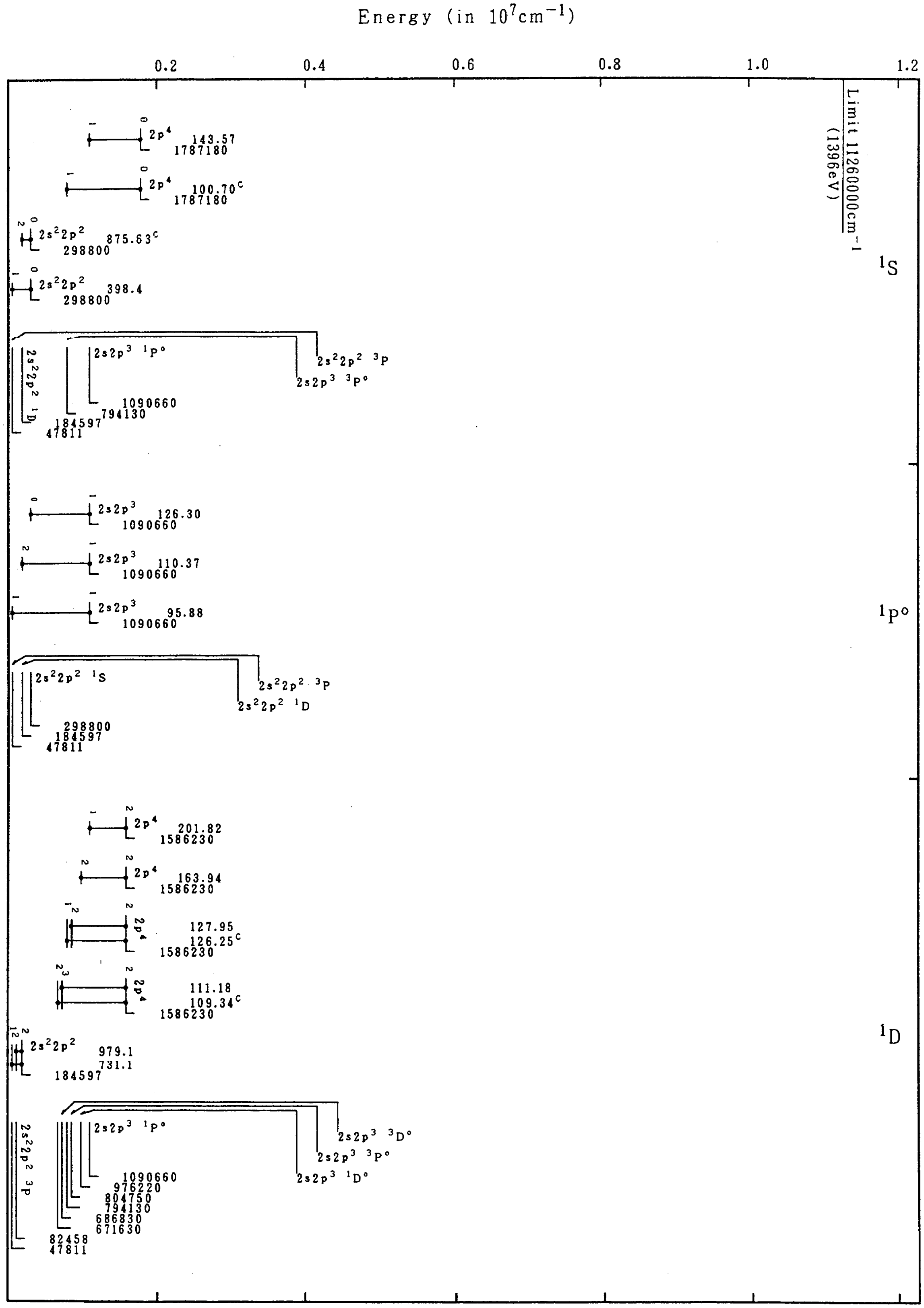

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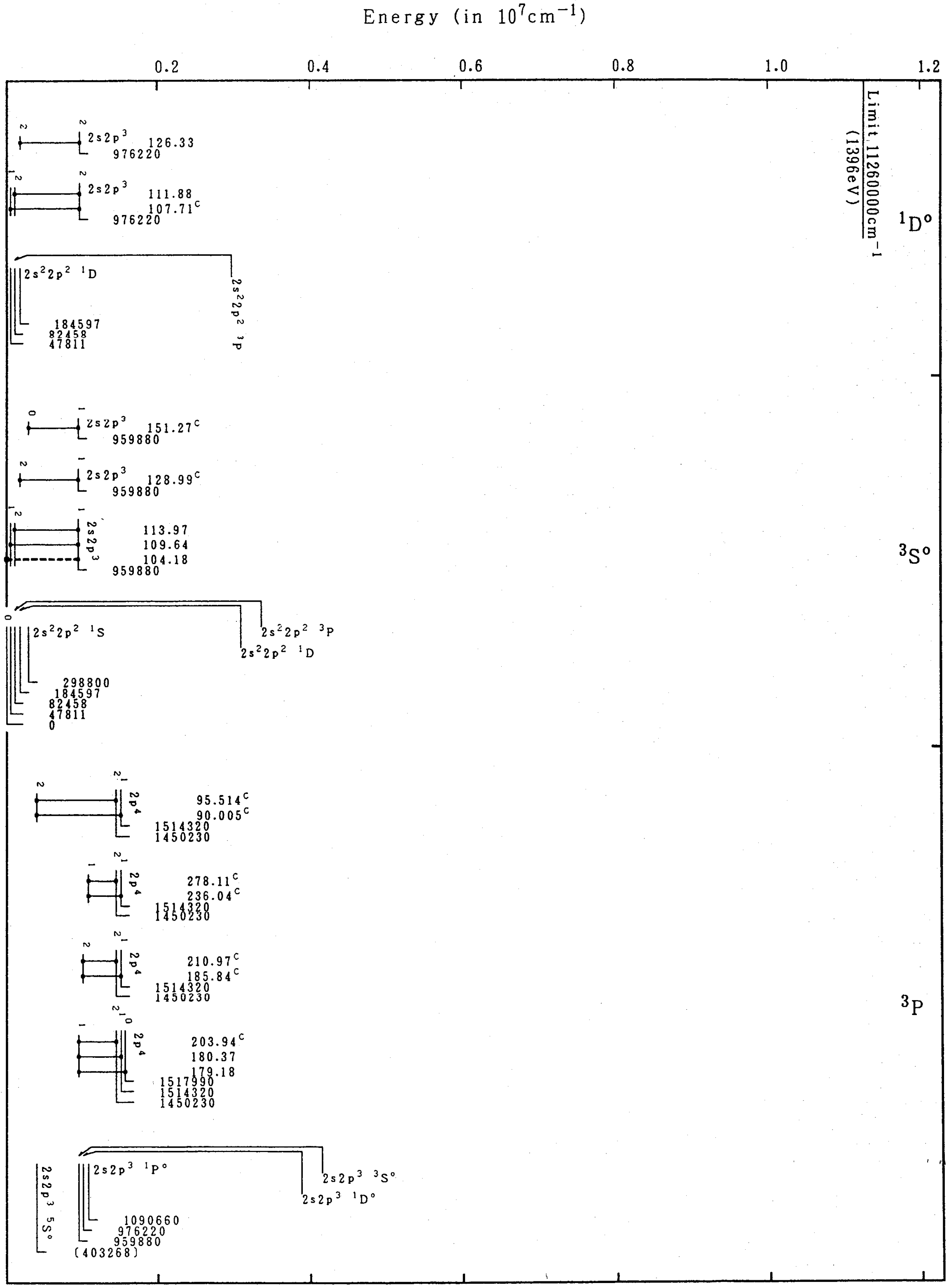

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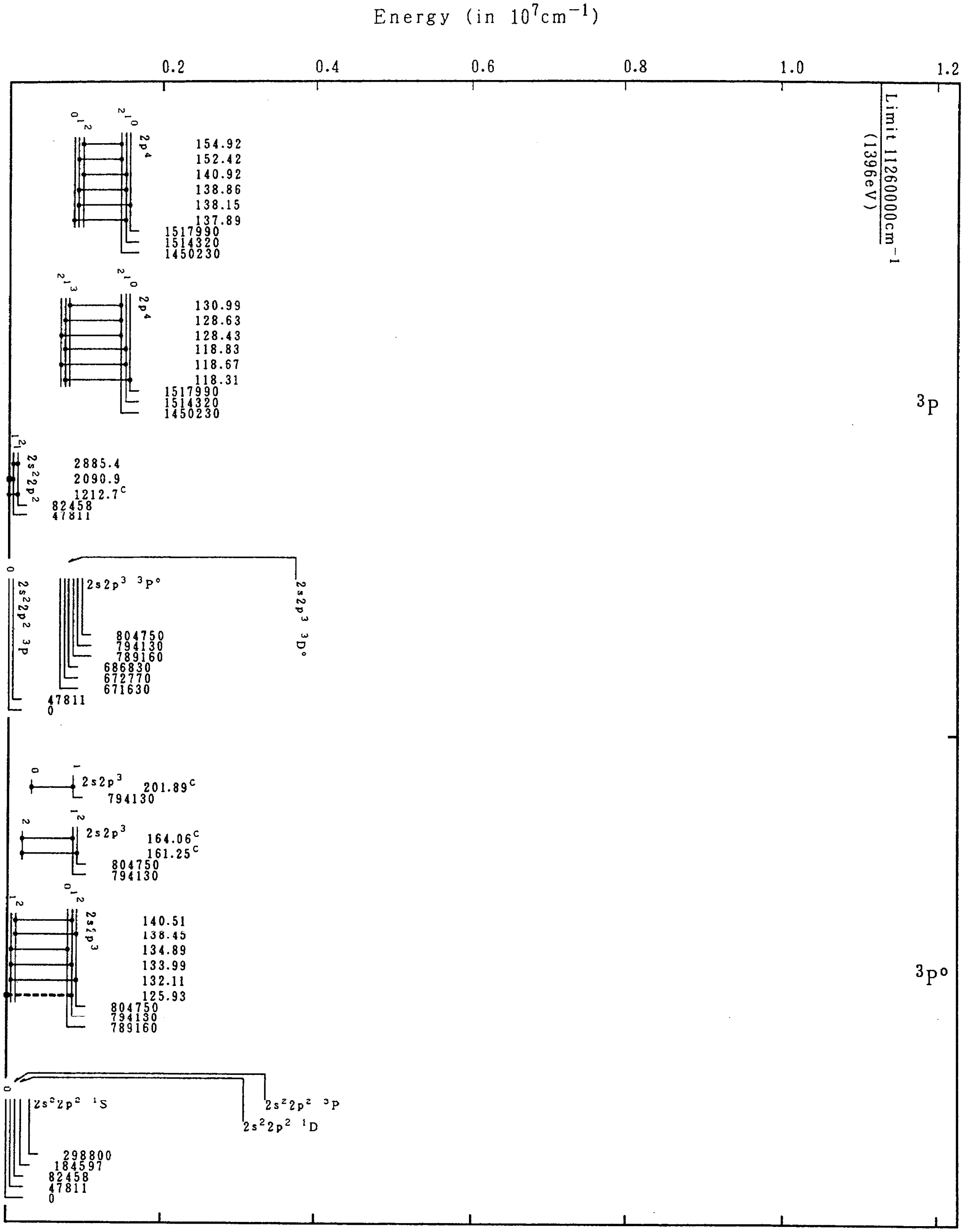

