

Energies, E1, M1, E2 transition rates, hyperfine structures, and Landé g_J factors for states of the $2s^22p^2$, $2s2p^3$, and $2p^4$ configurations in carbon-like ions between F IV and Ni XXIII

P. Jönsson¹, P. Rynkun² and G. Gaigalas^{2,3}

¹Center for Technology Studies,
Malmö University, 20506 Malmö, Sweden

²Vilnius Pedagogical University,
Studentų g. 39, LT-08106 Vilnius, Lithuania

³Vilnius University, Institute of Theoretical Physics and Astronomy,
A. Goštauto 12, LT-01108 Vilnius, Lithuania

Abstract

Energies, E1, M1, E2 transition rates, hyperfine-structures, and Landé g_J factors from relativistic configuration interaction calculations are reported for the states of the $(1s^2)2s^22p^2$, $2s2p^3$, and $2p^4$ configurations in all carbon-like ions between F IV and Ni XXIII. Valence, core-valence, and core-core correlation effects were accounted for through SD-MR expansions to increasing sets of active orbitals. The calculated energy levels generally agree within a few hundred cm^{-1} with the experimentally compiled results, and the Babushkin (length) and Coulomb (velocity) forms of transition rates agree within less than 1% for a majority of the allowed transitions.

1 Introduction

Emission lines of carbon-like ions are highly useful in the diagnostics of the solar, astrophysical, and fusion plasmas [1]. For this reason a number of researchers have calculated energy levels and transition rates over the years. Fawcett has presented oscillator strengths and energy levels for allowed 2-2 and 2-3 transitions in carbon-like ions between F IV and Ni XXIII based on calculations using the HFR code of Cowan [2, 3]. Aggarwal *et. al* used the CIV3 code to obtain rates between low-lying states for a number of ions from F IV to Ar XIII [4, 5, 6]. Zhang and Sampson used the relativistic distorted wave method to obtain values for a large number of states [7, 8]. Froese Fischer and Tachiev calculated energy levels and transition rates for low-lying states for ions up to Al VIII using multiconfiguration Breit-Pauli wave functions [9]. More recently Jönsson and Bieroń used the relativistic configuration interaction (RCI) method to obtain energy levels, transition rates, hyperfine-structure parameters and Landé g_J values for low lying states in N II, O III, F IV, Ne V, and Ti XVII [10]. The present work extends the work of Jönsson and Bieroń, and we report data for states of the $2s^22p^2$, $2s2p^3$, and $2p^4$ configurations for carbon-like ions between F IV and Ni XXIII. There are few data on hyperfine structure and Landé g_J factors available in the literature, and the computed values should fill this gap. The accuracy of the present data are assessed, and rates for selected transitions are compared with earlier reported values.

2 Computational procedure

Here we give a brief outline of the multiconfiguration Dirac-Hartree-Fock (MCDHF) method [11]. Starting from the Dirac-Coulomb Hamiltonian

$$H_{\text{DC}} = \sum_{i=1}^N (c \boldsymbol{\alpha}_i \cdot \mathbf{p}_i + (\beta_i - 1)c^2 + V_i^N) + \sum_{i>j}^N 1/r_{ij}, \quad (1)$$

where V^N is the monopole part of the electron-nucleus Coulomb interaction, the atomic state functions (ASFs) describing different fine-structure states are obtained as linear combinations of symmetry adapted configuration state functions (CSFs)

$$|\gamma JM_J\rangle = \sum_{j=1}^{N_{\text{CSFs}}} c_j |\gamma_j JM_J\rangle. \quad (2)$$

In the expression above J and M_J are the angular quantum numbers. γ denotes other appropriate labeling of the configuration state function, for example parity, orbital occupancy, and coupling scheme. The configuration state functions are built from products of one-electron Dirac orbitals. In the relativistic self-consistent field procedure both the radial parts of the Dirac orbitals and the

expansion coefficients are optimized to self-consistency. The Breit interaction

$$H_{\text{Breit}} = - \sum_{i < j}^N \left[\boldsymbol{\alpha}_i \cdot \boldsymbol{\alpha}_j \frac{\cos(\omega_{ij} r_{ij}/c)}{r_{ij}} + (\boldsymbol{\alpha}_i \cdot \nabla_i)(\boldsymbol{\alpha}_j \cdot \nabla_j) \frac{\cos(\omega_{ij} r_{ij}/c) - 1}{\omega_{ij}^2 r_{ij}/c^2} \right] \quad (3)$$

as well as leading QED corrections can be included in subsequent RCI calculations [12]. Calculations can be done for single levels, but also for portions of a spectrum in the extended optimal level (EOL) scheme, where optimization is on a weighted sum of energies [13]. Using the latter scheme a balanced description of a number of fine-structure states belonging to one or more configurations can be obtained in a single calculation. All calculations were performed with the GRASP2K code [14].

3 Computation of atomic properties

Once the atomic state functions have been obtained, different properties like hyperfine-structures and oscillator strengths can be expressed in terms of reduced matrix elements of tensor operators of different rank

$$\langle \gamma J \| \mathbf{T}^{(k)} \| \gamma' J' \rangle. \quad (4)$$

Inserting the CSF expansions, the expression above reduces to a sum over matrix elements between CSFs. Using Racah algebra techniques these matrix elements, in turn, can be obtained as sums over radial integrals [15].

3.1 Hyperfine-structure

In atoms with nuclear spin the fine-structure levels are split into closely spaced hyperfine levels. The splittings of the fine-structure levels are to first order given by the magnetic dipole A_J and electric quadrupole B_J hyperfine interaction constants

$$A_J = \frac{\mu_I}{I} \frac{1}{\sqrt{J(J+1)}} \langle \gamma J \| \sum_{j=1}^N -i\sqrt{2}\alpha r_j^{-2} (\boldsymbol{\alpha}_j \mathbf{C}^{(1)}(j))^{(1)} \| \gamma J \rangle, \quad (5)$$

$$B_J = 2Q \sqrt{\frac{J(2J-1)}{(J+1)(2J+3)}} \langle \gamma J \| \sum_{j=1}^N -r_j^{-3} \mathbf{C}^{(2)}(j) \| \gamma J \rangle, \quad (6)$$

where the reduced matrix elements are defined in the Brink and Satchler sense [16]. The hyperfine levels of closely spaced fine-structure levels are also affected by the off-diagonal hyperfine interaction [17]. This effect is however small and is neglected in the present study. The nuclear magnetic dipole moments μ_I and the nuclear quadrupole moments Q for the different isotopes were taken from a compilation by Stone [18].

3.2 Landé g_J -factors

The Landé g_J -factors are given by

$$g_J = \frac{2}{\sqrt{J(J+1)}} \langle \gamma J \| \sum_{j=1}^N \left[-i \frac{\sqrt{2}}{2\alpha^2} r_j \left(\boldsymbol{\alpha}_j \mathbf{C}^{(1)}(j) \right)^{(1)} + \frac{g_s - 2}{2} \beta_j \boldsymbol{\Sigma}_j \right] \| \gamma J \rangle, \quad (7)$$

and determine the splitting of magnetic sub-levels in external magnetic fields. In addition they give information about the coupling conditions in the system [19]. The Landé g_J -factors were calculated using the Zeeman module of GRASP2K [20].

3.3 Transition parameters

The transition parameters, such as rates for spontaneous decay, for multipole transitions between two atomic states $\gamma J M_J$ and $\gamma' J' M'_J$ can be expressed in terms of reduced transition matrix elements

$$\langle \gamma J \| \mathbf{Q}_k^{(\lambda)} \| \gamma' J' \rangle, \quad (8)$$

where $\mathbf{Q}_k^{(\lambda)}$ is the electromagnetic multipole operator of order k in Coulomb or Babushkin gauge [21]. The superscript designates the type of multipole: $\lambda = 1$ for electric multipoles and $\lambda = 0$ for magnetic multipoles. Standard Racah algebra assumes that the atomic state functions are built from the same orthogonal radial orbital set. However, this restriction can be relaxed. To compute transition matrix elements between two atomic state functions described by independently optimized orbital sets, transformations of the atomic state functions are performed in such a way that the orbital sets become biorthogonal, in which case the calculation can be handled using standard techniques [22].

4 Generation of configuration expansions

In this work calculations were done by configuration, i.e. wave functions for all states belonging to a specific configuration were determined simultaneously in an EOL calculation [13]. The configuration expansions were obtained using the active set method [23, 24]. Here CSFs of a specified parity and J symmetry are generated by excitations from a number of reference configurations to a set of relativistic orbitals. By applying restrictions on the allowed excitations, different electron correlation effects can be targeted. To monitor the convergence of the calculated energies and transition parameters, the active sets were increased in a systematic way by adding layers of correlation orbitals. In the present work valence, core-valence, and core-core correlation effects were included, and the configuration expansions were obtained by SD-excitations to active sets with principal quantum numbers $n = 3 \dots 8$ and orbital quantum numbers $l = 0 \dots 5$ (i.e. angular symmetries s, p, d, f, g, h) from all shells of the $(1s^2)2s^2 2p^2$, $2s 2p^3$, and $2p^4$ configurations.

The self-consistent field calculations for each layer of orbitals were followed by RCI calculations, including the Breit interaction. At the final stage the multireference set for the states of the $2s^22p^2$ and $2p^4$ configurations were enlarged to include $\{2s^22p^2, 2p^4, 2s2p^23d, 2s^23d^2\}$. The multireference was chosen based on the criteria that it should contain the configurations that had the largest weights in the preceding self-consistent field calculations. Among the states generated by SD-excitations from the multireference set only those interacting with the multireference states were kept. In the same way the multireference set for $2s2p^3$ was enlarged to include the configurations $\{2s2p^3, 2p^33d, 2s^22p3d, 2s2p3d^2\}$. The leading QED effects – vacuum polarization and self-energy – were included in the final multireference RCI calculations.

The configuration space was explored in two directions in the current work: through the enlarged active set of orbitals, and through the increased multireference set. It would be desirable to increase the size of both sets further, but it would cross the limit imposed by the computational resources at hand. All calculations were performed on a single processor machine with 3 Gb internal memory and the largest multireference expansion, the one for the $2s2p^3$ states, contained almost 1 000 000 CSFs distributed over the $J = 0, 1, 2, 3$ symmetry blocks. Convergence patterns of energies and other calculated properties are given in [10], and we refer to this article for a thorough discussion of the completeness of the orbital basis.

5 Results and evaluation of data

Table 1 displays the experimental energy levels and the computed energies from the largest RCI calculations including QED corrections. The computed energies agree very well with the experimental values. Energy differences are in most cases around a few hundred cm^{-1} . The only exceptions are the $2s2p^3\ ^5S_2^o$ and $2p^4\ ^1S_0$ states, which sometimes are of the order $500\ \text{cm}^{-1}$ too low and too high, respectively. Also the fine-structure separations are well described, although there are some difficulties to reproduce the fine-structure splittings in $2s2p^3\ ^3P^o$ for Na VI, Mg VII, and Al VIII, where the fine-structure is very small and highly irregular. The same difficulties to account for fine-structure separations in these ions are seen for calculations in the Breit-Pauli approximation [6, 9]. The fine-structure for $2s2p^3\ ^3P^o$ is strongly affected by the multireference set, and to improve the accuracy in the calculated values within the RCI scheme it would be desirable to increase the multireference set further. Overall, the present RCI calculations give much improved energy structures compared to other calculations, with a balanced description for all the studied states and ions.

Rates for all E1 transitions in the $2s^22p^2 - 2s2p^3$ and $2s2p^3 - 2p^4$ transition arrays are given in Table 2. Rates are based on computed transition energies. The agreement between the transition rates obtained in the Babushkin and Coulomb gauges is very good for strong transitions. In weak transitions the agreement between the gauges depends on a particular term under consid-

eration. For some transitions the agreement is good but for others, e.g. the $2s^2 2p^2 \ ^3P_2 - 2s 2p^3 \ ^5S_2^o$, there are substantial differences, especially at the low- Z end of the sequence. The weakness of a transition frequently comes out as a result of cancellation between a number of large contributions or between different parts of the radial transition integrals, and residual correlation may affect rates in the two gauges very differently [25]. The general wisdom is that values in the Babushkin gauge are the most accurate ones. The agreement between the present values and the Breit-Pauli values by Froese Fischer and Tachiev is very good, especially for strong transitions. The calculations by Aggarwal *et al.* [4, 5, 6] are comparatively small in terms of electron correlation effects included. Nevertheless, the general agreement between these calculations and the Breit-Pauli calculations by Froese Fischer and Tachiev as well as the present fully relativistic ones is satisfactory (see [10] for a more comprehensive assessment of the accuracy). The strongest transitions in the arrays have been calculated by Fawcett using the HFR code [2]. Although small, these calculations agree quite well with the present calculation for the high- Z end, where correlation effects are less important. To illustrate the level of agreement between different methods, calculated rates for some transitions along the sequence are displayed in Table 5.

In Table 3 there is also rates for M1 and E2 transitions between the fine-structure levels of the $2s^2 2p^2$ configuration. Again rates are based on computed transition energies. These transitions are comparatively weak. The strength of the M1 transitions, however, increases along the sequence to reach rates up to 10^5 s^{-1} for Ni XXIII. The M1 and E2 transitions have been considered in the work by Froese Fischer and Tachiev [9], and in Table 6 their values are compared with the present ones for Mg VII. As seen from the table there is a good agreement between the two sets of calculations.

In Table 4 magnetic dipole and electric quadrupole hyperfine interaction constants are displayed together with the Landé g_J -factors for all ions. The hyperfine splittings for the states belonging to the $2s 2p^3$ configuration are dominated by large magnetic dipole interaction constants. For the $2s^2 2p^2$ states the electric quadrupole interaction constants are also important. The Landé g_J factors are related to the angular momentum coupling. For light elements the values are close to what is expected from pure LS coupling. As Z increases coupling conditions change, and we approach values of the g_J -factors characteristic of cases with large term mixing. The transition between the coupling schemes is illustrated in Table 7, where g_J factors are displayed for $2s^2 2p^2 \ ^3P_2$, $2s^2 2p^2 \ ^1D_2$, $2s 2p^3 \ ^3P_1^o$, and $2s 2p^3 \ ^1P_1^o$ in seven ions along the sequence.

6 Summary

We report energy levels, transition rates, hyperfine interaction constants, and Landé g_J -factors for relativistic configuration interaction calculations for transitions among the $(1s^2) 2s^2 2p^2$, $2s 2p^3$, and $2p^4$ configurations of all carbon-like ions from F IV to Ni XXIII. The calculations account for valence, core-valence

and core-core correlation through large configuration expansions based on orbital sets with principal quantum numbers $n = 3 \dots 8$ and orbital quantum numbers $l = 0 \dots 5$. The results for the energies and transition rates are compared with the earlier available values obtained from calculations in the Breit-Pauli approximation [4, 5, 6, 9] and by the HFR code [2]. The present energy values generally agree within a few hundred cm^{-1} with the experimentally compiled results for all the studied ions and compare favorably with values from other calculations. The Babushkin (length) and Coulomb (velocity) forms of transition rates agree within less than 1% for a majority of the allowed transitions.

Electronic form of the tables are available from the journal.

Acknowledgments

Financial support by the Swedish Research Council is gratefully acknowledged.

References

- [1] A.K. Bhatia and G.A. Doschek, *At. Data Nucl. Data Tables* 55 (1993) 315.
- [2] B.C. Fawcett, *At. Data Nucl. Data Tables* 37 (1987) 367.
- [3] R.D. Cowan, *The Theory of Atomic Structure and Spectra*, Univ. of California Press, 1981.
- [4] K.M. Aggarwal, A. Hibbert, and F.P. Keenan, *Astrophys. J. Suppl. Ser.* 108 (1997) 393.
- [5] K.M. Aggarwal, *Astrophys. J. Suppl. Ser.* 118 (1998) 589.
- [6] K.M. Aggarwal, F.P. Keenan, and A.Z. Msezane, *Astrophys. J. Suppl. Ser.* 136 (2001) 763.
- [7] H.L. Zhang and D.H. Sampson, *At. Data Nucl. Data Tables* 63 (1996) 275.
- [8] H.L. Zhang and D.H. Sampson, *At. Data Nucl. Data Tables* 65 (1997) 183.
- [9] C. Froese Fischer and G. Tachiev, *At. Data Nucl. Data Tables* 87 (2004) 1.
- [10] P. Jönsson and J. Bieroń, *J. Phys. B* 43 (2010) 074023.
- [11] I.P. Grant, *Relativistic Quantum Theory of Atoms and Molecules*, Springer, New York, 2007.
- [12] B.J. McKenzie, I.P. Grant, and P.H. Norrington, *Comput. Phys. Commun.* 21 (1980) 233.
- [13] K.G. Dyall, I.P. Grant, C.T. Johnson, F.A. Parpia, and E.P. Plummer, *Comput. Phys. Commun.* 55 (1989) 425.