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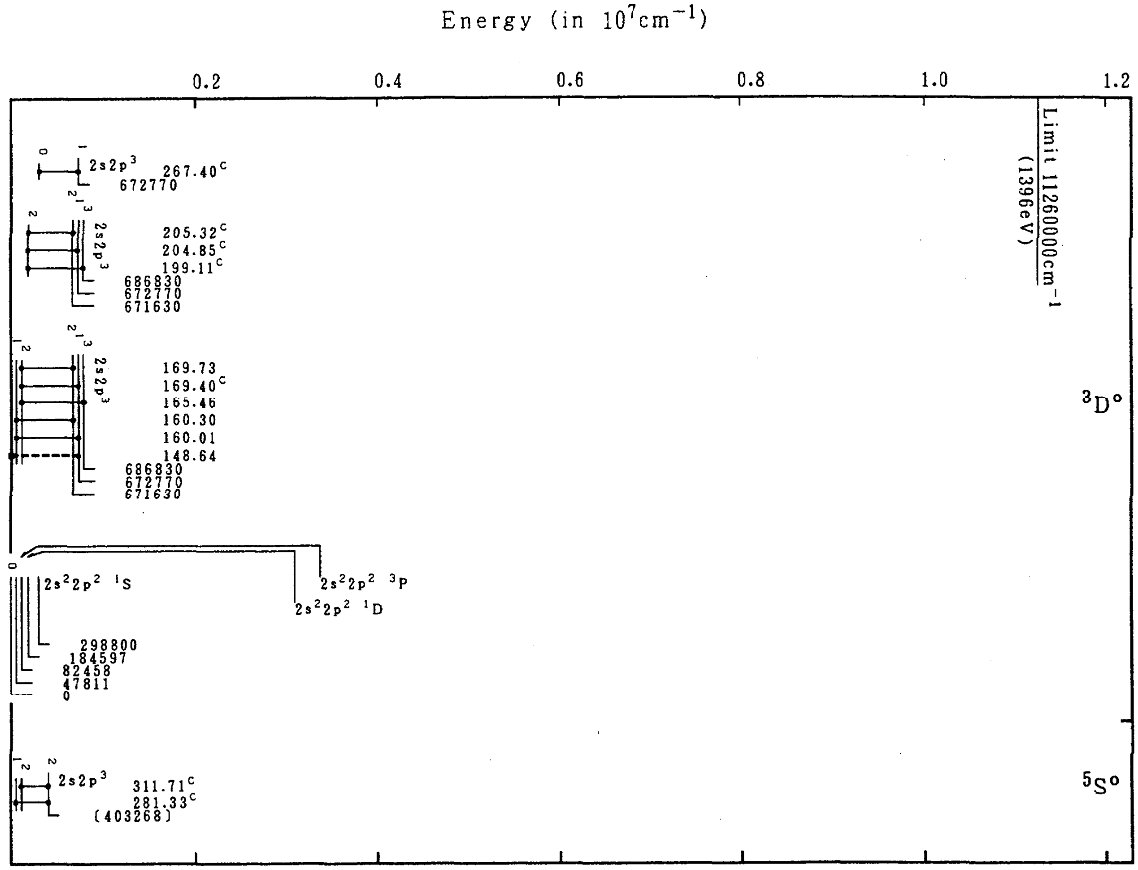

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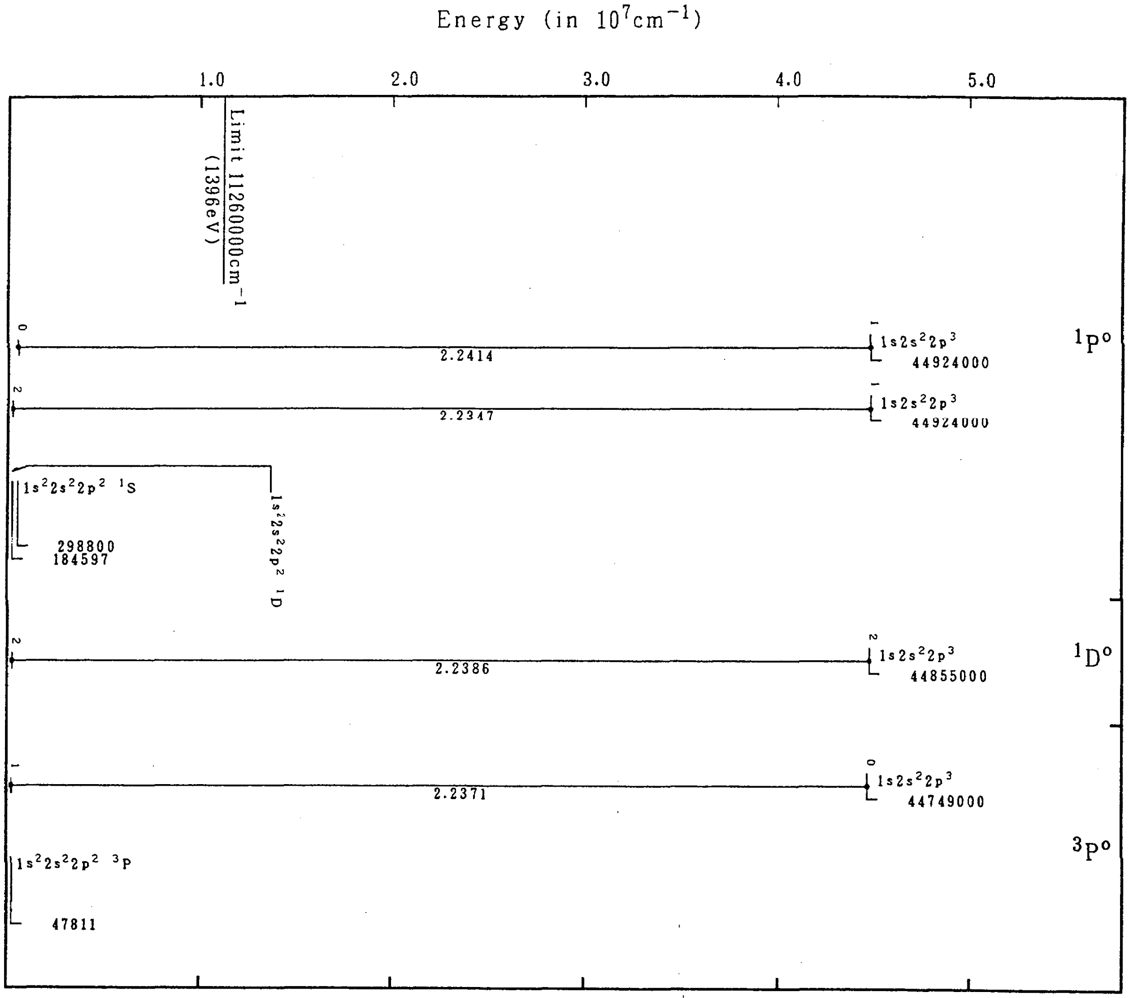

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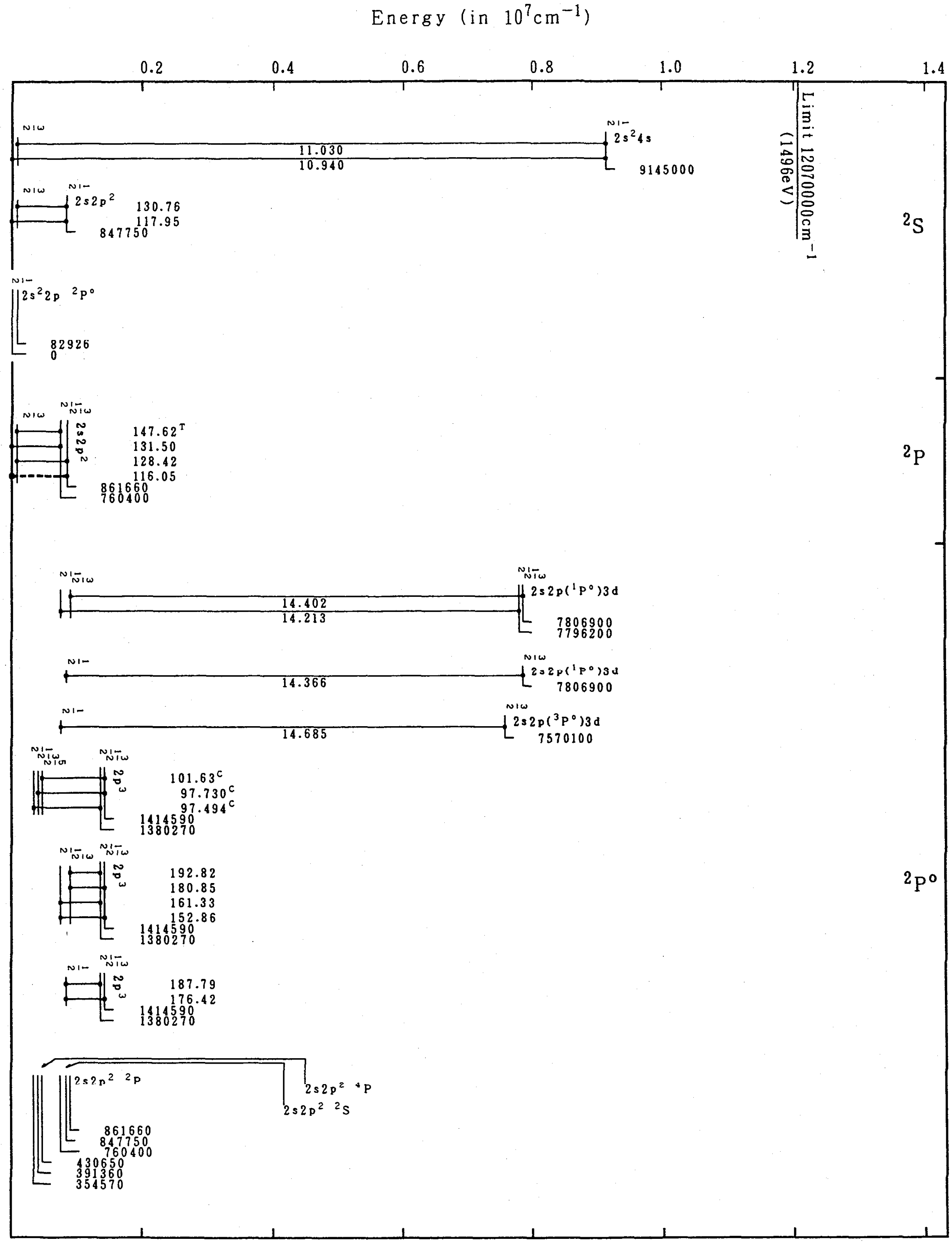

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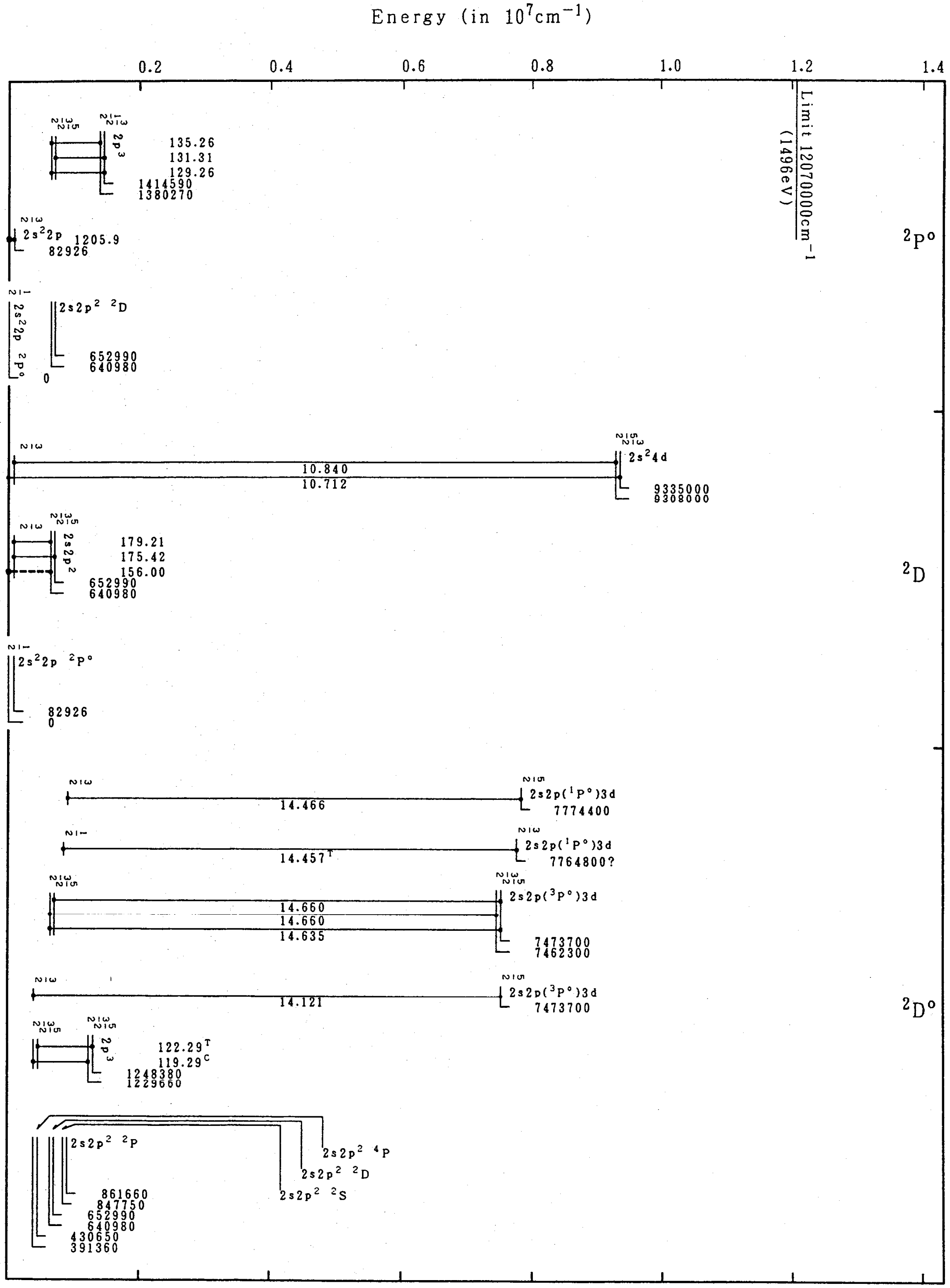

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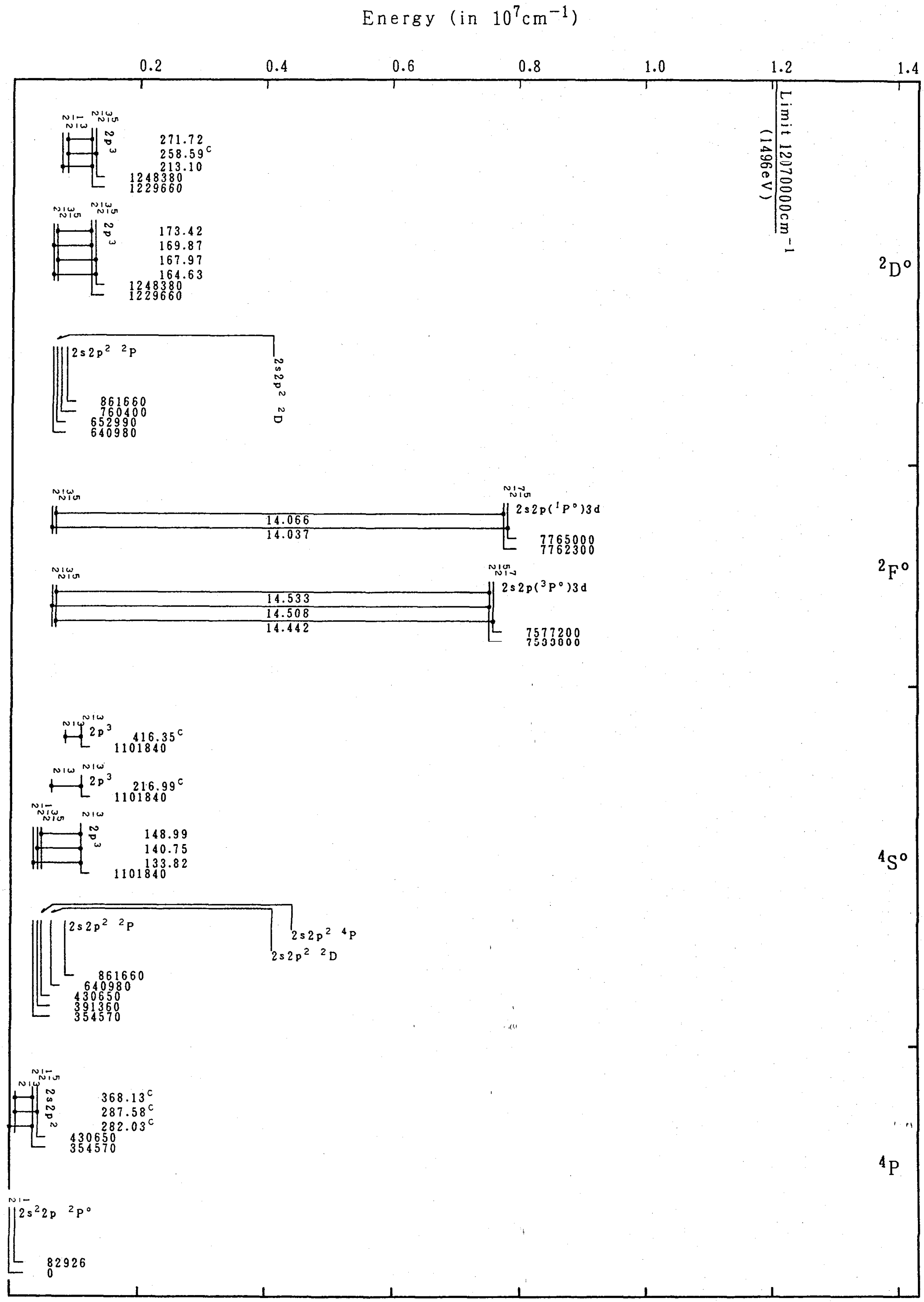

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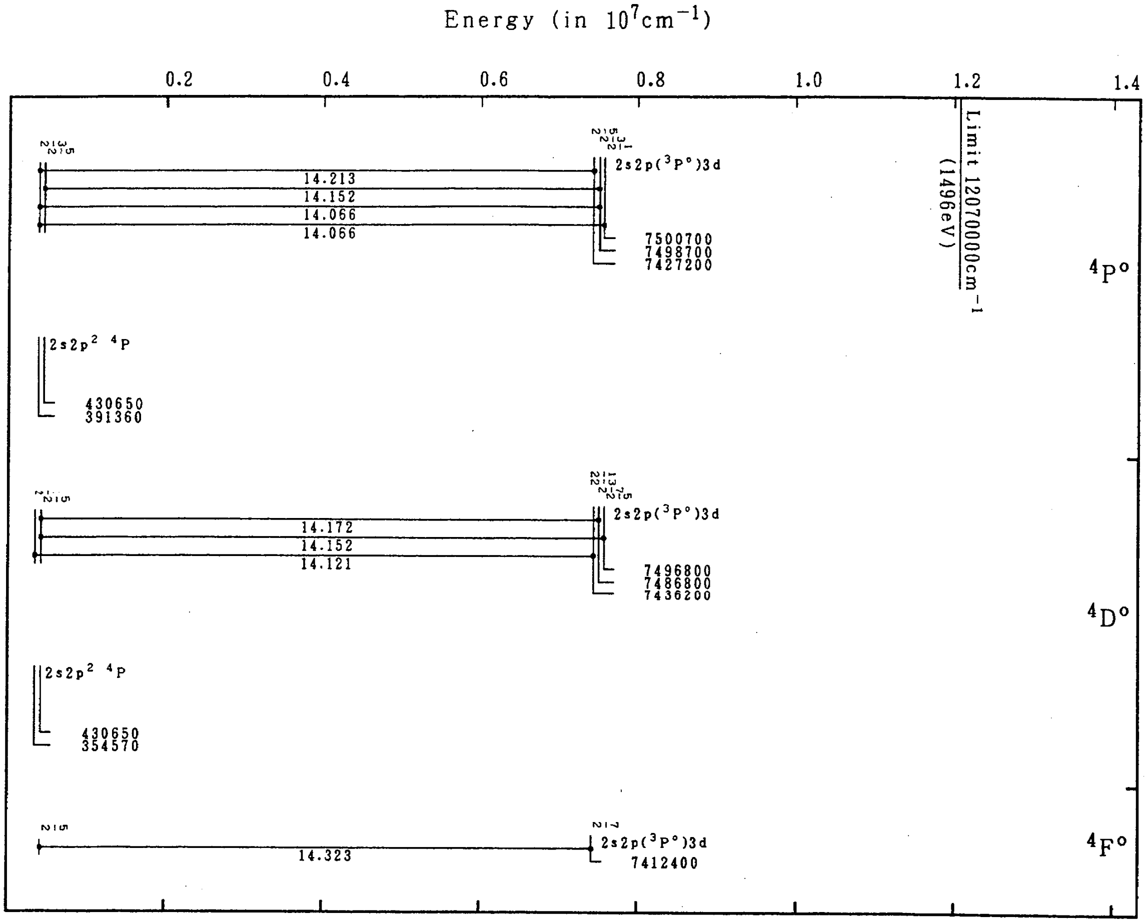