- [14] P. Jönsson, X. He, C. Froese Fischer, and I.P. Grant, *Comput. Phys. Commun.* 177 (2007) 597.
- [15] G. Gaigalas, S. Fritzsche, I. P. Grant, *Comput. Phys. Commun.* 139 (2001) 263.
- [16] P. Jönsson, F.A. Parpia, and C. Froese Fischer, *Comput. Phys. Commun.* 96 (1996) 301.
- [17] M. Andersson, P. Jönsson, and H. Sabel, *J. Phys. B* 39 (2006) 4239.
- [18] N.J. Stone, *At. Data and Nucl. Data Tables* 90 (2005) 75.
- [19] C. Froese Fischer and P. Jönsson, *Journal of Molecular Structure* 537 (2001) 55.
- [20] M. Andersson and P. Jönsson, *Comput. Phys. Commun.* 178 (2008) 156.
- [21] I.P. Grant, *J. Phys. B* 7 (1974) 1458.
- [22] J. Olsen , M. Godefroid, P. Jönsson, P.Å. Malmqvist, and C. Froese Fischer, *Phys. Rev. E* 52 (1995) 4499.
- [23] J. Olsen, B.O. Roos, P. Jorgensen, and H.J.Aa Jensen, *J. Chem. Phys.* 89 (1988) 2185.
- [24] L. Sturesson, P. Jönsson, and C. Froese Fischer, *Comput. Phys. Commun.* 177 (2007) 539.
- [25] A. Ynnerman and C. Froese Fischer, *Phys. Rev. A* 51 (1995) 2020.
- [26] Y. Ralchenko, A.E. Kramida, J. Reader, and NIST ASD Team (2008). NIST Atomic Spectra Database (v 3.1.5) [online]. Available : <http://physics.nist.gov/asd3> [2008, June 26] National Institute of Standards and Technology, Gaithersburg, MD.

Explanation of Tables

Table 1. Energy levels

Level	Calculated (Calc.) and observed (Obs.) energies are given in units of cm^{-1} relative to a ground state energy of zero.
Splitting	Splitting of energy levels relative to the lowest level for the term. The splitting of the highest level is the spread of the term. The observed (Obs.) energies are those of [26].

Table 2. Transition rates

Upper	Characteristics of upper levels.
Lower	Characteristics of lower levels.
ΔE_{obs}	Observed transition energies in cm^{-1} obtained from [26].
ΔE_{calc}	Calculated transition energies in cm^{-1} .
A_B	Transition rates for spontaneous emission in Babushkin gauge in units of s^{-1} . Rates are based on computed transition energies.
A_C	The transition rates for spontaneous emission in Coulomb gauge in units of s^{-1} . Rates are based on computed transition energies.

Table 3. E2 and M1 transition rates

Upper	Characteristics of upper levels.
Lower	Characteristics of lower levels.
Type	Electric quadrupole transitions E2 or the magnetic dipole transitions M1.
ΔE_{obs}	Observed transition energies in cm^{-1} obtained from [26].
ΔE_{calc}	Calculated transition energies in cm^{-1} .
A	Transition rates for spontaneous emission in units of s^{-1} . Rates are based on computed transition energies.

Table 4. Hyperfine interaction constants and Landé factor

A_J	The magnetic dipole hyperfine interaction constant in MHz.
B_J	The electric quadrupole hyperfine interaction constant in MHz.
g_J	The Landé factor.

Table 5. Comparison of rates for transitions in seven ions in the sequence

Upper	Characteristics of upper levels.
Lower	Characteristics of lower levels.
This work	Transition rates for spontaneous emission in s^{-1} in Babushkin and Coulomb gauges from present calculations.
HFR	Transition rates for spontaneous emission in s^{-1} from [2].
CIV3	Transition rates for spontaneous emission in s^{-1} from [6].
MCHF+BP	Transition rates for spontaneous emission in s^{-1} from [9].

Table 6. Comparison of M1 and E2 rates for Mg VII

Upper	Characteristics of upper levels.
Lower	Characteristics of lower levels.
Type	Electric quadrupole transitions E2 or magnetic dipole transitions M1.
This work	Transition rates for spontaneous emission in s^{-1} from present calculations.
MCHF+BP	Transition rates for spontaneous emission in s^{-1} from [9].

Table 7. Landé g_J -factors for seven ions in the sequence

Landé g_J -factors from present calculations.

Table 1: Energy levels. See page 8 for Explanation of Tables.

Level	J	Level (cm^{-1})			Splitting (cm^{-1})		
		Calc.	Obs.	Diff.	Calc.	Obs.	Diff.
F IV							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	227.0	226.0	1.0	227.0	226.0	1.0
	2	613.4	614.0	-0.6	613.2	614.0	-0.6
$2s^2 2p^2 \ ^1D$	2	25 371.9	25 238.2	133.7			
$2s^2 2p^2 \ ^1S$	0	53 769.8	53 541.2	228.6			
$2s 2p^3 \ ^5S^o$	2	73 979.3	74 194.7	-215.4			
$2s 2p^3 \ ^3D^o$	3	147 917.2	147 843.0	74.2			
	2	147 963.9	147 888.7	75.2	46.7	45.7	1.0
	1	147 976.5	147 903.5	73.0	59.3	60.5	-1.2
$2s 2p^3 \ ^3P^o$	2	175 449.0	175 236.8	212.2			
	1	175 453.0	175 241.9	211.1	4.0	5.1	-1.1
	0	175 480.0	175 263.9	216.1	31.0	27.1	3.9
$2s 2p^3 \ ^1D^o$	2	229 210.5	228 903.8	306.7			
$2s 2p^3 \ ^3S^o$	1	238 512.8	238 296.7	216.1			
$2s 2p^3 \ ^1P^o$	1	257 916.0	257 386.5	529.5			
$2p^4 \ ^3P$	2	348 608.5	348 327.4	281.1			
	1	349 049.7	348 766.6	283.1	441.2	439.2	2.0
	0	349 248.0	348 959.8	288.2	639.5	632.4	7.1
$2p^4 \ ^1D$	2	367 779.1	367 402.6	376.5			
$2p^4 \ ^1S$	0	422 818.2	422 030.0	788.2			
Ne V							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	411.4	411.2	0.2	411.4	411.2	0.2
	2	1 108.6	1 109.5	-0.9	1108.6	1109.5	-0.9
$2s^2 2p^2 \ ^1D$	2	30 428.1	30 290.7	137.4			
$2s^2 2p^2 \ ^1S$	0	64 141.3	63 915.4	225.9			
$2s 2p^3 \ ^5S^o$	2	88 176.6	88 399.5	-222.9			
$2s 2p^3 \ ^3D^o$	3	175 906.6	175 832.3	74.3			
	2	175 976.7	175 902.7	74.0	70.1	70.4	-0.3
	1	176 000.3	175 925.0	75.3	93.7	92.7	1.0
$2s 2p^3 \ ^3P^o$	2	208 347.0	208 151.3	195.7			
	1	208 351.9	208 153.3	198.6	4.9	2.0	2.9
	0	208 388.7	208 185.0	203.7	41.7	33.7	8.0
$2s 2p^3 \ ^1D^o$	2	270 855.6	270 552.9	302.7			
$2s 2p^3 \ ^3S^o$	1	279 582.4	279 371.2	211.2			
$2s 2p^3 \ ^1P^o$	1	304 289.6	303 819.2	470.4			
$2p^4 \ ^3P$	2	412 919.5	412 678.1	241.4			
	1	413 711.9	413 467.9	244.0	792.4	789.8	2.6
	0	414 061.4	413 811.0	250.4	1141.9	1132.9	9.0
$2p^4 \ ^1D$	2	436 941.6	436 582.7	358.9			
$2p^4 \ ^1S$	0	501 189.6	500 481.8	707.8			

Table 1: Continued.

Level	J	Level (cm^{-1})			Splitting (cm^{-1})		
		Calc.	Obs.	Diff.	Calc.	Obs.	Diff.
Na VI							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	695	698	-3	695	698	-3
	2	1 855	1 859	-4	1 855	1 859	-4
$2s^2 2p^2 \ ^1D$	2	35 645	35 498	147			
$2s^2 2p^2 \ ^1S$	0	74 646	74 414	232			
$2s 2p^3 \ ^5S^o$	2	102 796	103 362	-566			
$2s 2p^3 \ ^3D^o$	3	204 219	204 132	87			
	2	204 313	204 223	90	94	91	3
	1	204 352	204 261	91	133	129	4
$2s 2p^3 \ ^3P^o$	2	241 521	241 341	180			
	1	241 522	241 341	181	1	0	1
	0	241 570	241 341	229	49	0	49
$2s 2p^3 \ ^1D^o$	2	312 642	312 315	327			
$2s 2p^3 \ ^3S^o$	1	320 811	320 589	222			
$2s 2p^3 \ ^1P^o$	1	350 779	350 319	460			
$2p^4 \ ^3P$	2	477 493	477 277	216			
	1	478 812	478 597	215	1 319	1 320	-1
	0	479 383	479 157	226	1 890	1 880	10
$2p^4 \ ^1D$	2	506 487	506 114	373			
$2p^4 \ ^1S$	0	579 847	579 173	674			
Mg VII							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	1 112	1 107	5	1 112	1 107	5
	2	2 928	2 924	4	2 928	2 924	4
$2s^2 2p^2 \ ^1D$	2	41 097	40 948	149			
$2s^2 2p^2 \ ^1S$	0	85 385	85 153	232			
$2s 2p^3 \ ^5S^o$	2	117 899	118 100	-201			
$2s 2p^3 \ ^3D^o$	3	232 950	232 853	97			
	2	233 060	232 957	103	110	104	6
	1	233 122	233 024	98	172	171	1
$2s 2p^3 \ ^3P^o$	1	275 104	274 897	207			
	2	275 116	274 904	212	12	7	5
	0	275 161	274 947	214	57	50	7
$2s 2p^3 \ ^1D^o$	2	354 747	354 401	346			
$2s 2p^3 \ ^3S^o$	1	362 367	362 117	250			
$2s 2p^3 \ ^1P^o$	1	397 622	397 153	469			
$2p^4 \ ^3P$	2	542 556	542 316	240			
	1	544 632	544 393	239	2 076	2 077	-1
	0	545 511	545 264	247	2 955	2 948	7
$2p^4 \ ^1D$	2	576 656	576 280	376			
$2p^4 \ ^1S$	0	659 075	658 440	635			

Table 1: Continued.

Level	J	Level (cm^{-1})			Splitting (cm^{-1})		
		Calc.	Obs.	Diff.	Calc.	Obs.	Diff.
Al VIII							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	1 709	1 710	-1	1 709	1 710	-1
	2	4 414	4 420	-6	4 414	4 420	-6
$2s^2 2p^2 \ ^1D$	2	46 871	46 720	151			
$2s^2 2p^2 \ ^1S$	0	96 466	96 260	206			
$2s 2p^3 \ ^5S^o$	2	133 627	133 840	-213			
$2s 2p^3 \ ^3D^o$	3	262 264	262 180	84			
	2	262 369	262 270	99	105	90	15
	1	262 465	262 330	135	201	150	51
$2s 2p^3 \ ^3P^o$	1	309 271	309 110	161			
	2	309 316	309 110	206	45	0	45
	0	309 333	309 110	223	62	0	62
$2s 2p^3 \ ^1D^o$	2	397 384	397 020	364			
$2s 2p^3 \ ^3S^o$	1	404 437	404 200	237			
$2s 2p^3 \ ^1P^o$	1	445 028	444 570	458			
$2p^4 \ ^3P$	2	608 317	608 100	217			
	1	611 442	611 180	262	3 125	3 080	45
	0	612 727	612 510	217	4 410	4 410	0
$2p^4 \ ^1D$	2	647 694	647 310	384			
$2p^4 \ ^1S$	0	739 145	738 490	655			
Si IX							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	2 540	2 545	-5	2 540	2 545	-5
	2	6 411	6 414	-3	6 411	6 414	-3
$2s^2 2p^2 \ ^1D$	2	53 070	52 926	144			
$2s^2 2p^2 \ ^1S$	0	108 017	107 799	218			
$2s 2p^3 \ ^5S^o$	2	150 120	150 770	-650			
$2s 2p^3 \ ^3D^o$	3	292 323	292 232	91			
	2	292 384	292 296	88	61	64	-3
	1	292 525	292 441	84	202	209	-7
$2s 2p^3 \ ^3P^o$	1	344 202	344 009	193			
	0	344 256	344 075	181	54	66	-12
	2	344 313	344 118	195	111	109	2
$2s 2p^3 \ ^1D^o$	2	440 751	440 403	348			
$2s 2p^3 \ ^3S^o$	1	447 194	446 942	252			
$2s 2p^3 \ ^1P^o$	1	493 218	492 755	463			
$2p^4 \ ^3P$	2	674 987	674 764	223			
	1	679 526	679 300	226	4 539	4 536	3
	0	681 323	681 079	244	6 336	6 315	21
$2p^4 \ ^1D$	2	719 867	719 502	365			
$2p^4 \ ^1S$	0	820 340	819 689	651			

Table 1: Continued.

Level	J	Level (cm^{-1})			Splitting (cm^{-1})		
		Calc.	Obs.	Diff.	Calc.	Obs.	Diff.
P X							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	3 676	3 692	-16	3 676	3 692	-16
	2	9 027	9 045	-18	9 027	9 045	-18
$2s^2 2p^2 \ ^1D$	2	59 825	59 690	135			
$2s^2 2p^2 \ ^1S$	0	120 190	119 960	230			
$2s 2p^3 \ ^5S^o$	2	167 541	167 740	-199			
$2s 2p^3 \ ^3D^o$	2	323 256	323 201	55			
	3	323 307	323 234	73	51	33	18
	1	323 459	323 416	43	203	215	-12
$2s 2p^3 \ ^3P^o$	1	380 093	379 910	183			
	0	380 120	379 929	191	27	19	8
	2	380 323	380 149	174	230	239	-9
$2s 2p^3 \ ^1D^o$	2	485 057	484 750	307			
$2s 2p^3 \ ^3S^o$	1	490 816	490 592	224			
$2s 2p^3 \ ^1P^o$	1	542 429	541 990	439			
$2p^4 \ ^3P$	2	742 785	742 590	195			
	1	749 188	749 011	177	6 403	6 421	-18
	0	751 605	751 411	194	8 820	8 821	-1
$2p^4 \ ^1D$	2	793 464	793 130	334			
$2p^4 \ ^1S$	0	902 971					
S XI							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	5 203	5 208	-5	5 203	5 208	-5
	2	12 383	12 388	-5	12 383	12 388	-5
$2s^2 2p^2 \ ^1D$	2	67 290	67 146	144			
$2s^2 2p^2 \ ^1S$	0	133 145	132 929	216			
$2s 2p^3 \ ^5S^o$	2	186 065	186 251	-186			
$2s 2p^3 \ ^3D^o$	2	355 141	355 076	65			
	3	355 415	355 350	65	274	274	0
	1	355 430	355 364	66	289	288	1
$2s 2p^3 \ ^3P^o$	0	417 128	416 947	181			
	1	417 164	416 986	178	36	39	-3
	2	417 591	417 419	172	463	472	-9
$2s 2p^3 \ ^1D^o$	2	530 530	530 177	353			
$2s 2p^3 \ ^3S^o$	1	535 487	535 220	267			
$2s 2p^3 \ ^1P^o$	1	592 926	592 480	446			
$2p^4 \ ^3P$	2	811 940	811 702	238			
	1	820 754	820 531	223	8 814	8 829	-15
	0	823 889	823 645	244	11 949	11 943	6
$2p^4 \ ^1D$	2	868 801	868 462	339			
$2p^4 \ ^1S$	0	987 353	986 736	617			

Table 1: Continued.