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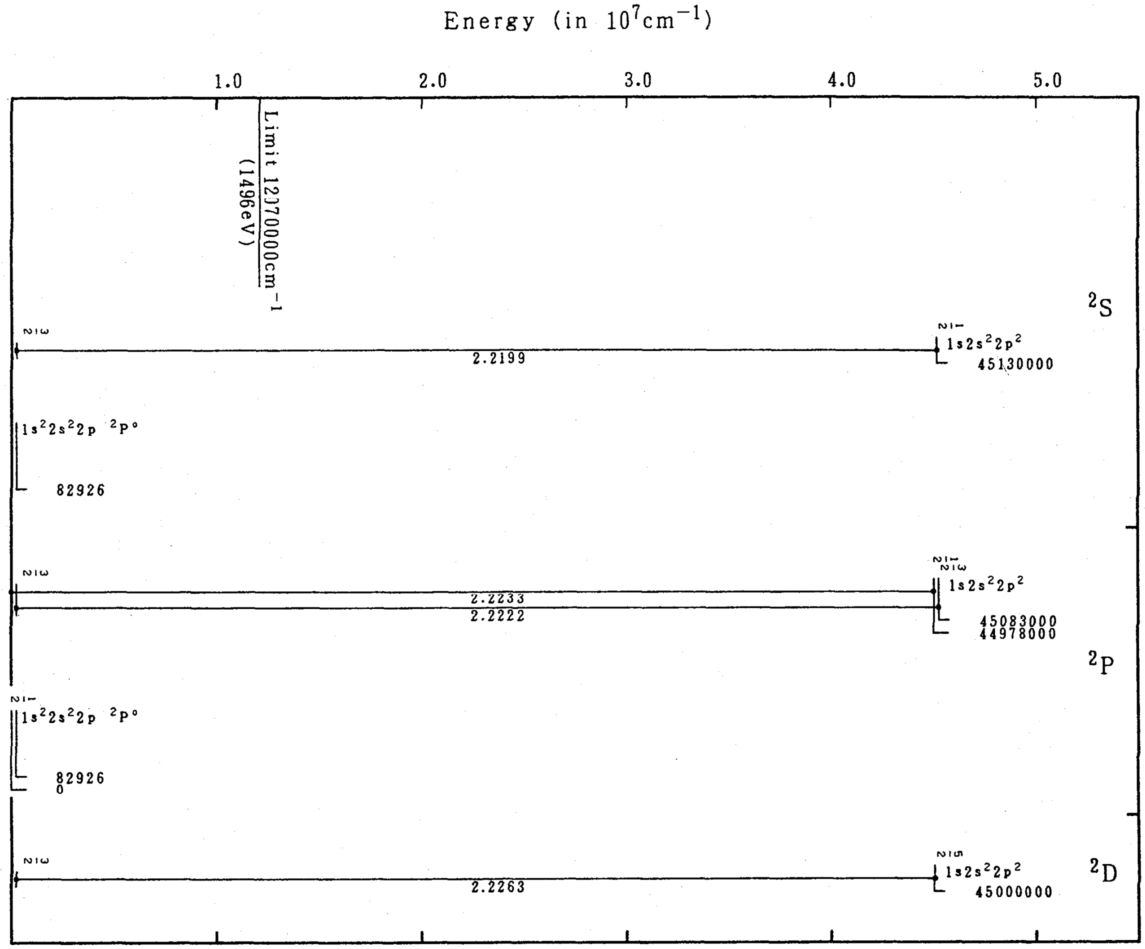

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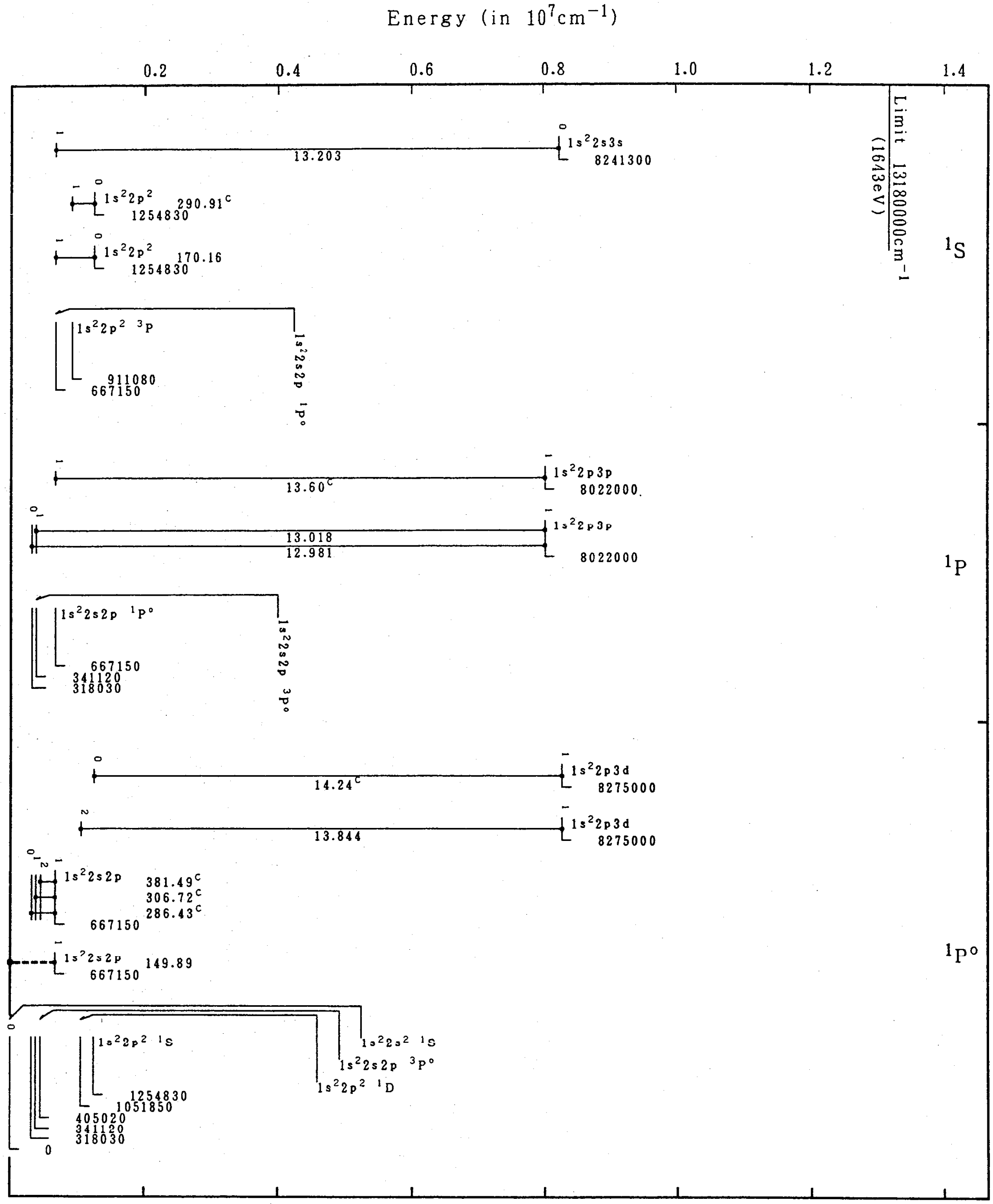

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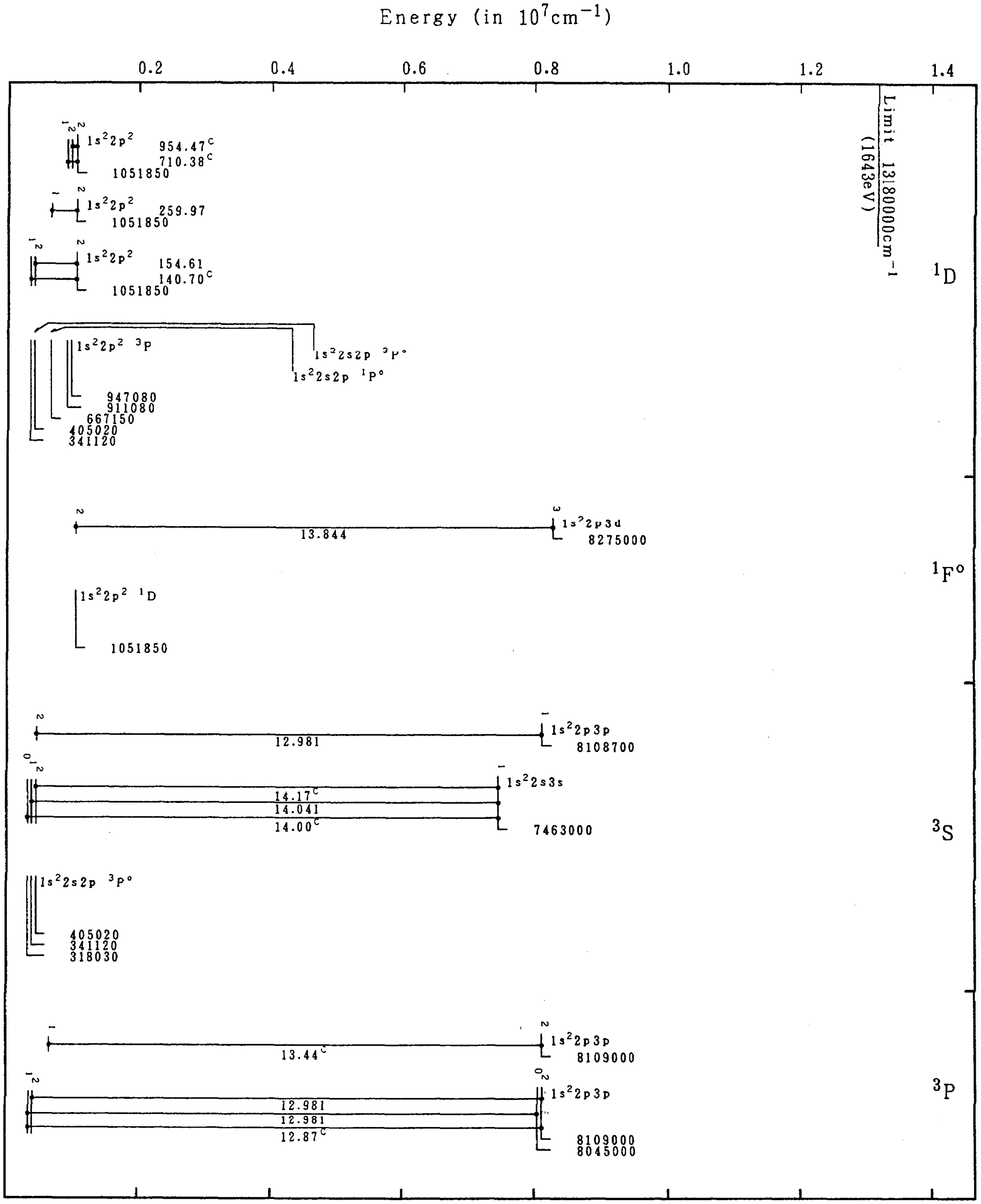