Level	J	Level (cm^{-1})			Splitting (cm^{-1})		
		Calc.	Obs.	Diff.	Calc.	Obs.	Diff.
Cl XII							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	7 221	7 240	-19	7 221	7 240	-19
	2	16 610	16 629	-19	16 610	16 629	-19
$2s^2 2p^2 \ ^1D$	2	75 660	75 530	130			
$2s^2 2p^2 \ ^1S$	0	147 125	146 917	208			
$2s 2p^3 \ ^5S^o$	2	205 925	206 100	-175			
$2s 2p^3 \ ^3D^o$	2	388 244	388 179	65			
	1	388 645	388 581	64	401	402	-1
	3	388 902	388 838	64	658	659	-1
$2s 2p^3 \ ^3P^o$	0	455 543	455 399	144			
	1	455 693	455 554	139	150	155	-5
	2	456 433	456 294	139	890	895	-5
$2s 2p^3 \ ^1D^o$	2	577 461	577 110	351			
$2s 2p^3 \ ^3S^o$	1	581 438	581 190	248			
$2s 2p^3 \ ^1P^o$	1	645 045	644 595	450			
$2p^4 \ ^3P$	2	882 736	882 550	186			
	1	894 615	894 430	185	11 879	11 880	-1
	0	898 542	898 330	212	15 806	15 780	26
$2p^4 \ ^1D$	2	946 260	945 920	340			
$2p^4 \ ^1S$	0	1 073 932	1 073 320	612			
Ar XIII							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	9 854	9 859	-5	9 854	9 859	-5
	2	21 845	21 850	-5	21 845	21 850	-5
$2s^2 2p^2 \ ^1D$	2	85 165	85 032	133			
$2s^2 2p^2 \ ^1S$	0	162 367	162 138	229			
$2s 2p^3 \ ^5S^o$	2	227 327					
$2s 2p^3 \ ^3D^o$	2	422 735	422 720	15			
	1	423 279	423 260	19	544	540	4
	3	424 009	424 000	9	1 274	1 280	-6
$2s 2p^3 \ ^3P^o$	0	495 608	495 440	168			
	1	495 947	495 810	137	339	370	-31
	2	497 159	497 040	119	1 551	1 600	-49
$2s 2p^3 \ ^1D^o$	2	626 126	625 860	266			
$2s 2p^3 \ ^3S^o$	1	628 873	628 630	243			
$2s 2p^3 \ ^1P^o$	1	699 123	698 690	433			
$2p^4 \ ^3P$	2	955 431	955 300	131			
	1	971 156	970 900	256	15 725	15 600	125
	0	975 903	975 700	203	20 472	20 400	72
$2p^4 \ ^1D$	2	1 026 223	1 026 300	-77			
$2p^4 \ ^1S$	0	1 163 125					

Table 1: Continued.

Level	J	Level (cm^{-1})			Splitting (cm^{-1})		
		Calc.	Obs.	Diff.	Calc.	Obs.	Diff.
K XIV							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	13 242	13 235	7	13 242	13 235	7
	2	28 230	28 225	5	28 230	28 225	5
$2s^2 2p^2 \ ^1D$	2	96 080	95 913	167			
$2s^2 2p^2 \ ^1S$	0	179 161	178 914	247			
$2s 2p^3 \ ^5S^o$	2	250 521	250 640	-119			
$2s 2p^3 \ ^3D^o$	2	458 821	458 754	67			
	1	459 538	459 498	40	717	744	-27
	3	461 024	461 002	22	2 203	2 248	-45
$2s 2p^3 \ ^3P^o$	0	537 617	537 402	215			
	1	538 248	538 032	216	631	630	1
	2	540 144	539 938	206	2 527	2 536	-9
$2s 2p^3 \ ^1D^o$	2	676 864	676 460	404			
$2s 2p^3 \ ^3S^o$	1	678 037	677 710	327			
$2s 2p^3 \ ^1P^o$	1	755 567	755 050	517			
$2p^4 \ ^3P$	2	1 030 329	1 030 090	239			
	1	1 050 818	1 050 620	198	20 489	20 530	-41
	0	1 056 343	1 056 200	143	26 014	26 110	-96
$2p^4 \ ^1D$	2	1 109 135	1 108 800	335			
$2p^4 \ ^1S$	0	1 255 446	1 254 810	636			
Ca XV							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	17 547	17 559	-12	17 547	17 559	-12
	2	35 911	35 923	-12	35 911	35 923	-12
$2s^2 2p^2 \ ^1D$	2	108 730	108 600	130			
$2s^2 2p^2 \ ^1S$	0	197 836	197 670	166			
$2s 2p^3 \ ^5S^o$	2	275 770	275 900	-130			
$2s 2p^3 \ ^3D^o$	2	496 721	496 680	41			
	1	497 630	497 570	60	909	890	19
	3	500 264	500 230	34	3 543	3 550	-7
$2s 2p^3 \ ^3P^o$	0	581 890	581 730	160			
	1	582 947	582 780	167	1 057	1 050	7
	2	585 801	585 670	131	3 911	3 940	-29
$2s 2p^3 \ ^3S^o$	1	729 191	728 880	311			
$2s 2p^3 \ ^1D^o$	2	730 051	729 650	401			
$2s 2p^3 \ ^1P^o$	1	814 834	814 380	454			
$2p^4 \ ^3P$	2	1 107 754	1 107 550	204			
	1	1 134 079	1 133 850	229	26 325	26 300	25
	0	1 140 232	1 139 970	262	32 478	32 420	58
$2p^4 \ ^1D$	2	1 195 478	1 195 120	358			
$2p^4 \ ^1S$	0	1 351 477	1 350 890	587			

Table 1: Continued.

Level	J	Level (cm^{-1})			Splitting (cm^{-1})		
		Calc.	Obs.	Diff.	Calc.	Obs.	Diff.
Sc XVI							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	22 949	22 959	-10	22 949	22 959	-10
	2	45 030	45 026	4	45 030	45 026	4
$2s^2 2p^2 \ ^1D$	2	123 484	123 360	124			
$2s^2 2p^2 \ ^1S$	0	218 757	218 720	37			
$2s 2p^3 \ ^5S^o$	2	303 357	301 400	-43			
$2s 2p^3 \ ^3D^o$	2	536 676	536 610	66			
	1	537 775	537 720	50	1 099	1 110	-1
	3	542 078	542 030	48	5 402	5 420	-18
$2s 2p^3 \ ^3P^o$	0	628 780	628 600	180			
	1	630 437	630 250	187	1 657	1 650	7
	2	634 584	634 430	154	5 804	5 830	-26
$2s 2p^3 \ ^3S^o$	1	782 628	782 360	268			
$2s 2p^3 \ ^1D^o$	2	786 111	785 740	371			
$2s 2p^3 \ ^1P^o$	1	877 437	877 000	437			
$2p^4 \ ^3P$	2	1 188 051	1 187 830	221			
	1	1 221 452	1 221 300	152	33 401	33 470	-69
	0	1 227 939	1 227 760	179	39 888	39 930	-42
$2p^4 \ ^1D$	2	1 285 778	1 285 480	298			
$2p^4 \ ^1S$	0	1 451 877	1 451 350	527			
Ti XVII							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	29 646	29 658	-12	29 646	29 658	-12
	2	55 732	55 730	2	55 732	55 730	2
$2s^2 2p^2 \ ^1D$	2	140 762	140 660	102			
$2s^2 2p^2 \ ^1S$	0	242 326	242 180	146			
$2s 2p^3 \ ^5S^o$	2	333 563	333 660	-97			
$2s 2p^3 \ ^3D^o$	2	578 934	578 890	44			
	1	580 177	580 110	67	1 243	1 220	23
	3	586 825	586 760	65	7 891	7 870	21
$2s 2p^3 \ ^3P^o$	0	678 649	678 450	199			
	1	681 120	680 910	210	2 471	2 460	11
	2	686 960	686 780	180	8 311	8 330	-19
$2s 2p^3 \ ^3S^o$	1	838 646	838 340	306			
$2s 2p^3 \ ^1D^o$	2	845 498	845 140	358			
$2s 2p^3 \ ^1P^o$	1	943 921	943 500	421			
$2p^4 \ ^3P$	2	1 271 596	1 271 380	216			
	1	1 313 493	1 313 280	213	41 897	41 900	-3
	0	1 319 827	1 319 740	87	48 231	48 360	-129
$2p^4 \ ^1D$	2	1 380 605	1 380 290	315			
$2p^4 \ ^1S$	0	1 557 392	1 556 810	582			

Table 1: Continued.

Level	J	Level (cm^{-1})			Splitting (cm^{-1})		
		Calc.	Obs.	Diff.	Calc.	Obs.	Diff.
V XVIII							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	37 850	37 960	-110	37 850	37 960	-110
	2	68 160	68 190	-30	68 160	68 190	-30
$2s^2 2p^2 \ ^1D$	2	161 021	160 910	111			
$2s^2 2p^2 \ ^1S$	0	268 973	269 000	-27			
$2s 2p^3 \ ^5S^o$	2	366 700	366 870	-170			
$2s 2p^3 \ ^3D^o$	2	623 806	623 860	-54			
	1	625 076	625 040	36	1 270	1 180	90
	3	634 927	634 950	-23	11 121	11 090	31
$2s 2p^3 \ ^3P^o$	0	731 923	731 870	53			
	1	735 462	735 420	42	3 539	3 550	-11
	2	743 452	743 350	102	11 529	11 480	49
$2s 2p^3 \ ^3S^o$	1	897 614	897 330	284			
$2s 2p^3 \ ^1D^o$	2	908 757	908 420	337			
$2s 2p^3 \ ^1P^o$	1	1 014 919	1 014 420	499			
$2p^4 \ ^3P$	2	1 358 780	1 358 710	70			
	1	1 410 788	1 410 770	18	52 008	52 060	-52
	0	1 416 239	1 416 110	129	57 459	57 400	59
$2p^4 \ ^1D$	2	1 480 561	1 480 330	231			
$2p^4 \ ^1S$	0	1 668 852	1 668 300	552			
Cr XIX							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	47 788	47 811	-23	47 788	47 811	-23
	2	82 464	82 458	6	82 464	82 458	6
$2s^2 2p^2 \ ^1D$	2	184 749	184 600	149			
$2s^2 2p^2 \ ^1S$	0	299 155	298 800	355			
$2s 2p^3 \ ^5S^o$	2	403 040	403 268	-228			
$2s 2p^3 \ ^3D^o$	2	671 577	671 520	57			
	1	672 651	672 580	71	1 074	1 060	14
	3	686 771	686 730	41	15 194	15 210	-16
$2s 2p^3 \ ^3P^o$	0	788 991	788 830	161			
	1	793 892	793 710	182	4 901	4 880	21
	2	804 534	804 380	154	15 543	15 550	-7
$2s 2p^3 \ ^3S^o$	1	959 869	959 570	299			
$2s 2p^3 \ ^1D^o$	2	976 418	976 000	418			
$2s 2p^3 \ ^1P^o$	1	1 090 038	1 090 510	-472			
$2p^4 \ ^3P$	2	1 450 024	1 449 990	34			
	1	1 513 964	1 514 020	-56	63 940	64 030	-90
	0	1 517 504	1 517 690	-186	67 480	67 700	-220
$2p^4 \ ^1D$	2	1 586 289	1 586 020	269			
$2p^4 \ ^1S$	0	1 787 179	1 786 900	279			

Table 1: Continued.

Level	J	Level (cm^{-1})			Splitting (cm^{-1})		
		Calc.	Obs.	Diff.	Calc.	Obs.	Diff.
Mn XX							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	59 696	59 850	-154	59 696	59 850	-154
	2	98 806	98 650	156	98 806	98 650	156
$2s^2 2p^2 \ ^1D$	2	212 457	212 260	197			
$2s^2 2p^2 \ ^1S$	0	333 349	333 080	269			
$2s 2p^3 \ ^5S^o$	2	442 890	443 060	-170			
$2s 2p^3 \ ^3D^o$	2	722 634	722 710	-76			
	1	723 143	723 090	53	509	380	129
	3	742 831	742 940	-109	20 197	20 230	-33
$2s 2p^3 \ ^3P^o$	0	850 331	850 340	-9			
	1	856 918	856 900	18	6 587	6 560	27
	2	870 740	870 580	160	20 409	20 240	169
$2s 2p^3 \ ^3S^o$	1	1 025 856	1 025 510	346			
$2s 2p^3 \ ^1D^o$	2	1 049 148	1 048 880	268			
$2s 2p^3 \ ^1P^o$	1	1 173 004	1 172 570	434			
$2p^4 \ ^3P$	2	1 545 763	1 545 800	-37			
	1	1 623 673	1 623 650	23	77 910	77 850	60
	0	1 623 932	1 623 890	42	78 169	78 090	79
$2p^4 \ ^1D$	2	1 698 458	1 698 290	168			
$2p^4 \ ^1S$	0	1 913 367	1 912 980	387			
Fe XXI							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	73 820	73 851	-31	73 820	73 851	-31
	2	117 364	117 354	10	117 364	117 354	10
$2s^2 2p^2 \ ^1D$	2	244 667	244 561	106			
$2s^2 2p^2 \ ^1S$	0	372 052	371 980	72			
$2s 2p^3 \ ^5S^o$	2	486 521	486 950	-429			
$2s 2p^3 \ ^3D^o$	1	776 751	776 690	61			
	2	777 371	777 340	31	620	650	-30
	3	803 562	803 540	22	26 811	26 850	-39
$2s 2p^3 \ ^3P^o$	0	916 402	916 330	72			
	1	925 024	924 920	104	8 622	8 590	32
	2	942 556	942 430	126	26 154	26 100	54
$2s 2p^3 \ ^3S^o$	1	1 096 012	1 095 670	342			
$2s 2p^3 \ ^1D^o$	2	1 127 631	1 127 240	391			
$2s 2p^3 \ ^1P^o$	1	1 261 529	1 261 140	389			
$2p^4 \ ^3P$	2	1 646 462	1 646 300	162			
	0	1 735 831	1 735 700	131	89 369	89 400	-31
	1	1 740 606	1 740 500	106	94 144	94 200	-56
$2p^4 \ ^1D$	2	1 817 776	1 817 100	676			
$2p^4 \ ^1S$	0	2 048 489	2 048 200	289			

Table 1: Continued.

Level	J	Level (cm^{-1})			Splitting (cm^{-1})		
		Calc.	Obs.	Diff.	Calc.	Obs.	Diff.
Co XXII							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	90 415	90 730	-315	90 415	90 730	-315
	2	138 338	138 250	88	138 338	138 250	88
$2s^2 2p^2 \ ^1D$	2	281 909	281 820	89			
$2s^2 2p^2 \ ^1S$	0	415 775	415 520	255			
$2s 2p^3 \ ^5S^o$	2	534 186	534 760	-574			
$2s 2p^3 \ ^3D^o$	1	833 676	833 840	-164			
	2	836 233	836 280	-47	2 557	2 440	117
	3	869 443	869 510	-67	35 767	35 670	97
$2s 2p^3 \ ^3P^o$	0	987 686	987 830	-144			
	1	998 702	998 650	52	11 016	10 820	196
	2	1 020 448	1 020 290	158	32 762	32 460	302
$2s 2p^3 \ ^3S^o$	1	1 170 819	1 170 450	369			
$2s 2p^3 \ ^1D^o$	2	1 212 627	1 212 130	497			
$2s 2p^3 \ ^1P^o$	1	1 357 369	1 356 870	499			
$2p^4 \ ^3P$	2	1 752 597	1 752 580	17			
	0	1 853 511	1 853 530	-19	100 914	100 950	-36
	1	1 865 477	1 865 530	-53	112 880	112 950	-70
$2p^4 \ ^1D$	2	1 944 971	1 944 800	171			
$2p^4 \ ^1S$	0	2 193 665	2 193 340	325			
Ni XXIII							
$2s^2 2p^2 \ ^3P$	0	0	0	0			
	1	109 741	109 770	-29	109 741	109 770	-29
	2	161 951	161 922	29	161 951	161 922	29
$2s^2 2p^2 \ ^1D$	2	324 714	324 640	74			
$2s^2 2p^2 \ ^1S$	0	465 043	463 900	1 143			
$2s 2p^3 \ ^5S^o$	2	586 120	586 890	-770			
$2s 2p^3 \ ^3D^o$	1	894 125	894 100	25			
	2	899 729	900 000	-271	5 604	5 900	-296
	3	940 982	941 400	-418	46 857	47 300	-443
$2s 2p^3 \ ^3P^o$	0	1 064 692	1 064 900	-208			
	1	1 078 464	1 078 350	114	13 772	13 450	322
	2	1 104 863	1 104 750	113	40 171	39 850	321
$2s 2p^3 \ ^3S^o$	1	1 250 807	1 250 470	337			
$2s 2p^3 \ ^1D^o$	2	1 304 979	1 304 640	339			
$2s 2p^3 \ ^1P^o$	1	1 461 317	1 459 700	1 617			
$2p^4 \ ^3P$	2	1 864 674	1 864 700	-26			
	0	1 977 308	1 977 400	-92	112 634	112 700	-66
	1	1 999 037	1 999 400	-363	134 363	134 700	-337
$2p^4 \ ^1D$	2	2 080 806	2 080 600	206			
$2p^4 \ ^1S$	0	2 350 061	2 348 200	1861			

Table 2: Transition energies in (cm^{-1}) and rates in (s^{-1}). See page 8 for Explanations of Tables.

States		Energies (cm^{-1})		Transition rates (s^{-1})	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
F IV					
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_0$	147903	147976	4.996e+08	5.003e+08
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_0$	175242	175453	8.165e+08	8.119e+08
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_0$	238297	238511	1.987e+09	1.980e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_0$	257386	257916	6.082e+04	6.434e+04
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_1$	73969	73752	7.853e+02	1.255e+03
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_1$	147663	147736	6.704e+08	6.719e+08
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_1$	147677	147749	3.579e+08	3.581e+08
$2s2p^3 \ ^3P_0^o$	$2s^22p^2 \ ^3P_1$	175038	175253	2.474e+09	2.458e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_1$	175016	175226	6.400e+08	6.361e+08
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_1$	175011	175222	5.952e+08	5.922e+08
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_1$	228678	228983	4.326e+04	3.837e+04
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_1$	238071	238284	5.963e+09	5.944e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_1$	257160	257688	2.068e+06	2.040e+06
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_2$	73581	73365	1.971e+03	3.374e+03
$2s2p^3 \ ^3D_3^o$	$2s^22p^2 \ ^3P_2$	147229	147303	8.672e+08	8.700e+08
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_2$	147275	147350	2.042e+08	2.043e+08
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_2$	147289	147363	2.184e+07	2.182e+07
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_2$	174628	174839	1.013e+09	1.006e+09
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_2$	174623	174835	1.864e+09	1.853e+09
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_2$	228290	228597	9.674e+05	9.298e+05
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_2$	237683	237898	9.958e+09	9.930e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_2$	256772	257302	3.071e+05	3.006e+05
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^1D_2$	48957	48607	4.847e-02	2.360e-01
$2s2p^3 \ ^3D_3^o$	$2s^22p^2 \ ^1D_2$	122605	122545	7.342e+04	8.210e+04
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^1D_2$	122651	122592	1.521e+04	1.722e+04
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^1D_2$	122665	122604	7.878e+03	1.185e+04
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^1D_2$	150004	150081	9.675e+04	1.009e+05
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^1D_2$	149999	150077	1.925e+04	1.638e+04
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^1D_2$	203666	203838	7.533e+09	7.513e+09
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^1D_2$	213059	213139	4.063e+05	3.975e+05
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^1D_2$	232148	232544	1.112e+10	1.101e+10
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^1S_0$	94362	94206	5.951e+03	6.072e+03
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^1S_0$	121701	121683	3.314e+04	4.026e+04
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^1S_0$	184756	184741	1.702e+05	1.718e+05
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^1S_0$	203845	204146	2.373e+09	2.380e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^5S_2^o$	274132	274628	9.988e+04	8.620e+04
$2p^4 \ ^3P_1$	$2s2p^3 \ ^5S_2^o$	274572	275070	4.301e+04	3.613e+04
$2p^4 \ ^1D_2$	$2s2p^3 \ ^5S_2^o$	293208	293799	8.656e+00	4.008e+00
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3D_3^o$	200484	200690	5.313e+09	5.278e+09
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3D_3^o$	219560	219861	1.553e+06	1.495e+06

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_2^o$	200438	200643	9.817e+08	9.747e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_2^o$	200878	201085	4.717e+09	4.685e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	219514	219815	2.924e+05	2.813e+05
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_1^o$	200424	200631	6.712e+07	6.662e+07
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_1^o$	200864	201073	1.609e+09	1.598e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3D_1^o$	201057	201271	6.310e+09	6.266e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_1^o$	219500	219802	4.016e+03	1.968e+03
$2p^4\ ^1S_0$	$2s2p^3\ ^3D_1^o$	274127	274841	7.488e+04	7.535e+04
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_0^o$	173503	173569	4.332e+08	4.341e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_1^o$	173085	173154	3.275e+08	3.280e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_1^o$	173525	173596	3.062e+08	3.072e+08
$2p^4\ ^3P_0$	$2s2p^3\ ^3P_1^o$	173718	173794	1.335e+09	1.340e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_1^o$	192161	192326	1.027e+05	9.655e+04
$2p^4\ ^1S_0$	$2s2p^3\ ^3P_1^o$	246788	247365	2.783e+05	2.467e+05
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_2^o$	173090	173158	9.466e+08	9.492e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_2^o$	173530	173600	5.763e+08	5.785e+08
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_2^o$	192166	192330	4.566e+01	1.574e+02
$2p^4\ ^3P_2$	$2s2p^3\ ^1D_2^o$	119423	119397	3.271e+05	3.378e+05
$2p^4\ ^3P_1$	$2s2p^3\ ^1D_2^o$	119863	119839	5.869e+03	7.071e+03
$2p^4\ ^1D_2$	$2s2p^3\ ^1D_2^o$	138499	138568	3.242e+09	3.223e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3S_1^o$	110030	110095	6.990e+08	6.978e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3S_1^o$	110470	110537	7.112e+08	7.092e+08
$2p^4\ ^3P_0$	$2s2p^3\ ^3S_1^o$	110663	110736	7.169e+08	7.143e+08
$2p^4\ ^1D_2$	$2s2p^3\ ^3S_1^o$	129106	129267	6.665e+03	6.269e+03
$2p^4\ ^1S_0$	$2s2p^3\ ^3S_1^o$	183733	184306	2.462e+06	2.436e+06
$2p^4\ ^3P_2$	$2s2p^3\ ^1P_1^o$	90941	90691	3.143e+04	3.346e+04
$2p^4\ ^3P_1$	$2s2p^3\ ^1P_1^o$	91381	91133	1.010e+05	1.055e+05
$2p^4\ ^3P_0$	$2s2p^3\ ^1P_1^o$	91574	91331	1.849e+04	1.501e+04
$2p^4\ ^1D_2$	$2s2p^3\ ^1P_1^o$	110017	109863	3.041e+08	3.048e+08
$2p^4\ ^1S_0$	$2s2p^3\ ^1P_1^o$	164644	164902	8.874e+09	8.788e+09
Ne V					
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_0$	175925	176000	6.615e+08	6.620e+08
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_0$	208153	208351	1.031e+09	1.027e+09
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_0$	279371	279582	2.385e+09	2.378e+09
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_0$	303819	304289	8.488e+04	9.087e+04
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^3P_1$	87988	87765	2.340e+03	3.485e+03
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^3P_1$	175491	175565	8.850e+08	8.866e+08
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_1$	175514	175588	4.630e+08	4.629e+08
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_1$	207740	207935	7.397e+08	7.373e+08
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_1$	207742	207940	8.275e+08	8.238e+08
$2s2p^3\ ^3P_0^o$	$2s^22p^2\ ^3P_1$	207774	207977	3.140e+09	3.124e+09
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_1$	270141	270444	1.273e+05	1.159e+05

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_1$	278960	279171	7.159e+09	7.142e+09
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_1$	303408	303878	4.851e+06	4.793e+06
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^3P_2$	87290	87067	5.877e+03	9.207e+03
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^3P_2$	174723	174798	1.128e+09	1.131e+09
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^3P_2$	174793	174868	2.574e+08	2.573e+08
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_2$	174816	174891	2.700e+07	2.694e+07
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_2$	207042	207238	2.372e+09	2.361e+09
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_2$	207044	207243	1.272e+09	1.265e+09
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_2$	269443	269746	2.733e+06	2.648e+06
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_2$	278262	278473	1.198e+10	1.196e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_2$	302710	303181	5.277e+05	5.149e+05
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^1D_2$	58109	57748	3.080e-01	9.084e-01
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^1D_2$	145542	145478	2.182e+05	2.392e+05
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^1D_2$	145612	145548	4.563e+04	5.048e+04
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1D_2$	145635	145572	2.398e+04	3.377e+04
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^1D_2$	177861	177918	4.864e+04	4.214e+04
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1D_2$	177863	177923	2.789e+05	2.887e+05
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^1D_2$	240262	240427	9.523e+09	9.507e+09
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1D_2$	249081	249154	6.891e+05	6.765e+05
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1D_2$	273529	273861	1.330e+10	1.320e+10
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1S_0$	112010	111859	1.730e+04	1.758e+04
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1S_0$	144238	144210	9.474e+04	1.114e+05
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1S_0$	215456	215441	3.908e+05	3.941e+05
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1S_0$	239904	240148	3.064e+09	3.071e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^5S_2^o$	324279	324742	2.939e+05	2.609e+05
$2p^4\ ^3P_1$	$2s2p^3\ ^5S_2^o$	325068	325535	1.289e+05	1.123e+05
$2p^4\ ^1D_2$	$2s2p^3\ ^5S_2^o$	348183	348765	5.605e+01	4.061e+01
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_3^o$	236846	237012	6.654e+09	6.627e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_3^o$	260750	261035	4.038e+06	3.914e+06
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_2^o$	236776	236942	1.254e+09	1.247e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_2^o$	237565	237735	5.887e+09	5.861e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	260680	260964	7.697e+05	7.467e+05
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_1^o$	236753	236919	8.701e+07	8.652e+07
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_1^o$	237542	237711	2.035e+09	2.025e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3D_1^o$	237886	238061	7.888e+09	7.850e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_1^o$	260657	260941	1.698e+04	1.087e+04
$2p^4\ ^1S_0$	$2s2p^3\ ^3D_1^o$	324556	325189	1.971e+05	1.982e+05
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_2^o$	204527	204572	1.270e+09	1.272e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_2^o$	205316	205364	8.066e+08	8.091e+08
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_2^o$	228431	228594	3.292e+03	9.755e+02
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_1^o$	204525	204567	4.479e+08	4.481e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_1^o$	205314	205360	4.041e+08	4.051e+08

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3P_1^o$	205658	205709	1.838e+09	1.843e+09
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3P_1^o$	228429	228589	2.984e+05	2.835e+05
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3P_1^o$	292328	292837	8.496e+05	7.740e+05
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_0^o$	205282	205323	5.895e+08	5.901e+08
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1D_2^o$	142126	142064	8.686e+05	8.938e+05
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1D_2^o$	142915	142856	1.933e+04	2.232e+04
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1D_2^o$	166030	166086	4.405e+09	4.390e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3S_1^o$	133307	133337	9.836e+08	9.835e+08
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3S_1^o$	134096	134129	1.010e+09	1.008e+09
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3S_1^o$	134440	134479	1.022e+09	1.020e+09
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3S_1^o$	157211	157359	1.996e+04	1.927e+04
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3S_1^o$	221110	221607	6.191e+06	6.149e+06
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1P_1^o$	108859	108629	7.782e+04	8.258e+04
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1P_1^o$	109648	109422	2.684e+05	2.785e+05
$2p^4 \ ^3P_0$	$2s2p^3 \ ^1P_1^o$	109992	109771	4.083e+04	3.373e+04
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1P_1^o$	132763	132652	4.412e+08	4.424e+08
$2p^4 \ ^1S_0$	$2s2p^3 \ ^1P_1^o$	196662	196900	1.175e+10	1.168e+10
Na VI					
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_0$	204261	204352	8.383e+08	8.390e+08
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_0$	241341	241521	1.250e+09	1.247e+09
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_0$	320589	320810	2.786e+09	2.780e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_0$	350319	350779	1.232e+05	1.334e+05
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_1$	102664	102101	6.092e+03	8.607e+03
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_1$	203525	203618	1.117e+09	1.119e+09
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_1$	203563	203657	5.691e+08	5.688e+08
$2s2p^3 \ ^3P_0^o$	$2s^22p^2 \ ^3P_1$	240643	240875	3.834e+09	3.820e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_1$	240643	240827	1.036e+09	1.032e+09
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_1$	240643	240826	8.788e+08	8.775e+08
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_1$	311617	311947	3.235e+05	2.994e+05
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_1$	319891	320115	8.368e+09	8.352e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_1$	349621	350084	1.054e+07	1.042e+07
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_2$	101503	100940	1.518e+04	2.231e+04
$2s2p^3 \ ^3D_3^o$	$2s^22p^2 \ ^3P_2$	202273	202364	1.397e+09	1.402e+09
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_2$	202364	202457	3.056e+08	3.055e+08
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_2$	202402	202497	3.128e+07	3.120e+07
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_2$	239482	239666	1.532e+09	1.525e+09
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_2$	239482	239665	2.906e+09	2.898e+09
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_2$	310456	310786	6.712e+06	6.535e+06
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_2$	318730	318955	1.404e+10	1.402e+10
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_2$	348460	348924	8.665e+05	8.421e+05
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^1D_2$	67864	67150	1.682e+00	3.707e+00
$2s2p^3 \ ^3D_3^o$	$2s^22p^2 \ ^1D_2$	168634	168574	5.617e+05	6.077e+05

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^1D_2$	168725	168667	1.170e+05	1.276e+05
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1D_2$	168763	168707	6.413e+04	8.581e+04
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1D_2$	205843	205876	6.964e+05	7.173e+05
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^1D_2$	205843	205875	1.123e+05	9.909e+04
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^1D_2$	276817	276996	1.152e+10	1.151e+10
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1D_2$	285091	285165	1.150e+06	1.133e+06
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1D_2$	314821	315133	1.559e+10	1.550e+10
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1S_0$	129847	129706	4.371e+04	4.443e+04
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1S_0$	166927	166875	2.351e+05	2.706e+05
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1S_0$	246175	246164	8.340e+05	8.399e+05
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1S_0$	275905	276132	3.742e+09	3.748e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^5S_2^o$	373915	374697	7.379e+05	6.683e+05
$2p^4\ ^3P_1$	$2s2p^3\ ^5S_2^o$	375235	376016	3.273e+05	2.921e+05
$2p^4\ ^1D_2$	$2s2p^3\ ^5S_2^o$	402752	403691	2.803e+02	2.334e+02
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_3^o$	273145	273273	8.013e+09	7.990e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_3^o$	301982	302267	9.357e+06	9.110e+06
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_2^o$	273054	273180	1.548e+09	1.541e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_2^o$	274374	274499	7.058e+09	7.034e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	301891	302174	1.798e+06	1.753e+06
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_1^o$	273016	273140	1.095e+08	1.090e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_1^o$	274336	274459	2.482e+09	2.472e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3D_1^o$	274896	275030	9.478e+09	9.441e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_1^o$	301853	302134	5.104e+04	3.669e+04
$2p^4\ ^1S_0$	$2s2p^3\ ^3D_1^o$	374912	375494	4.568e+05	4.590e+05
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_0^o$	237256	237242	7.448e+08	7.457e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_1^o$	235936	235971	5.696e+08	5.698e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_1^o$	237256	237290	4.897e+08	4.910e+08
$2p^4\ ^3P_0$	$2s2p^3\ ^3P_1^o$	237816	237861	2.356e+09	2.363e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_1^o$	264773	264965	7.413e+05	7.094e+05
$2p^4\ ^1S_0$	$2s2p^3\ ^3P_1^o$	337832	338324	2.189e+06	2.028e+06
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_2^o$	235936	235972	1.574e+09	1.577e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_2^o$	237256	237291	1.057e+09	1.060e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_2^o$	264773	264966	2.639e+04	1.624e+04
$2p^4\ ^3P_2$	$2s2p^3\ ^1D_2^o$	164962	164850	2.035e+06	2.087e+06
$2p^4\ ^3P_1$	$2s2p^3\ ^1D_2^o$	166282	166170	5.368e+04	6.052e+04
$2p^4\ ^1D_2$	$2s2p^3\ ^1D_2^o$	193799	193845	5.627e+09	5.613e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3S_1^o$	156688	156682	1.284e+09	1.284e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3S_1^o$	158008	158001	1.333e+09	1.332e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3S_1^o$	158568	158572	1.357e+09	1.354e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3S_1^o$	185525	185676	4.924e+04	4.784e+04
$2p^4\ ^1S_0$	$2s2p^3\ ^3S_1^o$	258584	259036	1.409e+07	1.402e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^1P_1^o$	126958	126713	1.783e+05	1.880e+05