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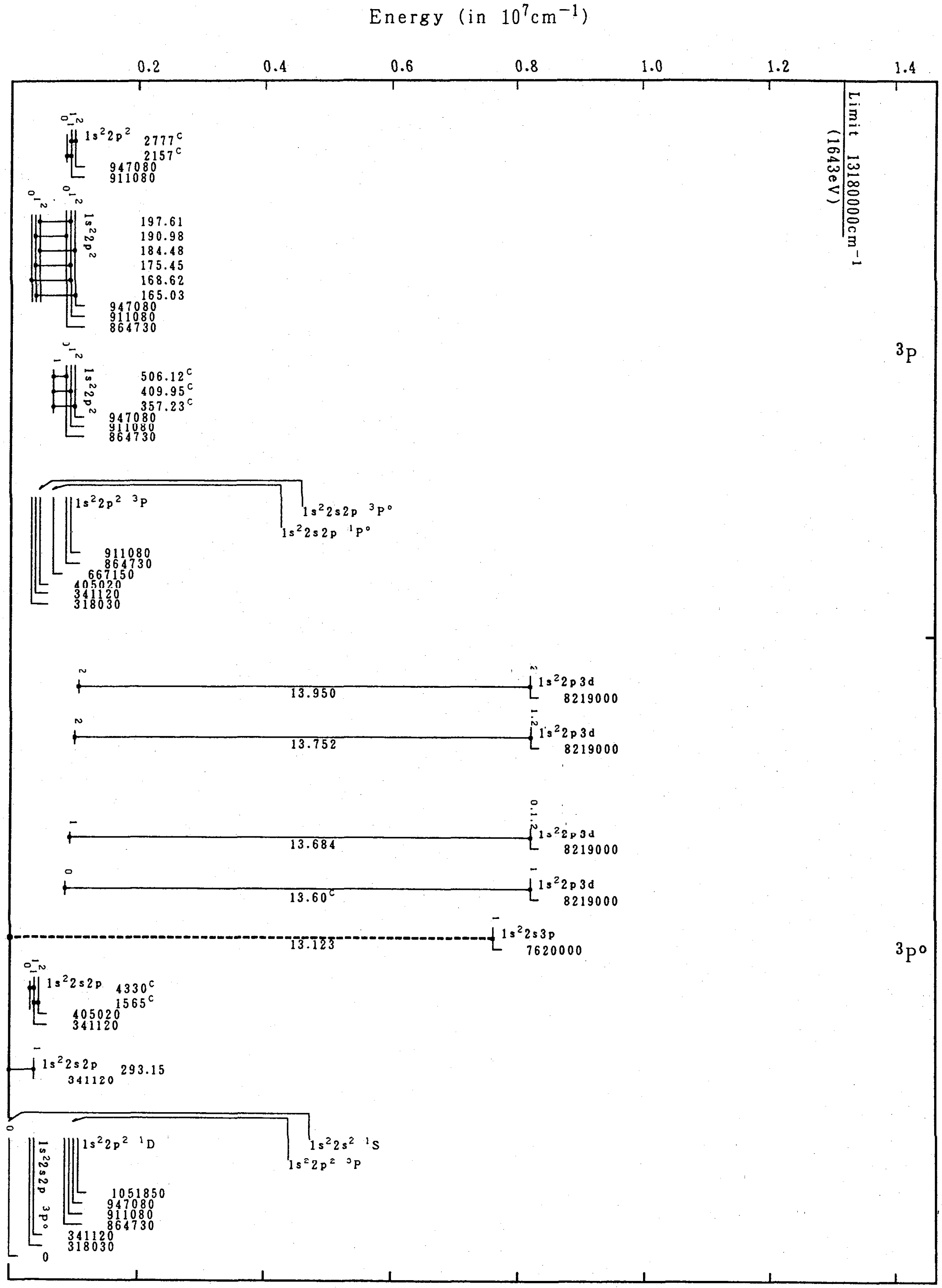

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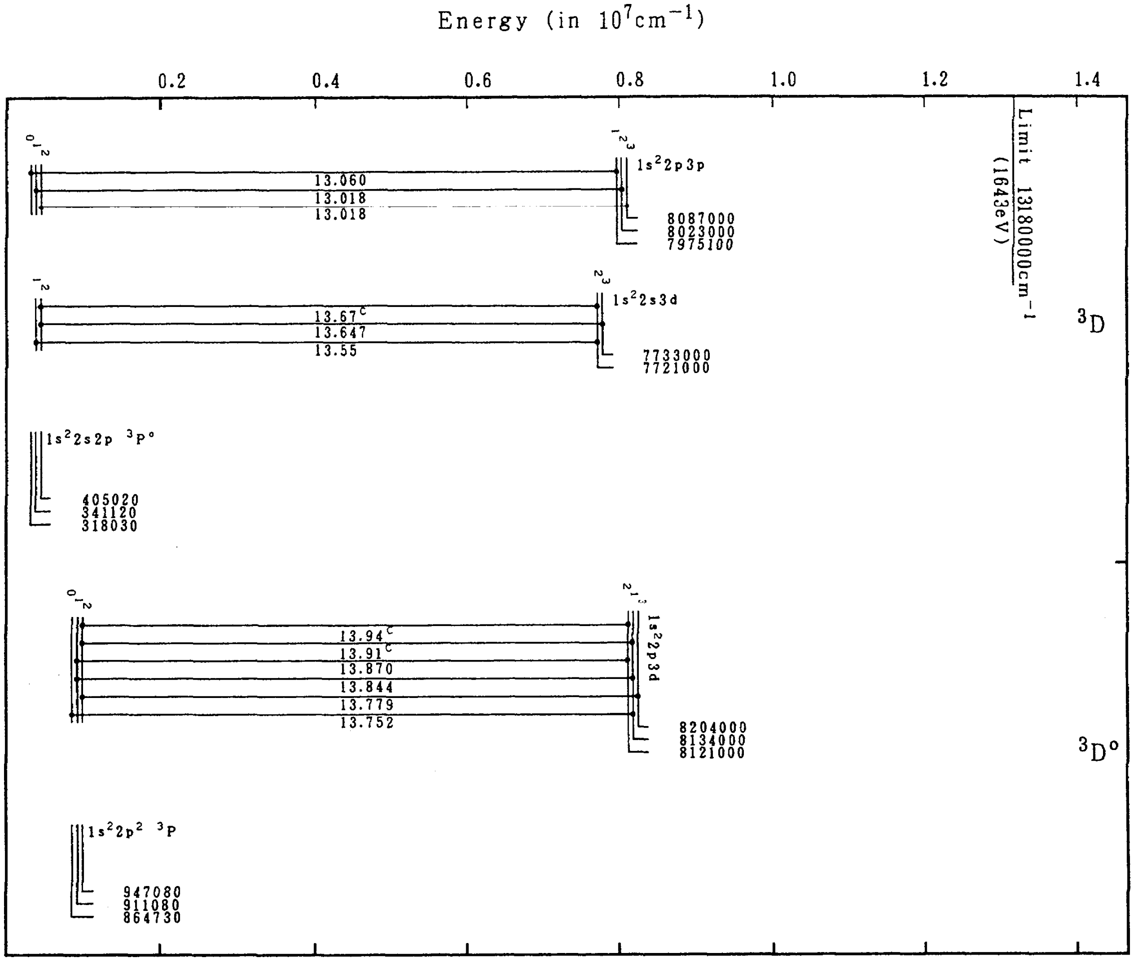

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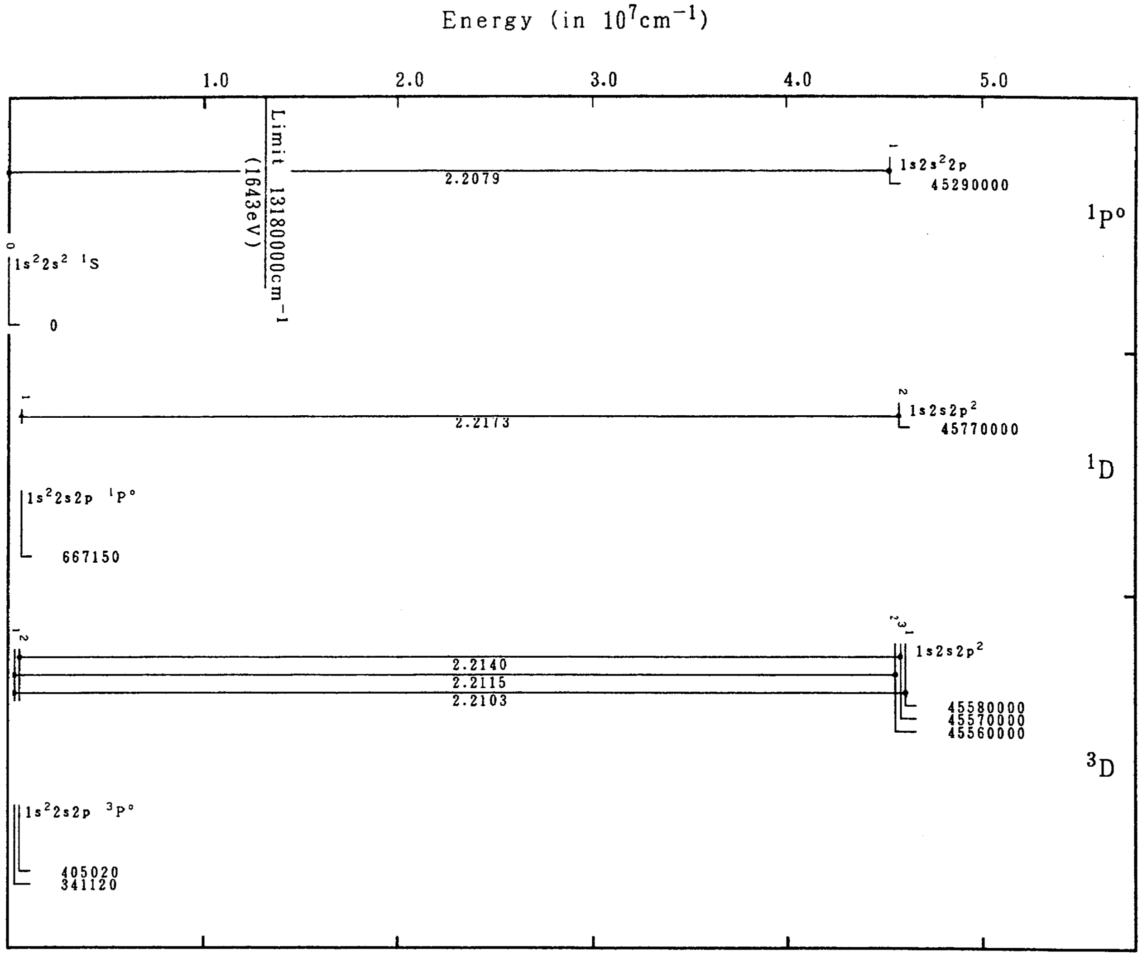