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1P_1^o$	128278	128032	6.407e+05	6.612e+05
$2p^4 \ ^3P_0$	$2s2p^3 \ ^1P_1^o$	128838	128604	8.352e+04	6.973e+04
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1P_1^o$	155795	155708	5.885e+08	5.905e+08
$2p^4 \ ^1S_0$	$2s2p^3 \ ^1P_1^o$	228854	229067	1.473e+10	1.466e+10
Mg VII					
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_0$	233024	233122	1.032e+09	1.033e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_0$	274897	275103	1.471e+09	1.468e+09
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_0$	362117	362366	3.191e+09	3.184e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_0$	397153	397621	1.789e+05	1.948e+05
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_1$	116993	116787	1.430e+04	1.937e+04
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_1$	231850	231947	1.368e+09	1.370e+09
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_1$	231917	232010	6.741e+08	6.733e+08
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_1$	273790	273991	1.268e+09	1.264e+09
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_1$	273797	274004	1.007e+09	1.006e+09
$2s2p^3 \ ^3P_0^o$	$2s^22p^2 \ ^3P_1$	273840	274049	4.551e+09	4.536e+09
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_1$	353294	353634	7.354e+05	6.889e+05
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_1$	361010	361254	9.586e+09	9.570e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_1$	396046	396509	2.131e+07	2.109e+07
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_2$	115176	114970	3.506e+04	4.905e+04
$2s2p^3 \ ^3D_3^o$	$2s^22p^2 \ ^3P_2$	229929	230022	1.671e+09	1.677e+09
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_2$	230033	230131	3.464e+08	3.459e+08
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_2$	230100	230194	3.438e+07	3.425e+07
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_2$	271973	272175	1.786e+09	1.778e+09
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_2$	271980	272188	3.466e+09	3.458e+09
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_2$	351477	351818	1.490e+07	1.456e+07
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_2$	359193	359438	1.615e+10	1.613e+10
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_2$	394229	394693	1.344e+06	1.304e+06
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^1D_2$	77152	76801	7.735e+00	1.440e+01
$2s2p^3 \ ^3D_3^o$	$2s^22p^2 \ ^1D_2$	191905	191852	1.297e+06	1.389e+06
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^1D_2$	192009	191962	2.661e+05	2.867e+05
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^1D_2$	192076	192025	1.545e+05	1.986e+05
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^1D_2$	233949	234006	1.557e+06	1.596e+06
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^1D_2$	233956	234018	2.419e+05	2.163e+05
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^1D_2$	313453	313649	1.354e+10	1.353e+10
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^1D_2$	321169	321269	1.822e+06	1.796e+06
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^1D_2$	356205	356524	1.793e+10	1.785e+10
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^1S_0$	147871	147737	9.912e+04	1.005e+05
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^1S_0$	189744	189718	5.219e+05	5.903e+05
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^1S_0$	276964	276981	1.674e+06	1.685e+06
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^1S_0$	312000	312236	4.425e+09	4.432e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^5S_2^o$	424216	424657	1.653e+06	1.515e+06
$2p^4 \ ^3P_1$	$2s2p^3 \ ^5S_2^o$	426293	426732	7.337e+05	6.644e+05

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2p^4\ ^1D_2$	$2s2p^3\ ^5S_2^o$	458180	458756	1.157e+03	1.020e+03
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_3^o$	309463	309605	9.389e+09	9.370e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_3^o$	343427	343705	1.977e+07	1.931e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_2^o$	309359	309496	1.869e+09	1.863e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_2^o$	311436	311572	8.223e+09	8.201e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	343323	343596	3.824e+06	3.740e+06
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_1^o$	309292	309433	1.357e+08	1.351e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_1^o$	311369	311509	2.953e+09	2.943e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3D_1^o$	312240	312388	1.107e+10	1.104e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_1^o$	343256	343533	1.253e+05	9.542e+04
$2p^4\ ^1S_0$	$2s2p^3\ ^3D_1^o$	425416	425952	9.658e+05	9.714e+05
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_1^o$	267419	267452	6.961e+08	6.957e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_1^o$	269496	269528	5.623e+08	5.635e+08
$2p^4\ ^3P_0$	$2s2p^3\ ^3P_1^o$	270367	270407	2.908e+09	2.915e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_1^o$	301383	301552	1.655e+06	1.591e+06
$2p^4\ ^1S_0$	$2s2p^3\ ^3P_1^o$	383543	383971	5.016e+06	4.696e+06
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_2^o$	267412	267439	1.862e+09	1.865e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_2^o$	269489	269515	1.339e+09	1.343e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_2^o$	301376	301539	1.177e+05	8.835e+04
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_0^o$	269446	269470	9.029e+08	9.033e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^1D_2^o$	187915	187809	4.325e+06	4.427e+06
$2p^4\ ^3P_1$	$2s2p^3\ ^1D_2^o$	189992	189885	1.321e+05	1.462e+05
$2p^4\ ^1D_2$	$2s2p^3\ ^1D_2^o$	221879	221909	6.903e+09	6.891e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3S_1^o$	180199	180189	1.596e+09	1.597e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3S_1^o$	182276	182265	1.682e+09	1.680e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3S_1^o$	183147	183144	1.724e+09	1.720e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3S_1^o$	214163	214289	1.058e+05	1.038e+05
$2p^4\ ^1S_0$	$2s2p^3\ ^3S_1^o$	296323	296708	2.940e+07	2.929e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^1P_1^o$	145163	144934	3.778e+05	3.972e+05
$2p^4\ ^3P_1$	$2s2p^3\ ^1P_1^o$	147240	147010	1.399e+06	1.439e+06
$2p^4\ ^3P_0$	$2s2p^3\ ^1P_1^o$	148111	147889	1.583e+05	1.333e+05
$2p^4\ ^1D_2$	$2s2p^3\ ^1P_1^o$	179127	179034	7.451e+08	7.473e+08
$2p^4\ ^1S_0$	$2s2p^3\ ^1P_1^o$	261287	261453	1.779e+10	1.773e+10
Al VIII					
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_0$	262330	262464	1.249e+09	1.249e+09
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_0$	309110	309270	1.694e+09	1.692e+09
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_0$	404200	404436	3.600e+09	3.593e+09
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_0$	444570	445028	2.633e+05	2.874e+05
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^3P_1$	132130	131917	3.103e+04	4.061e+04
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^3P_1$	260560	260660	1.643e+09	1.646e+09
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_1$	260620	260756	7.772e+08	7.757e+08
$2s2p^3\ ^3P_0^o$	$2s^22p^2\ ^3P_1$	307400	307623	5.299e+09	5.282e+09

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_1$	307400	307561	1.532e+09	1.528e+09
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_1$	307400	307607	1.122e+09	1.121e+09
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_1$	395310	395675	1.530e+06	1.446e+06
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_1$	402490	402727	1.082e+10	1.080e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_1$	442860	443319	4.050e+07	4.013e+07
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^3P_2$	129420	129212	7.424e+04	9.995e+04
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^3P_2$	257760	257850	1.953e+09	1.960e+09
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^3P_2$	257850	257955	3.776e+08	3.768e+08
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_2$	257910	258050	3.613e+07	3.596e+07
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_2$	304690	304856	2.033e+09	2.024e+09
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_2$	304690	304901	4.058e+09	4.050e+09
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_2$	392600	392969	3.061e+07	3.000e+07
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_2$	399780	400022	1.832e+10	1.831e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_2$	440150	440614	1.956e+06	1.896e+06
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^1D_2$	87120	86755	3.072e+01	5.141e+01
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^1D_2$	215460	215393	2.759e+06	2.930e+06
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^1D_2$	215550	215498	5.515e+05	5.891e+05
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1D_2$	215610	215593	3.436e+05	4.275e+05
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1D_2$	262390	262399	3.195e+06	3.261e+06
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^1D_2$	262390	262445	4.971e+05	4.498e+05
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^1D_2$	350300	350513	1.560e+10	1.559e+10
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1D_2$	357480	357565	2.723e+06	2.682e+06
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1D_2$	397850	398157	2.035e+10	2.027e+10
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1S_0$	166070	165998	2.067e+05	2.094e+05
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1S_0$	212850	212804	1.061e+06	1.184e+06
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1S_0$	307940	307970	3.192e+06	3.215e+06
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1S_0$	348310	348562	5.118e+09	5.127e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^5S_2^o$	474260	474690	3.411e+06	3.156e+06
$2p^4\ ^3P_1$	$2s2p^3\ ^5S_2^o$	477340	477815	1.502e+06	1.376e+06
$2p^4\ ^1D_2$	$2s2p^3\ ^5S_2^o$	513470	514067	4.112e+03	3.733e+03
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_3^o$	345920	346053	1.078e+10	1.076e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_3^o$	385130	385430	3.873e+07	3.792e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_2^o$	345830	345947	2.226e+09	2.219e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_2^o$	348910	349072	9.374e+09	9.354e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	385040	385325	7.532e+06	7.388e+06
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_1^o$	345770	345852	1.669e+08	1.661e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_1^o$	348850	348977	3.455e+09	3.444e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3D_1^o$	350180	350262	1.267e+10	1.263e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_1^o$	384980	385229	2.691e+05	2.131e+05
$2p^4\ ^1S_0$	$2s2p^3\ ^3D_1^o$	476160	476680	1.888e+06	1.900e+06
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_0^o$	302070	302109	1.066e+09	1.066e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_1^o$	298990	299046	8.296e+08	8.288e+08

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_1^o$	302070	302171	6.192e+08	6.205e+08
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3P_1^o$	303400	303456	3.505e+09	3.514e+09
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3P_1^o$	338200	338423	3.413e+06	3.291e+06
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3P_1^o$	429380	429874	1.055e+07	9.963e+06
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3P_2^o$	298990	299001	2.132e+09	2.136e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_2^o$	302070	302126	1.665e+09	1.670e+09
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3P_2^o$	338200	338378	3.975e+05	3.272e+05
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1D_2^o$	211080	210933	8.492e+06	8.676e+06
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1D_2^o$	214160	214058	2.965e+05	3.241e+05
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1D_2^o$	250290	250310	8.232e+09	8.221e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3S_1^o$	203900	203880	1.917e+09	1.919e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3S_1^o$	206980	207005	2.057e+09	2.055e+09
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3S_1^o$	208310	208290	2.127e+09	2.123e+09
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3S_1^o$	243110	243257	2.026e+05	1.998e+05
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3S_1^o$	334290	334708	5.711e+07	5.695e+07
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1P_1^o$	163530	163288	7.499e+05	7.854e+05
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1P_1^o$	166610	166414	2.844e+06	2.917e+06
$2p^4 \ ^3P_0$	$2s2p^3 \ ^1P_1^o$	167940	167698	2.812e+05	2.380e+05
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1P_1^o$	202740	202666	9.112e+08	9.138e+08
$2p^4 \ ^1S_0$	$2s2p^3 \ ^1P_1^o$	293920	294117	2.095e+10	2.089e+10
Si IX					
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_0$	292441	292525	1.494e+09	1.494e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_0$	344009	344201	1.919e+09	1.917e+09
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_0$	446942	447194	4.015e+09	4.008e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_0$	492755	493218	3.941e+05	4.300e+05
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_1$	148225	147579	6.330e+04	8.052e+04
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_1$	289751	289844	1.947e+09	1.951e+09
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_1$	289896	289985	8.766e+08	8.744e+08
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_1$	341464	341661	1.838e+09	1.834e+09
$2s2p^3 \ ^3P_0^o$	$2s^22p^2 \ ^3P_1$	341530	341715	6.083e+09	6.064e+09
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_1$	341573	341772	1.219e+09	1.219e+09
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_1$	437858	438210	2.964e+06	2.820e+06
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_1$	444397	444653	1.206e+10	1.204e+10
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_1$	490210	490678	7.298e+07	7.236e+07
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_2$	144356	143709	1.466e+05	1.915e+05
$2s2p^3 \ ^3D_3^o$	$2s^22p^2 \ ^3P_2$	285818	285912	2.241e+09	2.250e+09
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_2$	285882	285973	3.972e+08	3.961e+08
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_2$	286027	286114	3.644e+07	3.625e+07
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_2$	337595	337791	2.269e+09	2.259e+09
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_2$	337704	337902	4.691e+09	4.682e+09
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_2$	433989	434340	5.911e+07	5.807e+07
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_2$	440528	440783	2.058e+10	2.057e+10

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_2$	486341	486807	2.645e+06	2.560e+06
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^1D_2$	97844	97049	1.080e+02	1.681e+02
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^1D_2$	239306	239253	5.492e+06	5.799e+06
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^1D_2$	239370	239314	1.059e+06	1.124e+06
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1D_2$	239515	239454	7.157e+05	8.676e+05
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1D_2$	291083	291131	6.107e+06	6.211e+06
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^1D_2$	291192	291242	9.857e+05	9.018e+05
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^1D_2$	387477	387680	1.770e+10	1.770e+10
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1D_2$	394016	394123	3.795e+06	3.734e+06
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1D_2$	439829	440148	2.284e+10	2.276e+10
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1S_0$	184642	184508	4.029e+05	4.079e+05
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1S_0$	236210	236184	2.005e+06	2.216e+06
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1S_0$	339143	339177	5.828e+06	5.874e+06
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1S_0$	384956	385201	5.829e+09	5.839e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^5S_2^o$	523994	524866	6.586e+06	6.144e+06
$2p^4\ ^3P_1$	$2s2p^3\ ^5S_2^o$	528530	529406	2.856e+06	2.641e+06
$2p^4\ ^1D_2$	$2s2p^3\ ^5S_2^o$	568732	569747	1.292e+04	1.192e+04
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_3^o$	382532	382663	1.218e+10	1.217e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_3^o$	427270	427544	7.121e+07	6.986e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_2^o$	382468	382602	2.625e+09	2.617e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_2^o$	387004	387142	1.050e+10	1.048e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	427206	427483	1.391e+07	1.367e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_1^o$	382323	382461	2.049e+08	2.039e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_1^o$	386859	387001	3.993e+09	3.981e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3D_1^o$	388638	388797	1.427e+10	1.423e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_1^o$	427061	427342	5.202e+05	4.236e+05
$2p^4\ ^1S_0$	$2s2p^3\ ^3D_1^o$	527248	527815	3.466e+06	3.491e+06
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_1^o$	330755	330785	9.721e+08	9.708e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_1^o$	335291	335325	6.574e+08	6.589e+08
$2p^4\ ^3P_0$	$2s2p^3\ ^3P_1^o$	337070	337121	4.161e+09	4.172e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_1^o$	375493	375665	6.605e+06	6.385e+06
$2p^4\ ^1S_0$	$2s2p^3\ ^3P_1^o$	475680	476138	2.075e+07	1.972e+07
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_0^o$	335225	335270	1.236e+09	1.236e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_2^o$	330646	330674	2.382e+09	2.386e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_2^o$	335182	335213	2.049e+09	2.056e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_2^o$	375384	375554	1.133e+06	9.820e+05
$2p^4\ ^3P_2$	$2s2p^3\ ^1D_2^o$	234361	234236	1.560e+07	1.591e+07
$2p^4\ ^3P_1$	$2s2p^3\ ^1D_2^o$	238897	238775	6.206e+05	6.714e+05
$2p^4\ ^1D_2$	$2s2p^3\ ^1D_2^o$	279099	279116	9.615e+09	9.605e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3S_1^o$	227822	227792	2.246e+09	2.248e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3S_1^o$	232358	232332	2.462e+09	2.460e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3S_1^o$	234137	234129	2.573e+09	2.568e+09

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2p^4\ ^1D_2$	$2s2p^3\ ^3S_1^o$	272560	272673	3.502e+05	3.462e+05
$2p^4\ ^1S_0$	$2s2p^3\ ^3S_1^o$	372747	373146	1.043e+08	1.041e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^1P_1^o$	182009	181768	1.405e+06	1.467e+06
$2p^4\ ^3P_1$	$2s2p^3\ ^1P_1^o$	186545	186308	5.444e+06	5.569e+06
$2p^4\ ^3P_0$	$2s2p^3\ ^1P_1^o$	188324	188104	4.700e+05	3.992e+05
$2p^4\ ^1D_2$	$2s2p^3\ ^1P_1^o$	226747	226649	1.087e+09	1.090e+09
$2p^4\ ^1S_0$	$2s2p^3\ ^1P_1^o$	326934	327121	2.420e+10	2.414e+10
P X					
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_0$	323416	323459	1.776e+09	1.775e+09
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_0$	379910	380093	2.144e+09	2.143e+09
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_0$	490592	490816	4.437e+09	4.430e+09
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_0$	541990	542429	5.997e+05	6.542e+05
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^3P_1$	164048	163864	1.229e+05	1.528e+05
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^3P_1$	319509	319579	2.286e+09	2.291e+09
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_1$	319724	319783	9.701e+08	9.674e+08
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_1$	376218	376417	2.196e+09	2.193e+09
$2s2p^3\ ^3P_0^o$	$2s^22p^2\ ^3P_1$	376237	376443	6.909e+09	6.889e+09
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_1$	376457	376646	1.294e+09	1.295e+09
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_1$	481058	481380	5.408e+06	5.172e+06
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_1$	486900	487139	1.331e+10	1.330e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_1$	538298	538753	1.254e+08	1.244e+08
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^3P_2$	158695	158514	2.733e+05	3.486e+05
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^3P_2$	314156	314229	4.033e+08	4.019e+08
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^3P_2$	314189	314280	2.537e+09	2.548e+09
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_2$	314371	314432	3.535e+07	3.517e+07
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_2$	370865	371066	2.490e+09	2.478e+09
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_2$	371104	371296	5.370e+09	5.361e+09
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_2$	475705	476030	1.085e+08	1.068e+08
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_2$	481547	481789	2.293e+10	2.293e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_2$	532945	533402	3.271e+06	3.158e+06
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^1D_2$	108050	107716	3.434e+02	5.074e+02
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^1D_2$	263511	263431	1.902e+06	2.010e+06
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^1D_2$	263544	263482	1.036e+07	1.089e+07
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1D_2$	263726	263634	1.413e+06	1.678e+06
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1D_2$	320220	320268	1.099e+07	1.115e+07
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^1D_2$	320459	320498	1.898e+06	1.752e+06
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^1D_2$	425060	425232	1.986e+10	1.986e+10
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1D_2$	430902	430991	4.861e+06	4.775e+06
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1D_2$	482300	482604	2.541e+10	2.534e+10
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1S_0$	203456	203269	7.413e+05	7.513e+05
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1S_0$	259950	259903	3.562e+06	3.908e+06
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1S_0$	370632	370626	1.024e+07	1.033e+07

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1S_0$	422030	422239	6.559e+09	6.572e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^5S_2^o$	574850	575243	1.206e+07	1.132e+07
$2p^4\ ^3P_1$	$2s2p^3\ ^5S_2^o$	581271	581647	5.106e+06	4.758e+06
$2p^4\ ^1D_2$	$2s2p^3\ ^5S_2^o$	625390	625923	3.657e+04	3.413e+04
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_2^o$	419389	419528	3.075e+09	3.067e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_2^o$	425810	425932	1.161e+10	1.158e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	469929	470208	2.430e+07	2.392e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_3^o$	419356	419477	1.359e+10	1.358e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_3^o$	469896	470156	1.240e+08	1.218e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_1^o$	419174	419325	2.522e+08	2.509e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_1^o$	425595	425728	4.573e+09	4.559e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3D_1^o$	427995	428145	1.585e+10	1.581e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_1^o$	469714	470004	9.227e+05	7.670e+05
$2p^4\ ^1S_0$	$2s2p^3\ ^3D_1^o$	–	579511	6.031e+06	6.077e+06
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_1^o$	362680	362691	1.126e+09	1.124e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_1^o$	369101	369094	6.740e+08	6.760e+08
$2p^4\ ^3P_0$	$2s2p^3\ ^3P_1^o$	371501	371511	4.890e+09	4.905e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_1^o$	413220	413370	1.214e+07	1.176e+07
$2p^4\ ^1S_0$	$2s2p^3\ ^3P_1^o$	–	522877	3.862e+07	3.692e+07
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_0^o$	369082	369068	1.414e+09	1.414e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_2^o$	362441	362461	2.609e+09	2.614e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_2^o$	368862	368865	2.506e+09	2.516e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_2^o$	412981	413141	2.878e+06	2.574e+06
$2p^4\ ^3P_2$	$2s2p^3\ ^1D_2^o$	257840	257727	2.704e+07	2.754e+07
$2p^4\ ^3P_1$	$2s2p^3\ ^1D_2^o$	264261	264131	1.229e+06	1.319e+06
$2p^4\ ^1D_2$	$2s2p^3\ ^1D_2^o$	308380	308407	1.106e+10	1.105e+10
$2p^4\ ^3P_2$	$2s2p^3\ ^3S_1^o$	251998	251968	2.580e+09	2.583e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3S_1^o$	258419	258372	2.903e+09	2.899e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3S_1^o$	260819	260788	3.072e+09	3.065e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3S_1^o$	302538	302647	5.498e+05	5.432e+05
$2p^4\ ^1S_0$	$2s2p^3\ ^3S_1^o$	–	412154	1.807e+08	1.803e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^1P_1^o$	200600	200355	2.503e+06	2.601e+06
$2p^4\ ^3P_1$	$2s2p^3\ ^1P_1^o$	207021	206758	9.900e+06	1.010e+07
$2p^4\ ^3P_0$	$2s2p^3\ ^1P_1^o$	209421	209175	7.402e+05	6.296e+05
$2p^4\ ^1D_2$	$2s2p^3\ ^1P_1^o$	251140	251034	1.275e+09	1.279e+09
$2p^4\ ^1S_0$	$2s2p^3\ ^1P_1^o$	–	360541	2.753e+10	2.747e+10
S XI					
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_0$	355364	355430	2.103e+09	2.101e+09
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_0$	416986	417164	2.369e+09	2.367e+09
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_0$	535220	535486	4.867e+09	4.858e+09
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_0$	592480	592926	9.271e+05	9.986e+05
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^3P_1$	181043	180862	2.292e+05	2.785e+05

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^3P_1$	349868	349938	2.665e+09	2.670e+09
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_1$	350156	350227	1.055e+09	1.051e+09
$2s2p^3\ ^3P_0^o$	$2s^22p^2\ ^3P_1$	411739	411925	7.785e+09	7.759e+09
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_1$	411778	411961	2.622e+09	2.617e+09
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_1$	412211	412388	1.343e+09	1.345e+09
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_1$	524969	525327	9.382e+06	9.013e+06
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_1$	530012	530284	1.457e+10	1.455e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_1$	587272	587723	2.066e+08	2.051e+08
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^3P_2$	173863	173682	4.858e+05	6.051e+05
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^3P_2$	342688	342757	3.946e+08	3.926e+08
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^3P_2$	342962	343031	2.840e+09	2.852e+09
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_2$	342976	343046	3.305e+07	3.288e+07
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_2$	404598	404780	2.690e+09	2.675e+09
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_2$	405031	405208	6.105e+09	6.093e+09
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_2$	517789	518147	1.908e+08	1.882e+08
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_2$	522832	523103	2.540e+10	2.539e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_2$	580092	580542	3.596e+06	3.474e+06
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^1D_2$	119105	118774	1.002e+03	1.418e+03
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^1D_2$	287930	287850	3.221e+06	3.389e+06
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^1D_2$	288204	288124	1.867e+07	1.953e+07
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1D_2$	288218	288139	2.668e+06	3.101e+06
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1D_2$	349840	349873	1.876e+07	1.895e+07
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^1D_2$	350273	350300	3.554e+06	3.315e+06
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^1D_2$	463031	463239	2.207e+10	2.206e+10
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1D_2$	468074	468196	5.586e+06	5.450e+06
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1D_2$	525334	525635	2.809e+10	2.800e+10
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1S_0$	222435	222284	1.299e+06	1.315e+06
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1S_0$	284057	284019	6.002e+06	6.539e+06
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1S_0$	402291	402341	1.739e+07	1.755e+07
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1S_0$	459551	459780	7.316e+09	7.331e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^5S_2^o$	625451	625875	2.110e+07	1.993e+07
$2p^4\ ^3P_1$	$2s2p^3\ ^5S_2^o$	634280	634688	8.661e+06	8.116e+06
$2p^4\ ^1D_2$	$2s2p^3\ ^5S_2^o$	682211	682735	9.465e+04	8.903e+04
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_2^o$	456626	456799	3.588e+09	3.579e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_2^o$	465455	465612	1.267e+10	1.265e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	513386	513659	4.040e+07	3.986e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_3^o$	456352	456525	1.501e+10	1.501e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_3^o$	513112	513386	2.059e+08	2.026e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_1^o$	456338	456510	3.121e+08	3.104e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_1^o$	465167	465323	5.204e+09	5.189e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3D_1^o$	468281	468458	1.744e+10	1.740e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_1^o$	513098	513370	1.517e+06	1.279e+06

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3D_1^o$	631372	631923	1.003e+07	1.011e+07
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_0^o$	403584	403626	1.604e+09	1.603e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3P_1^o$	394716	394776	1.291e+09	1.289e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_1^o$	403545	403589	6.659e+08	6.678e+08
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3P_1^o$	406659	406724	5.701e+09	5.719e+09
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3P_1^o$	451476	451636	2.133e+07	2.070e+07
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3P_1^o$	569750	570188	6.872e+07	6.600e+07
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3P_2^o$	394283	394349	2.807e+09	2.812e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_2^o$	403112	403162	3.053e+09	3.065e+09
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3P_2^o$	451043	451209	6.729e+06	6.169e+06
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1D_2^o$	281525	281410	4.455e+07	4.535e+07
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1D_2^o$	290354	290223	2.326e+06	2.479e+06
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1D_2^o$	338285	338270	1.256e+10	1.256e+10
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3S_1^o$	276482	276453	2.919e+09	2.925e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3S_1^o$	285311	285266	3.384e+09	3.381e+09
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3S_1^o$	288425	288401	3.635e+09	3.629e+09
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3S_1^o$	333242	333313	7.872e+05	7.825e+05
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3S_1^o$	451516	451866	2.983e+08	2.981e+08
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1P_1^o$	219222	219014	4.258e+06	4.422e+06
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1P_1^o$	228051	227827	1.722e+07	1.755e+07
$2p^4 \ ^3P_0$	$2s2p^3 \ ^1P_1^o$	231165	230962	1.093e+06	9.277e+05
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1P_1^o$	275982	275874	1.475e+09	1.480e+09
$2p^4 \ ^1S_0$	$2s2p^3 \ ^1P_1^o$	394256	394426	3.098e+10	3.092e+10
Cl XII					
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_0$	388581	388645	2.486e+09	2.483e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_0$	455554	455693	2.591e+09	2.589e+09
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_0$	581190	581438	5.305e+09	5.295e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_0$	644595	645045	1.443e+06	1.544e+06
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_1$	198860	198703	4.139e+05	4.938e+05
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_1$	380939	381023	3.090e+09	3.096e+09
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_1$	381341	381424	1.129e+09	1.124e+09
$2s2p^3 \ ^3P_0^o$	$2s^22p^2 \ ^3P_1$	448159	448321	8.720e+09	8.691e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_1$	448314	448472	3.130e+09	3.125e+09
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_1$	449054	449212	1.363e+09	1.366e+09
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_1$	569870	570239	1.558e+07	1.503e+07
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_1$	573950	574217	1.582e+10	1.580e+10
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_1$	637355	637824	3.275e+08	3.253e+08
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_2$	189471	189315	8.291e+05	1.014e+06
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_2$	371550	371634	3.706e+08	3.683e+08
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_2$	371952	372035	2.990e+07	2.977e+07
$2s2p^3 \ ^3D_3^o$	$2s^22p^2 \ ^3P_2$	372209	372292	3.149e+09	3.164e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_2$	438925	439083	2.865e+09	2.848e+09

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_2$	439665	439823	6.906e+09	6.894e+09
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_2$	560481	560850	3.232e+08	3.192e+08
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_2$	564561	564828	2.800e+10	2.801e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_2$	627966	628435	3.338e+06	3.211e+06
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^1D_2$	130570	130264	2.714e+03	3.718e+03
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^1D_2$	312649	312583	5.165e+06	5.418e+06
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1D_2$	313051	312984	4.836e+06	5.533e+06
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^1D_2$	313308	313241	3.234e+07	3.373e+07
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1D_2$	380024	380033	3.051e+07	3.074e+07
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^1D_2$	380764	380772	6.471e+06	6.087e+06
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^1D_2$	501580	501800	2.433e+10	2.433e+10
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1D_2$	505660	505777	5.505e+06	5.330e+06
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1D_2$	569065	569384	3.089e+10	3.079e+10
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1S_0$	241664	241520	2.177e+06	2.206e+06
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1S_0$	308637	308568	9.642e+06	1.046e+07
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1S_0$	434273	434313	2.859e+07	2.888e+07
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1S_0$	497678	497920	8.102e+09	8.120e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^5S_2^o$	676450	676811	3.557e+07	3.377e+07
$2p^4\ ^3P_1$	$2s2p^3\ ^5S_2^o$	688330	688690	1.404e+07	1.323e+07
$2p^4\ ^1D_2$	$2s2p^3\ ^5S_2^o$	739820	740334	2.269e+05	2.148e+05
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_2^o$	494371	494491	4.169e+09	4.160e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_2^o$	506251	506371	1.369e+10	1.367e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	557741	558015	6.422e+07	6.345e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_1^o$	493969	494090	3.889e+08	3.865e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_1^o$	505849	505969	5.888e+09	5.871e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3D_1^o$	509749	509896	1.900e+10	1.896e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_1^o$	557339	557614	2.329e+06	1.987e+06
$2p^4\ ^1S_0$	$2s2p^3\ ^3D_1^o$	684739	685286	1.599e+07	1.613e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_3^o$	493712	493833	1.643e+10	1.644e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_3^o$	557082	557357	3.278e+08	3.230e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_0^o$	439031	439072	1.806e+09	1.805e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_1^o$	426996	427042	1.471e+09	1.468e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_1^o$	438876	438921	6.319e+08	6.341e+08
$2p^4\ ^3P_0$	$2s2p^3\ ^3P_1^o$	442776	442848	6.611e+09	6.634e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_1^o$	490366	490566	3.611e+07	3.509e+07
$2p^4\ ^1S_0$	$2s2p^3\ ^3P_1^o$	617766	618238	1.177e+08	1.135e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_2^o$	426256	426302	2.976e+09	2.982e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_2^o$	438136	438182	3.709e+09	3.725e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_2^o$	489626	489826	1.470e+07	1.370e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^1D_2^o$	305440	305275	7.007e+07	7.129e+07
$2p^4\ ^3P_1$	$2s2p^3\ ^1D_2^o$	317320	317154	4.248e+06	4.502e+06
$2p^4\ ^1D_2$	$2s2p^3\ ^1D_2^o$	368810	368799	1.414e+10	1.414e+10

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2p^4\ ^3P_2$	$2s2p^3\ ^3S_1^o$	301360	301297	3.259e+09	3.267e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3S_1^o$	313240	313176	3.913e+09	3.910e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3S_1^o$	317140	317103	4.276e+09	4.269e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3S_1^o$	364730	364821	1.021e+06	1.016e+06
$2p^4\ ^1S_0$	$2s2p^3\ ^3S_1^o$	492130	492493	4.713e+08	4.710e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^1P_1^o$	237955	237690	6.930e+06	7.183e+06
$2p^4\ ^3P_1$	$2s2p^3\ ^1P_1^o$	249835	249569	2.875e+07	2.927e+07
$2p^4\ ^3P_0$	$2s2p^3\ ^1P_1^o$	253735	253496	1.508e+06	1.273e+06
$2p^4\ ^1D_2$	$2s2p^3\ ^1P_1^o$	301325	301214	1.690e+09	1.696e+09
$2p^4\ ^1S_0$	$2s2p^3\ ^1P_1^o$	428725	428886	3.452e+10	3.447e+10
Ar XIII					
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_0$	423260	423279	2.939e+09	2.936e+09
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_0$	495810	495947	2.808e+09	2.807e+09
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_0$	628630	628873	5.752e+09	5.741e+09
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_0$	698690	699123	2.244e+06	2.382e+06
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^3P_1$	–	217473	7.273e+05	8.542e+05
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^3P_1$	412861	412881	3.564e+09	3.572e+09
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_1$	413401	413425	1.187e+09	1.181e+09
$2s2p^3\ ^3P_0^o$	$2s^22p^2\ ^3P_1$	485581	485754	9.723e+09	9.691e+09
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_1$	485951	486093	3.742e+09	3.736e+09
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_1$	487181	487305	1.352e+09	1.355e+09
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_1$	616001	616272	2.492e+07	2.412e+07
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_1$	618771	619019	1.706e+10	1.705e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_1$	688831	689269	5.007e+08	4.975e+08
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^3P_2$	–	205482	1.366e+06	1.645e+06
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^3P_2$	400870	400890	3.320e+08	3.295e+08
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_2$	401410	401434	2.636e+07	2.633e+07
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^3P_2$	402150	402164	3.465e+09	3.483e+09
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_2$	473960	474102	3.007e+09	2.988e+09
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_2$	475190	475314	7.783e+09	7.772e+09
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_2$	604010	604281	5.287e+08	5.229e+08
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_2$	606780	607028	3.077e+10	3.078e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_2$	676840	677278	2.312e+06	2.201e+06
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^1D_2$	–	142162	6.876e+03	9.170e+03
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^1D_2$	337688	337570	7.853e+06	8.225e+06
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1D_2$	338228	338114	8.449e+06	9.536e+06
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^1D_2$	338968	338843	5.403e+07	5.622e+07
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1D_2$	410778	410782	4.739e+07	4.762e+07
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^1D_2$	412008	411994	1.142e+07	1.082e+07
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^1D_2$	540828	540961	2.663e+10	2.664e+10
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1D_2$	543598	543708	4.231e+06	4.033e+06
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1D_2$	613658	613957	3.382e+10	3.372e+10