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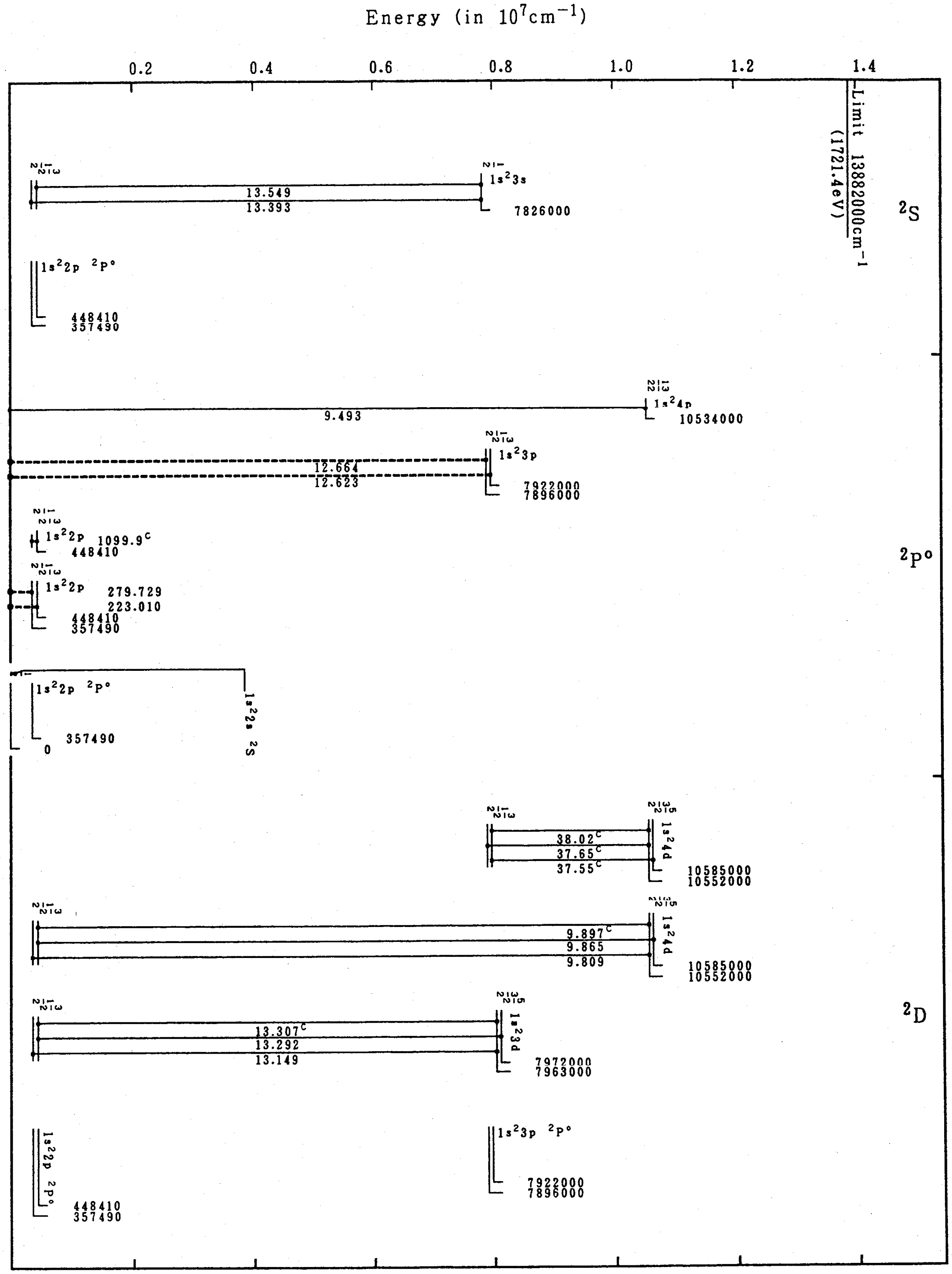
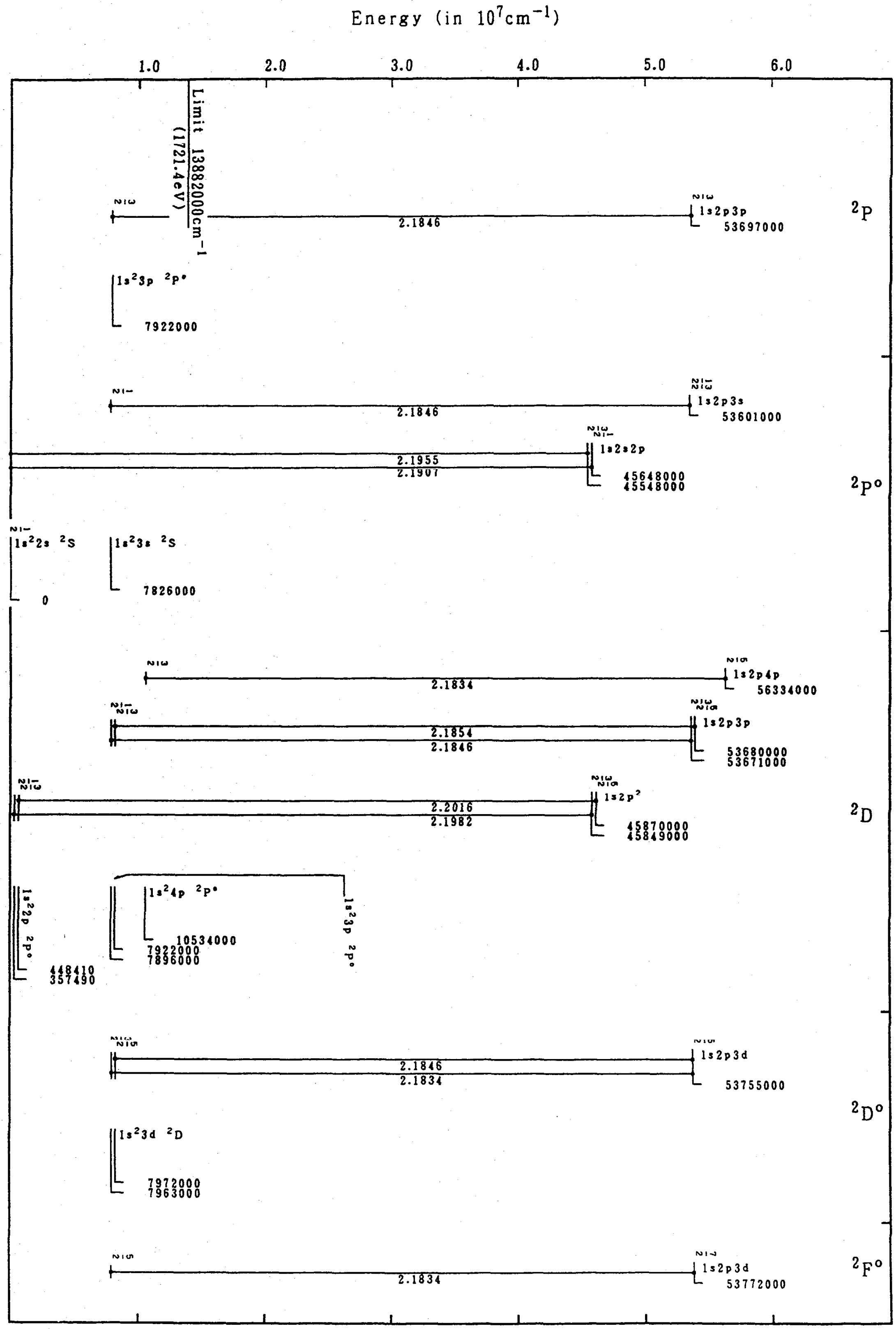


Cr XXII(Li–Sequence)