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1S_0$	261122	260912	3.503e+06	3.553e+06
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1S_0$	333672	333580	1.484e+07	1.603e+07
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1S_0$	466492	466506	4.556e+07	4.607e+07
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1S_0$	536552	536756	8.919e+09	8.942e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^5S_2^o$	–	728103	5.811e+07	5.540e+07
$2p^4\ ^3P_1$	$2s2p^3\ ^5S_2^o$	–	743828	2.187e+07	2.069e+07
$2p^4\ ^1D_2$	$2s2p^3\ ^5S_2^o$	–	798895	5.083e+05	4.836e+05
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_2^o$	532580	532695	4.830e+09	4.819e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_2^o$	548180	548420	1.465e+10	1.463e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	603580	603487	9.790e+07	9.686e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_1^o$	532040	532151	4.882e+08	4.850e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_1^o$	547640	547876	6.631e+09	6.612e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3D_1^o$	552440	552623	2.056e+10	2.051e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_1^o$	603040	602943	3.354e+06	2.884e+06
$2p^4\ ^1S_0$	$2s2p^3\ ^3D_1^o$	–	739845	2.455e+07	2.479e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_3^o$	531300	531422	1.784e+10	1.786e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_3^o$	602300	602213	5.025e+08	4.957e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_0^o$	475460	475547	2.025e+09	2.024e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_1^o$	459490	459483	1.665e+09	1.663e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_1^o$	475090	475208	5.713e+08	5.739e+08
$2p^4\ ^3P_0$	$2s2p^3\ ^3P_1^o$	479890	479955	7.627e+09	7.658e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_1^o$	530490	530275	5.913e+07	5.755e+07
$2p^4\ ^1S_0$	$2s2p^3\ ^3P_1^o$	–	667177	1.949e+08	1.887e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_2^o$	458260	458271	3.113e+09	3.120e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_2^o$	473860	473996	4.491e+09	4.512e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_2^o$	529260	529063	3.037e+07	2.866e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^1D_2^o$	329440	329304	1.056e+08	1.074e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^1D_2^o$	345040	345029	7.531e+06	7.945e+06
$2p^4\ ^1D_2$	$2s2p^3\ ^1D_2^o$	400440	400096	1.579e+10	1.579e+10
$2p^4\ ^3P_2$	$2s2p^3\ ^3S_1^o$	326670	326557	3.599e+09	3.609e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3S_1^o$	342270	342282	4.498e+09	4.494e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3S_1^o$	347070	347029	5.012e+09	5.006e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3S_1^o$	397670	397349	1.189e+06	1.184e+06
$2p^4\ ^1S_0$	$2s2p^3\ ^3S_1^o$	–	534251	7.143e+08	7.142e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^1P_1^o$	256610	256308	1.081e+07	1.119e+07
$2p^4\ ^3P_1$	$2s2p^3\ ^1P_1^o$	272210	272032	4.625e+07	4.704e+07
$2p^4\ ^3P_0$	$2s2p^3\ ^1P_1^o$	277010	276779	1.916e+06	1.600e+06
$2p^4\ ^1D_2$	$2s2p^3\ ^1P_1^o$	327610	327099	1.922e+09	1.930e+09
$2p^4\ ^1S_0$	$2s2p^3\ ^1P_1^o$	–	464001	3.818e+10	3.812e+10

K XIV

$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_0$	459498	459537	3.477e+09	3.473e+09
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_0$	538032	538247	3.019e+09	3.019e+09

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_0$	677710	678036	6.207e+09	6.195e+09
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_0$	755050	755567	3.447e+06	3.630e+06
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^3P_1$	237405	237278	1.250e+06	1.447e+06
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^3P_1$	445519	445579	4.091e+09	4.103e+09
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_1$	446263	446295	1.226e+09	1.219e+09
$2s2p^3\ ^3P_0^o$	$2s^22p^2\ ^3P_1$	524167	524375	1.081e+10	1.077e+10
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_1$	524797	525005	4.480e+09	4.473e+09
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_1$	526703	526902	1.307e+09	1.312e+09
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_1$	663225	663622	3.855e+07	3.741e+07
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_1$	664475	664794	1.827e+10	1.826e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_1$	741815	742325	7.398e+08	7.355e+08
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^3P_2$	222415	222290	2.184e+06	2.596e+06
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^3P_2$	430529	430591	2.814e+08	2.786e+08
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_2$	431273	431307	2.303e+07	2.311e+07
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^3P_2$	432777	432794	3.785e+09	3.807e+09
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_2$	509807	510017	3.113e+09	3.092e+09
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_2$	511713	511913	8.750e+09	8.738e+09
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_2$	648235	648634	8.374e+08	8.292e+08
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_2$	649485	649806	3.371e+10	3.374e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_2$	726825	727336	7.890e+05	7.241e+05
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^1D_2$	154727	154440	1.637e+04	2.134e+04
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^1D_2$	362841	362741	1.133e+07	1.186e+07
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1D_2$	363585	363457	1.424e+07	1.589e+07
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^1D_2$	365089	364944	8.726e+07	9.062e+07
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1D_2$	442119	442167	7.035e+07	7.050e+07
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^1D_2$	444025	444063	1.943e+07	1.851e+07
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^1D_2$	580547	580784	2.896e+10	2.899e+10
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1D_2$	581797	581956	1.918e+06	1.749e+06
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1D_2$	659137	659486	3.691e+10	3.682e+10
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1S_0$	280584	280376	5.422e+06	5.505e+06
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1S_0$	359118	359086	2.197e+07	2.367e+07
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1S_0$	498796	498875	7.041e+07	7.126e+07
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1S_0$	576136	576406	9.774e+09	9.801e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^5S_2^o$	779450	779808	9.237e+07	8.842e+07
$2p^4\ ^3P_1$	$2s2p^3\ ^5S_2^o$	799980	800297	3.285e+07	3.118e+07
$2p^4\ ^1D_2$	$2s2p^3\ ^5S_2^o$	858160	858613	1.071e+06	1.024e+06
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_2^o$	571336	571507	5.576e+09	5.565e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_2^o$	591866	591996	1.556e+10	1.554e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	650046	650313	1.435e+08	1.421e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_1^o$	570592	570791	6.174e+08	6.131e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_1^o$	591122	591280	7.435e+09	7.414e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3D_1^o$	596702	596804	2.210e+10	2.204e+10

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3D_1^o$	649302	649596	4.532e+06	3.919e+06
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3D_1^o$	795312	795908	3.641e+07	3.679e+07
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3D_3^o$	569088	569304	1.924e+10	1.927e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3D_3^o$	647798	648110	7.446e+08	7.351e+08
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_0^o$	513218	513200	2.263e+09	2.261e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3P_1^o$	492058	492081	1.875e+09	1.872e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_1^o$	512588	512570	4.861e+08	4.890e+08
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3P_1^o$	518168	518094	8.755e+09	8.794e+09
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3P_1^o$	570768	570886	9.398e+07	9.159e+07
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3P_1^o$	716778	717198	3.134e+08	3.044e+08
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3P_2^o$	490152	490185	3.218e+09	3.227e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_2^o$	510682	510673	5.415e+09	5.442e+09
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3P_2^o$	568862	568990	5.987e+07	5.702e+07
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1D_2^o$	353630	353464	1.530e+08	1.555e+08
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1D_2^o$	374160	373953	1.303e+07	1.369e+07
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1D_2^o$	432340	432270	1.752e+10	1.752e+10
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3S_1^o$	352380	352292	3.936e+09	3.949e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3S_1^o$	372910	372781	5.148e+09	5.144e+09
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3S_1^o$	378490	378305	5.865e+09	5.860e+09
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3S_1^o$	431090	431097	1.217e+06	1.213e+06
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3S_1^o$	577100	577409	1.040e+09	1.041e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1P_1^o$	275040	274762	1.619e+07	1.673e+07
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1P_1^o$	295570	295251	7.183e+07	7.299e+07
$2p^4 \ ^3P_0$	$2s2p^3 \ ^1P_1^o$	301150	300775	2.193e+06	1.799e+06
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1P_1^o$	353750	353567	2.172e+09	2.183e+09
$2p^4 \ ^1S_0$	$2s2p^3 \ ^1P_1^o$	499760	499879	4.195e+10	4.190e+10
Ca XV					
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_0$	497570	497629	4.118e+09	4.114e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_0$	582780	582947	3.221e+09	3.222e+09
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_0$	728880	729191	6.670e+09	6.658e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_0$	814380	814833	5.186e+06	5.426e+06
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_1$	258341	258222	2.106e+06	2.409e+06
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_1$	479121	479173	4.674e+09	4.689e+09
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_1$	480011	480082	1.241e+09	1.233e+09
$2s2p^3 \ ^3P_0^o$	$2s^22p^2 \ ^3P_1$	564171	564342	1.198e+10	1.194e+10
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_1$	565221	565399	5.372e+09	5.364e+09
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_1$	568111	568253	1.231e+09	1.237e+09
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_1$	711321	711643	1.945e+10	1.944e+10
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_1$	712091	712503	5.783e+07	5.626e+07
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_1$	796821	797286	1.058e+09	1.052e+09
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_2$	239977	239858	3.400e+06	3.993e+06
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_2$	460757	460809	2.225e+08	2.196e+08

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_2$	461647	461718	2.048e+07	2.072e+07
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^3P_2$	464307	464353	4.109e+09	4.134e+09
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_2$	546857	547036	3.176e+09	3.152e+09
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_2$	549747	549890	9.822e+09	9.810e+09
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_2$	692957	693280	3.686e+10	3.690e+10
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_2$	693727	694139	1.284e+09	1.273e+09
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_2$	778457	778923	2.475e+04	3.736e+04
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^1D_2$	167300	167040	3.668e+04	4.690e+04
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^1D_2$	388080	387991	1.553e+07	1.624e+07
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1D_2$	388970	388900	2.316e+07	2.558e+07
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^1D_2$	391630	391534	1.364e+08	1.414e+08
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1D_2$	474180	474217	9.971e+07	9.966e+07
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^1D_2$	477070	477071	3.165e+07	3.030e+07
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1D_2$	620280	620461	4.766e+04	1.888e+04
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^1D_2$	621050	621321	3.130e+10	3.134e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1D_2$	705780	706104	4.019e+10	4.010e+10
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1S_0$	299900	299793	8.085e+06	8.224e+06
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1S_0$	385110	385111	3.140e+07	3.375e+07
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1S_0$	531210	531355	1.056e+08	1.070e+08
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1S_0$	616710	616998	1.067e+10	1.070e+10
$2p^4\ ^3P_2$	$2s2p^3\ ^5S_2^o$	831650	831984	1.434e+08	1.378e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^5S_2^o$	857950	858308	4.770e+07	4.543e+07
$2p^4\ ^1D_2$	$2s2p^3\ ^5S_2^o$	919220	919708	2.136e+06	2.049e+06
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_2^o$	610870	611033	6.413e+09	6.401e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_2^o$	637170	637358	1.640e+10	1.638e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	698440	698757	2.025e+08	2.008e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_1^o$	609980	610124	7.859e+08	7.801e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_1^o$	636280	636449	8.301e+09	8.277e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3D_1^o$	642400	642602	2.364e+10	2.358e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_1^o$	697550	697848	5.747e+06	4.983e+06
$2p^4\ ^1S_0$	$2s2p^3\ ^3D_1^o$	853320	853847	5.222e+07	5.281e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_3^o$	607320	607489	2.062e+10	2.066e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_3^o$	694890	695213	1.070e+09	1.057e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_0^o$	552120	552188	2.522e+09	2.521e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_1^o$	524770	524806	2.100e+09	2.097e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_1^o$	551070	551131	3.812e+08	3.843e+08
$2p^4\ ^3P_0$	$2s2p^3\ ^3P_1^o$	557190	557284	9.992e+09	1.004e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_1^o$	612340	612530	1.454e+08	1.418e+08
$2p^4\ ^1S_0$	$2s2p^3\ ^3P_1^o$	768110	768530	4.905e+08	4.778e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_2^o$	521880	521952	3.295e+09	3.306e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_2^o$	548180	548277	6.493e+09	6.528e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_2^o$	609450	609676	1.131e+08	1.085e+08

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3S_1^o$	378670	378562	4.269e+09	4.285e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3S_1^o$	404970	404887	5.876e+09	5.872e+09
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3S_1^o$	411090	411040	6.859e+09	6.855e+09
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3S_1^o$	466240	466286	1.047e+06	1.044e+06
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3S_1^o$	622010	622286	1.458e+09	1.459e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1D_2^o$	377900	377703	2.133e+08	2.168e+08
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1D_2^o$	404200	404028	2.208e+07	2.311e+07
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1D_2^o$	465470	465427	1.933e+10	1.934e+10
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1P_1^o$	293170	292919	2.323e+07	2.399e+07
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1P_1^o$	319470	319244	1.078e+08	1.095e+08
$2p^4 \ ^3P_0$	$2s2p^3 \ ^1P_1^o$	325590	325397	2.177e+06	1.721e+06
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1P_1^o$	380740	380644	2.442e+09	2.456e+09
$2p^4 \ ^1S_0$	$2s2p^3 \ ^1P_1^o$	536510	536643	4.587e+10	4.582e+10
Sc XVI					
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_0$	537720	537774	4.885e+09	4.881e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_0$	630250	630436	3.412e+09	3.414e+09
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_0$	782360	782627	7.141e+09	7.127e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_0$	877000	877437	7.573e+06	7.870e+06
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_1$	278441	280407	3.492e+06	3.950e+06
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_1$	513651	513726	5.311e+09	5.331e+09
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_1$	514761	514825	1.230e+09	1.221e+09
$2s2p^3 \ ^3P_0^o$	$2s^22p^2 \ ^3P_1$	605641	605830	1.326e+10	1.322e+10
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_1$	607291	607487	6.449e+09	6.440e+09
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_1$	611471	611634	1.125e+09	1.132e+09
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_1$	759401	759678	2.058e+10	2.058e+10
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_1$	762781	763161	8.441e+07	8.231e+07
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_1$	854041	854487	1.467e+09	1.459e+09
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_2$	256374	258326	5.173e+06	6.009e+06
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_2$	491584	491645	1.607e+08	1.578e+08
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_2$	492694	492744	1.934e+07	1.979e+07
$2s2p^3 \ ^3D_3^o$	$2s^22p^2 \ ^3P_2$	497004	497047	4.433e+09	4.463e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_2$	585224	585406	3.193e+09	3.167e+09
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_2$	589404	589553	1.102e+10	1.101e+10
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_2$	737334	737597	4.023e+10	4.028e+10
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_2$	740714	741080	1.905e+09	1.890e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_2$	831974	832406	2.838e+06	2.945e+06
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^1D_2$	178040	179872	7.749e+04	9.744e+04
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^1D_2$	413250	413191	2.019e+07	2.113e+07
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^1D_2$	414360	414290	3.628e+07	3.971e+07
$2s2p^3 \ ^3D_3^o$	$2s^22p^2 \ ^1D_2$	418670	418593	2.062e+08	2.136e+08
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^1D_2$	506890	506952	1.347e+08	1.342e+08
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^1D_2$	511070	511100	4.902e+07	4.707e+07