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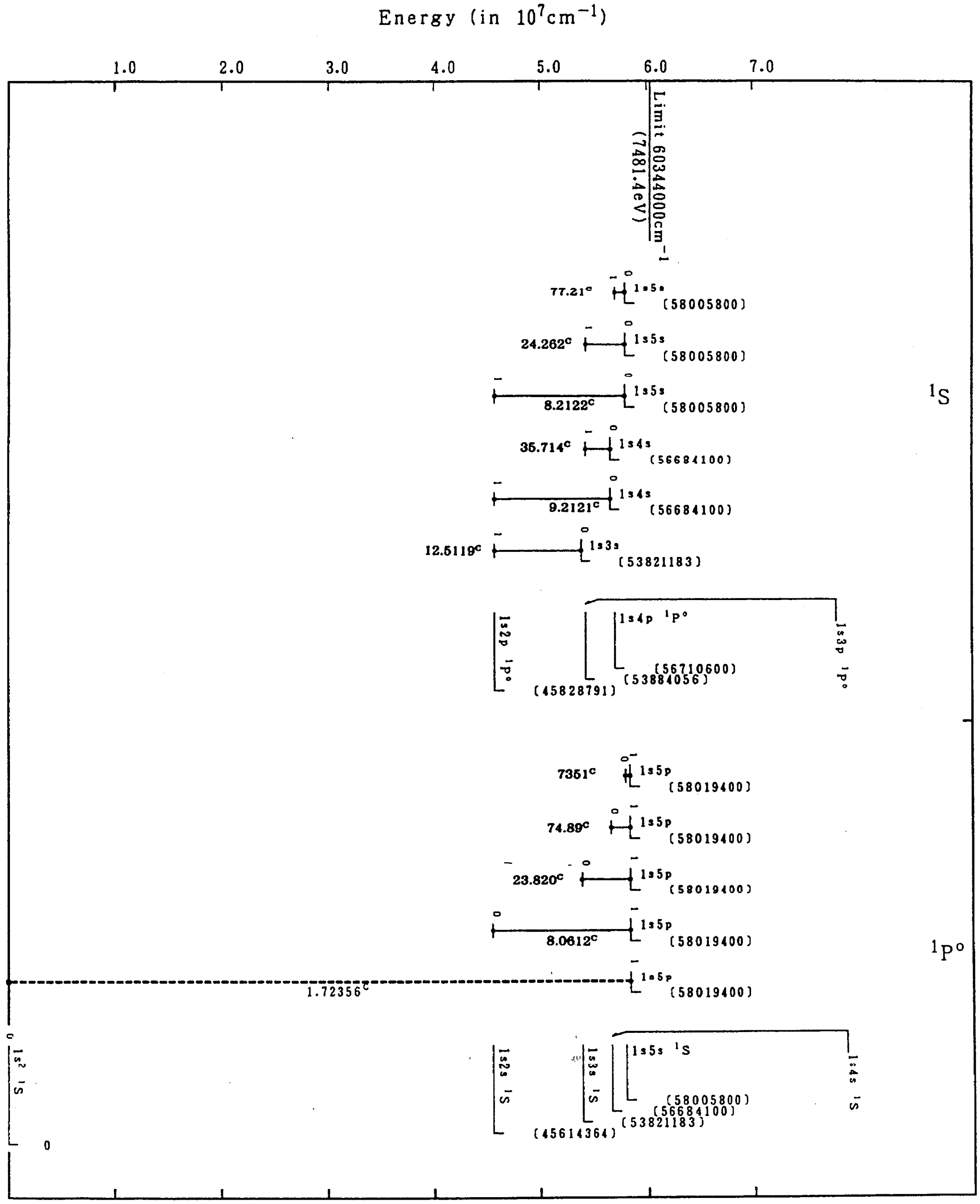
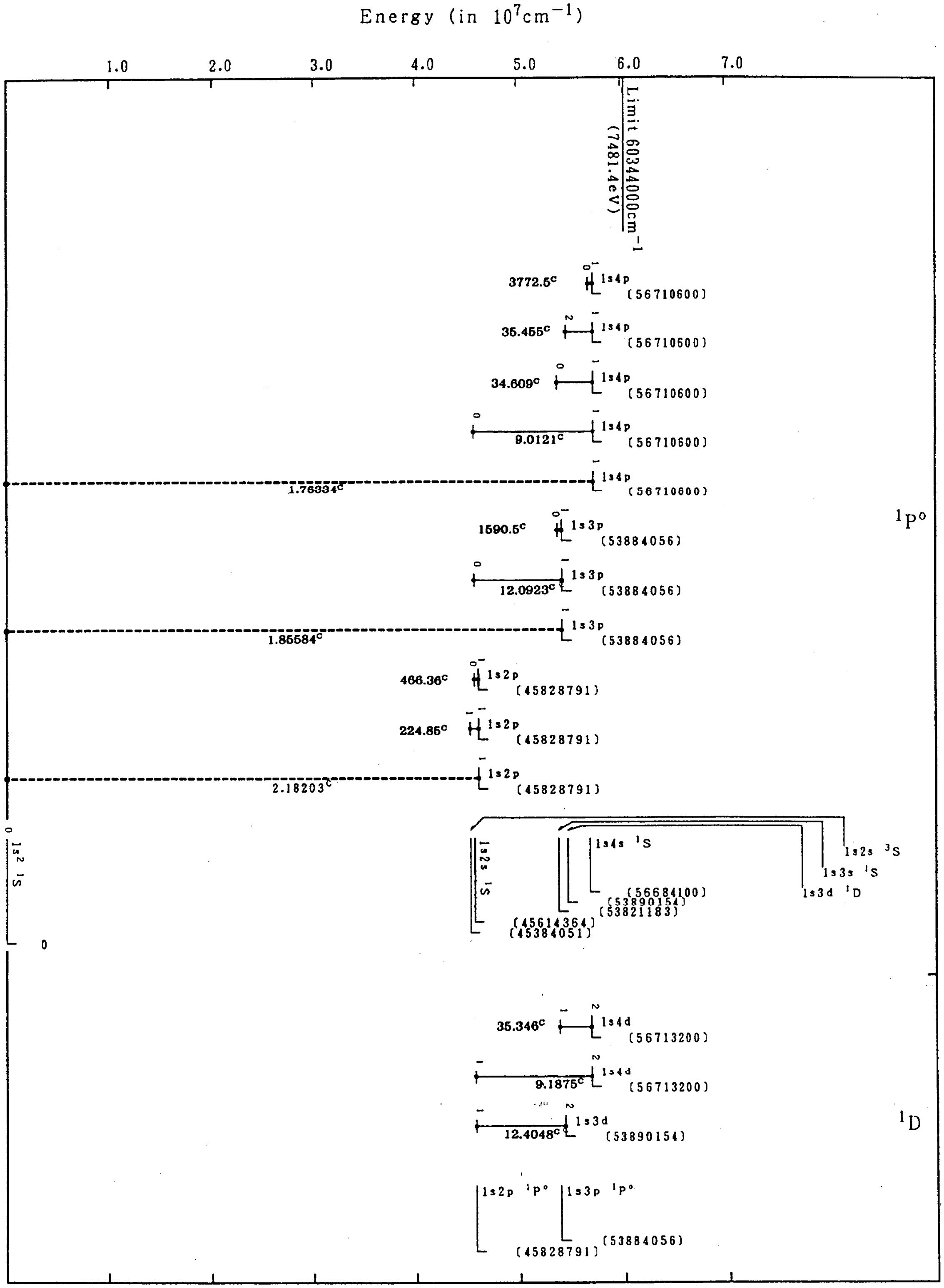
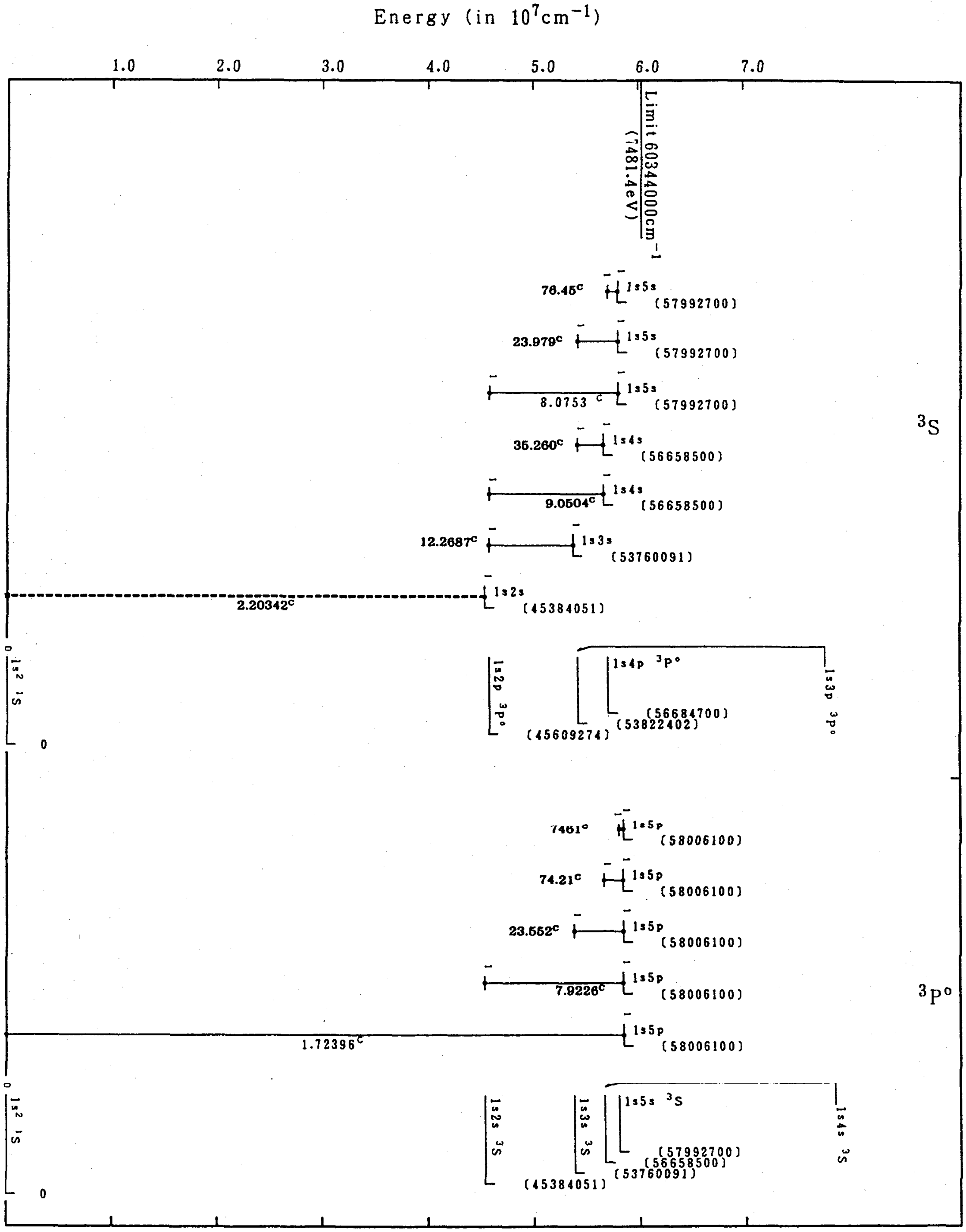


Cr XXIII(He–Sequence)



Cr XXIII(He–Sequence)



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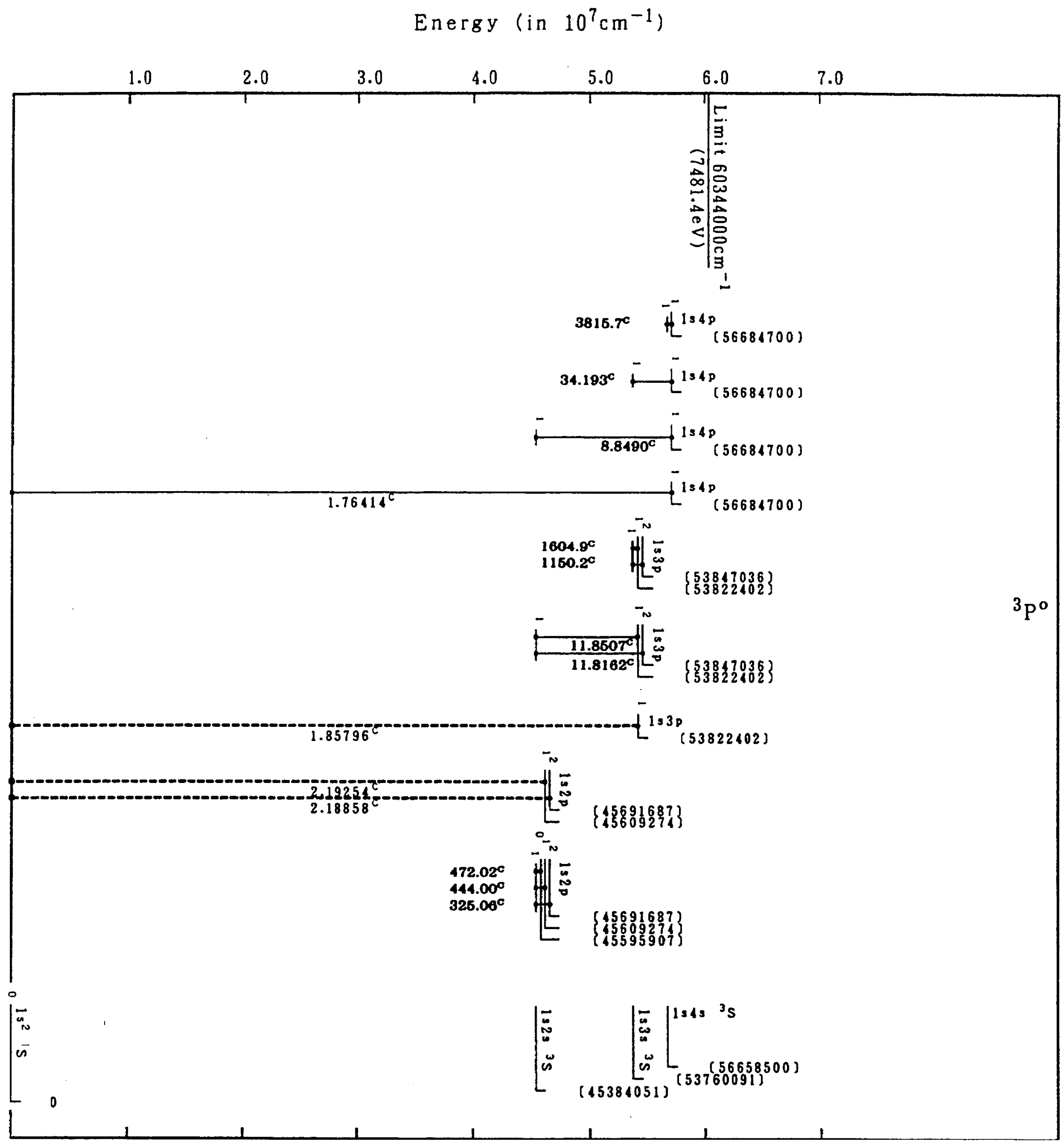

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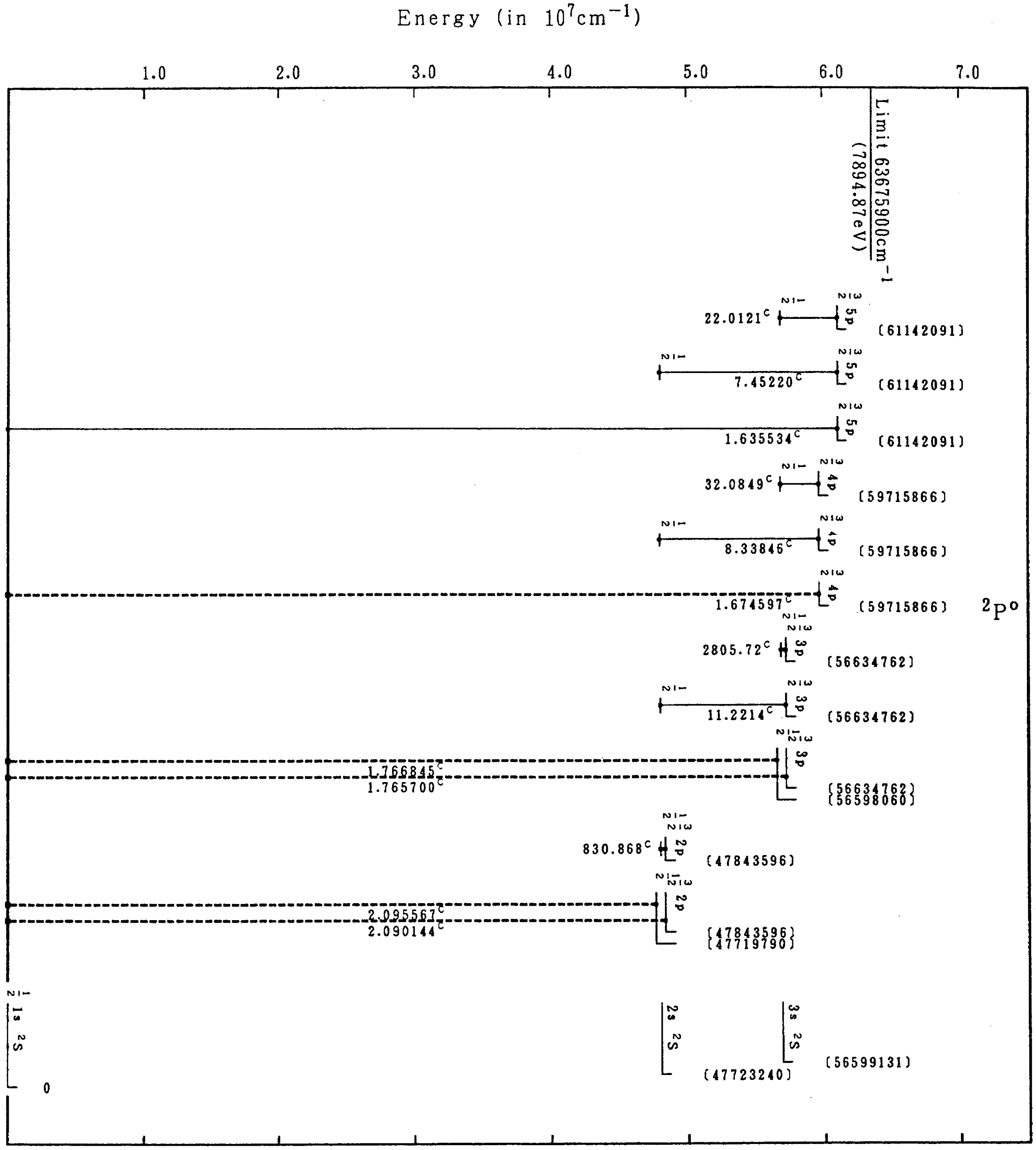
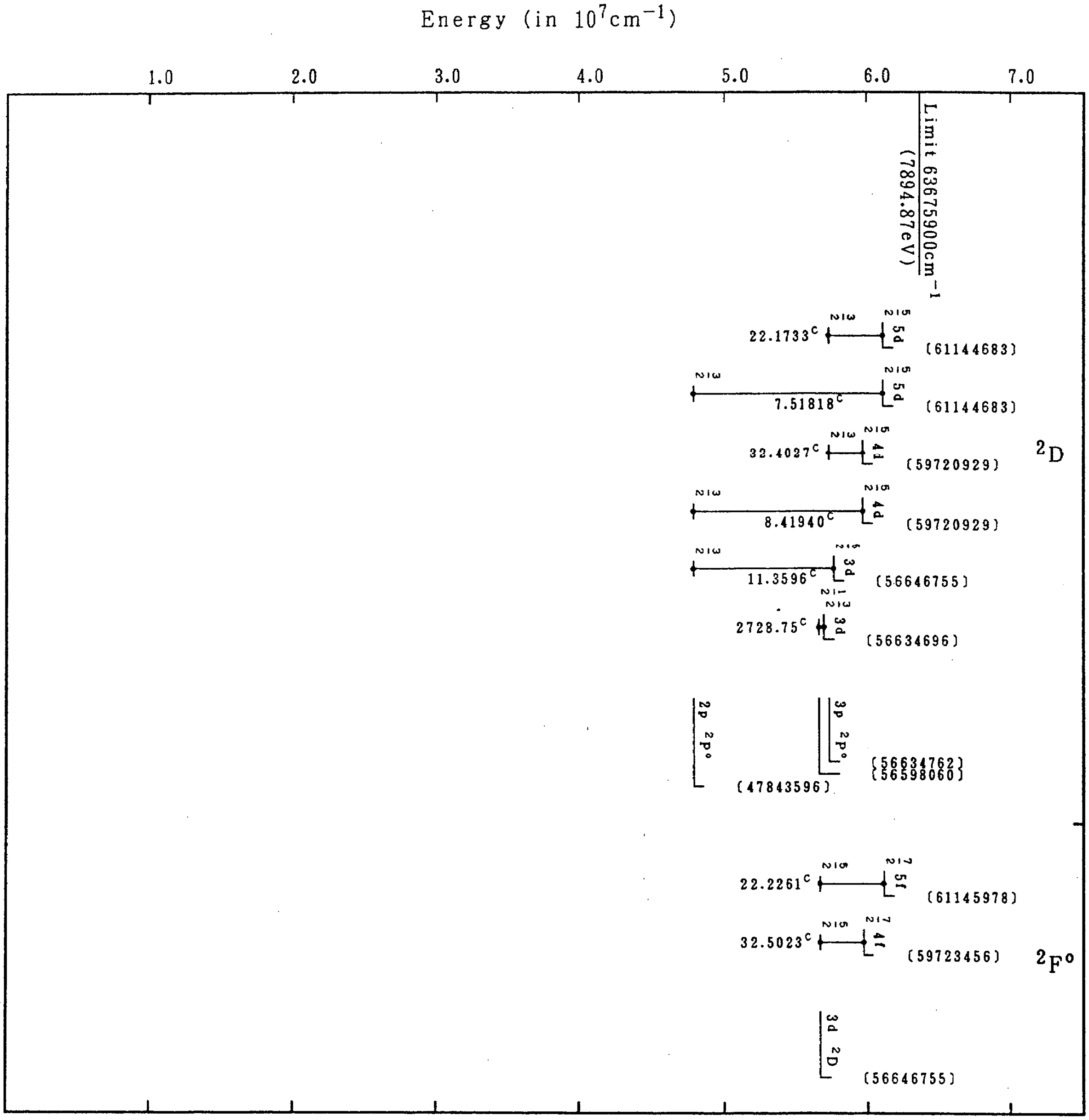


Cr XXIV(H−Sequence)



Cr XXIV(H–Sequence)

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