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1D_2$	659000	659143	2.365e+06	2.695e+06
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^1D_2$	662380	662626	3.362e+10	3.368e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1D_2$	753640	753953	4.369e+10	4.359e+10
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1S_0$	319000	319017	1.162e+07	1.184e+07
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1S_0$	411530	411679	4.343e+07	4.661e+07
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1S_0$	563640	563870	1.535e+08	1.557e+08
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1S_0$	658280	658679	1.161e+10	1.165e+10
$2p^4\ ^3P_2$	$2s2p^3\ ^5S_2^o$	886430	884694	2.183e+08	2.103e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^5S_2^o$	919900	918094	6.714e+07	6.410e+07
$2p^4\ ^1D_2$	$2s2p^3\ ^5S_2^o$	984080	982421	4.049e+06	3.896e+06
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_2^o$	651220	651375	7.344e+09	7.332e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_2^o$	684690	684775	1.719e+10	1.717e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	748870	749102	2.756e+08	2.736e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_1^o$	650110	650276	1.005e+09	9.975e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_1^o$	683580	683677	9.224e+09	9.198e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3D_1^o$	690040	690164	2.519e+10	2.512e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_1^o$	747760	748003	6.815e+06	5.912e+06
$2p^4\ ^1S_0$	$2s2p^3\ ^3D_1^o$	913630	914102	7.255e+07	7.340e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_3^o$	645800	645973	2.197e+10	2.202e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_3^o$	743450	743700	1.493e+09	1.476e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_0^o$	592700	592671	2.809e+09	2.807e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_1^o$	557580	557614	2.338e+09	2.336e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_1^o$	591050	591014	2.654e+08	2.684e+08
$2p^4\ ^3P_0$	$2s2p^3\ ^3P_1^o$	597510	597502	1.133e+10	1.139e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_1^o$	655230	655341	2.193e+08	2.141e+08
$2p^4\ ^1S_0$	$2s2p^3\ ^3P_1^o$	821100	821439	7.482e+08	7.309e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_2^o$	553400	553466	3.349e+09	3.362e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_2^o$	586870	586867	7.731e+09	7.775e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_2^o$	651050	651194	2.056e+08	1.984e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3S_1^o$	405470	405423	4.593e+09	4.613e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3S_1^o$	438940	438823	6.696e+09	6.691e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3S_1^o$	445400	445311	8.022e+09	8.021e+09
$2p^4\ ^1D_2$	$2s2p^3\ ^3S_1^o$	503120	503150	6.830e+05	6.805e+05
$2p^4\ ^1S_0$	$2s2p^3\ ^3S_1^o$	668990	669248	1.966e+09	1.968e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^1D_2^o$	402090	401940	2.869e+08	2.916e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^1D_2^o$	435560	435340	3.674e+07	3.835e+07
$2p^4\ ^1D_2$	$2s2p^3\ ^1D_2^o$	499740	499667	2.123e+10	2.125e+10
$2p^4\ ^3P_2$	$2s2p^3\ ^1P_1^o$	310830	310613	3.198e+07	3.300e+07
$2p^4\ ^3P_1$	$2s2p^3\ ^1P_1^o$	344300	344014	1.565e+08	1.589e+08
$2p^4\ ^3P_0$	$2s2p^3\ ^1P_1^o$	350760	350501	1.733e+06	1.276e+06
$2p^4\ ^1D_2$	$2s2p^3\ ^1P_1^o$	408480	408341	2.734e+09	2.751e+09
$2p^4\ ^1S_0$	$2s2p^3\ ^1P_1^o$	574350	574439	4.996e+10	4.991e+10

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
Ti XVII					
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_0$	580110	580176	5.800e+09	5.796e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_0$	680910	681119	3.592e+09	3.594e+09
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_0$	838340	838645	7.615e+09	7.600e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_0$	943500	943920	1.068e+07	1.105e+07
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_1$	304002	303916	5.707e+06	6.392e+06
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_1$	549232	549288	6.000e+09	6.026e+09
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_1$	550452	550530	1.189e+09	1.179e+09
$2s2p^3 \ ^3P_0^o$	$2s^22p^2 \ ^3P_1$	648792	649002	1.467e+10	1.463e+10
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_1$	651252	651473	7.746e+09	7.736e+09
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_1$	657122	657314	9.960e+08	1.003e+09
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_1$	808682	808999	2.165e+10	2.165e+10
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_1$	815482	815851	1.201e+08	1.173e+08
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_1$	913842	914274	1.972e+09	1.963e+09
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_2$	277930	277830	7.710e+06	8.873e+06
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_2$	523160	523202	1.021e+08	9.938e+07
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_2$	524380	524444	2.032e+07	2.106e+07
$2s2p^3 \ ^3D_3^o$	$2s^22p^2 \ ^3P_2$	531030	531093	4.757e+09	4.791e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_2$	625180	625387	3.164e+09	3.135e+09
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_2$	631050	631228	1.237e+10	1.236e+10
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_2$	782610	782913	4.384e+10	4.391e+10
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_2$	789410	789765	2.731e+09	2.713e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_2$	887770	888188	1.387e+07	1.408e+07
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^1D_2$	193000	192800	1.542e+05	1.911e+05
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^1D_2$	438230	438172	2.494e+07	2.613e+07
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^1D_2$	439450	439414	5.460e+07	5.934e+07
$2s2p^3 \ ^3D_3^o$	$2s^22p^2 \ ^1D_2$	446100	446063	3.013e+08	3.119e+08
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^1D_2$	540250	540357	1.727e+08	1.716e+08
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^1D_2$	546120	546198	7.153e+07	6.881e+07
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^1D_2$	697680	697883	1.550e+07	1.656e+07
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^1D_2$	704480	704735	3.591e+10	3.598e+10
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^1D_2$	802840	803158	4.744e+10	4.735e+10
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^1S_0$	337930	337850	1.608e+07	1.642e+07
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^1S_0$	438730	438793	5.831e+07	6.252e+07
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^1S_0$	596160	596319	2.167e+08	2.200e+08
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^1S_0$	701320	701594	1.260e+10	1.265e+10
$2p^4 \ ^3P_2$	$2s2p^3 \ ^5S_2^o$	937720	938032	3.264e+08	3.154e+08
$2p^4 \ ^3P_1$	$2s2p^3 \ ^5S_2^o$	979620	979929	9.169e+07	8.776e+07
$2p^4 \ ^1D_2$	$2s2p^3 \ ^5S_2^o$	1046630	1047042	7.326e+06	7.073e+06
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3D_2^o$	692490	692661	8.369e+09	8.358e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3D_2^o$	734390	734558	1.795e+10	1.792e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3D_2^o$	801400	801670	3.622e+08	3.600e+08

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3D_1^o$	691270	691418	1.289e+09	1.279e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3D_1^o$	733170	733315	1.020e+10	1.017e+10
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3D_1^o$	739630	739650	2.679e+10	2.670e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3D_1^o$	800180	800428	7.523e+06	6.508e+06
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3D_1^o$	976700	977215	9.764e+07	9.884e+07
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3D_3^o$	684620	684770	2.330e+10	2.336e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3D_3^o$	793530	793779	2.031e+09	2.010e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_0^o$	634830	634843	3.125e+09	3.124e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3P_1^o$	590470	590475	2.588e+09	2.588e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_1^o$	632370	632372	1.516e+08	1.543e+08
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3P_1^o$	638830	638707	1.273e+10	1.281e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3P_1^o$	699380	699485	3.231e+08	3.159e+08
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3P_1^o$	875900	876271	1.113e+09	1.090e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3P_2^o$	584600	584635	3.388e+09	3.405e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_2^o$	626500	626532	9.127e+09	9.181e+09
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3P_2^o$	693510	693644	3.606e+08	3.498e+08
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3S_1^o$	433040	432949	4.907e+09	4.931e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3S_1^o$	474940	474846	7.624e+09	7.620e+09
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3S_1^o$	481400	481181	9.384e+09	9.387e+09
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3S_1^o$	541950	541959	2.397e+05	2.379e+05
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3S_1^o$	718470	718746	2.554e+09	2.557e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1D_2^o$	426240	426097	3.724e+08	3.786e+08
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1D_2^o$	468140	467994	6.020e+07	6.267e+07
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1D_2^o$	535150	535107	2.321e+10	2.325e+10
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1P_1^o$	327880	327674	4.218e+07	4.353e+07
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1P_1^o$	369780	369571	2.201e+08	2.234e+08
$2p^4 \ ^3P_0$	$2s2p^3 \ ^1P_1^o$	376240	375906	9.060e+05	5.449e+05
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1P_1^o$	436790	436684	3.047e+09	3.069e+09
$2p^4 \ ^1S_0$	$2s2p^3 \ ^1P_1^o$	613310	613471	5.428e+10	5.423e+10
V XVIII					
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_0$	625040	625075	6.893e+09	6.890e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_0$	735420	735462	3.760e+09	3.763e+09
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_0$	897330	897614	8.090e+09	8.074e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_0$	1014420	1014919	1.448e+07	1.488e+07
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_1$	328910	328850	9.207e+06	1.022e+07
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_1$	585900	585955	6.741e+09	6.776e+09
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_1$	587080	587225	1.120e+09	1.110e+09
$2s2p^3 \ ^3P_0^o$	$2s^22p^2 \ ^3P_1$	693910	694072	1.623e+10	1.618e+10
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_1$	697460	697611	9.304e+09	9.295e+09
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_1$	705390	705601	8.495e+08	8.570e+08
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_1$	859370	859763	2.266e+10	2.267e+10
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_1$	870460	870906	1.668e+08	1.634e+08

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_1$	976460	977068	2.576e+09	2.565e+09
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^3P_2$	298680	298540	1.129e+07	1.289e+07
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^3P_2$	555670	555645	5.274e+07	5.061e+07
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_2$	556850	556915	2.453e+07	2.575e+07
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^3P_2$	566760	566766	5.083e+09	5.122e+09
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_2$	667230	667302	3.092e+09	3.062e+09
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_2$	675160	675292	1.392e+10	1.391e+10
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_2$	829140	829454	4.771e+10	4.780e+10
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_2$	840230	840596	3.780e+09	3.758e+09
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_2$	946230	946758	3.910e+07	3.930e+07
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^1D_2$	205960	205679	2.887e+05	3.536e+05
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^1D_2$	462950	462785	2.935e+07	3.083e+07
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1D_2$	464130	464055	7.879e+07	8.506e+07
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^1D_2$	474040	473906	4.254e+08	4.404e+08
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1D_2$	574510	574441	2.097e+08	2.077e+08
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^1D_2$	582440	582431	9.741e+07	9.376e+07
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1D_2$	736420	736593	4.870e+07	5.103e+07
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^1D_2$	747510	747736	3.816e+10	3.825e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1D_2$	853510	853898	5.149e+10	5.139e+10
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1S_0$	356040	356102	2.146e+07	2.195e+07
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1S_0$	466420	466489	7.621e+07	8.163e+07
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1S_0$	628330	628641	2.970e+08	3.020e+08
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1S_0$	745420	745945	1.365e+10	1.371e+10
$2p^4\ ^3P_2$	$2s2p^3\ ^5S_2^o$	991840	992079	4.805e+08	4.656e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^5S_2^o$	1043900	1044088	1.216e+08	1.166e+08
$2p^4\ ^1D_2$	$2s2p^3\ ^5S_2^o$	1113460	1113860	1.270e+07	1.230e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_2^o$	734850	734973	9.487e+09	9.476e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_2^o$	786910	786982	1.869e+10	1.866e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	856470	856755	4.604e+08	4.580e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_1^o$	733670	733703	1.656e+09	1.642e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_1^o$	785730	785712	1.121e+10	1.118e+10
$2p^4\ ^3P_0$	$2s2p^3\ ^3D_1^o$	791070	791163	2.847e+10	2.837e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_1^o$	855290	855485	7.660e+06	6.587e+06
$2p^4\ ^1S_0$	$2s2p^3\ ^3D_1^o$	1043260	1043776	1.273e+08	1.290e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_3^o$	723760	723852	2.458e+10	2.466e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_3^o$	845380	845634	2.699e+09	2.672e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_0^o$	678900	678865	3.478e+09	3.476e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_1^o$	623290	623317	2.849e+09	2.851e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_1^o$	675350	675325	5.727e+07	5.923e+07
$2p^4\ ^3P_0$	$2s2p^3\ ^3P_1^o$	680690	680776	1.418e+10	1.428e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_1^o$	744910	745098	4.658e+08	4.558e+08
$2p^4\ ^1S_0$	$2s2p^3\ ^3P_1^o$	932880	933389	1.615e+09	1.585e+09

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3P_2^o$	615360	615327	3.424e+09	3.444e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_2^o$	667420	667335	1.067e+10	1.074e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3P_2^o$	736980	737108	6.120e+08	5.958e+08
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3S_1^o$	461380	461165	5.208e+09	5.235e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3S_1^o$	513440	513173	8.682e+09	8.676e+09
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3S_1^o$	518780	518624	1.097e+10	1.098e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3S_1^o$	583000	582946	5.452e+01	1.114e+02
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3S_1^o$	770970	771237	3.198e+09	3.202e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1D_2^o$	450290	450022	4.672e+08	4.748e+08
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1D_2^o$	502350	502031	9.721e+07	1.010e+08
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1D_2^o$	571910	571804	2.528e+10	2.532e+10
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1P_1^o$	344290	343861	5.333e+07	5.499e+07
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1P_1^o$	396350	395869	3.000e+08	3.045e+08
$2p^4 \ ^3P_0$	$2s2p^3 \ ^1P_1^o$	401690	401320	1.114e+05	1.010e+04
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1P_1^o$	465910	465642	3.381e+09	3.409e+09
$2p^4 \ ^1S_0$	$2s2p^3 \ ^1P_1^o$	653880	653933	5.888e+10	5.882e+10
Cr XIX					
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_0$	672580	672650	8.192e+09	8.187e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_0$	793710	793892	3.918e+09	3.921e+09
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_0$	959570	959869	8.560e+09	8.544e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_0$	1090510	1091038	1.889e+07	1.936e+07
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_1$	355457	355251	1.467e+07	1.616e+07
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_1$	623709	623788	7.528e+09	7.569e+09
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_1$	624769	624862	1.022e+09	1.010e+09
$2s2p^3 \ ^3P_0^o$	$2s^22p^2 \ ^3P_1$	741019	741203	1.795e+10	1.789e+10
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_1$	745899	746104	1.117e+10	1.115e+10
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_1$	756569	756745	6.931e+08	7.010e+08
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_1$	911759	912081	2.361e+10	2.362e+10
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_1$	928189	928630	2.265e+08	2.221e+08
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_1$	1042699	1043250	3.274e+09	3.261e+09
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_2$	320810	320575	1.629e+07	1.844e+07
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_2$	589062	589112	1.785e+07	1.639e+07
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_2$	590122	590186	3.392e+07	3.590e+07
$2s2p^3 \ ^3D_3^o$	$2s^22p^2 \ ^3P_2$	604272	604307	5.410e+09	5.452e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_2$	711252	711427	2.981e+09	2.948e+09
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_2$	721922	722069	1.571e+10	1.570e+10
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_2$	877112	877405	5.184e+10	5.196e+10
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_2$	893542	893953	5.041e+09	5.014e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_2$	1008052	1008574	8.452e+07	8.472e+07
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^1D_2$	218668	218290	5.080e+05	6.161e+05
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^1D_2$	486920	486828	3.309e+07	3.485e+07
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^1D_2$	487980	487902	1.088e+08	1.169e+08

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^1D_2$	502130	502022	5.802e+08	6.006e+08
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1D_2$	609110	609143	2.398e+08	2.365e+08
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^1D_2$	619780	619784	1.224e+08	1.177e+08
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1D_2$	774970	775120	1.121e+08	1.165e+08
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^1D_2$	791400	791669	4.037e+10	4.049e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1D_2$	905910	906289	5.586e+10	5.576e+10
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1S_0$	373780	373495	2.758e+07	2.827e+07
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1S_0$	494910	494737	9.727e+07	1.042e+08
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1S_0$	660770	660714	3.958e+08	4.030e+08
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1S_0$	791710	791883	1.477e+10	1.483e+10
$2p^4\ ^3P_2$	$2s2p^3\ ^5S_2^o$	1046722	1046984	6.980e+08	6.781e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^5S_2^o$	1110752	1110925	1.567e+08	1.506e+08
$2p^4\ ^1D_2$	$2s2p^3\ ^5S_2^o$	1182752	1183249	2.117e+07	2.055e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_2^o$	778470	778446	1.069e+10	1.069e+10
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_2^o$	842500	842387	1.946e+10	1.942e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	914500	914712	5.670e+08	5.647e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_1^o$	777410	777372	2.123e+09	2.106e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_1^o$	841440	841313	1.225e+10	1.222e+10
$2p^4\ ^3P_0$	$2s2p^3\ ^3D_1^o$	845110	844853	3.030e+10	3.019e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_1^o$	913440	913638	7.097e+06	6.019e+06
$2p^4\ ^1S_0$	$2s2p^3\ ^3D_1^o$	1114320	1114528	1.609e+08	1.630e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_3^o$	763260	763252	2.583e+10	2.593e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_3^o$	899290	899517	3.511e+09	3.478e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_0^o$	725190	724973	3.872e+09	3.870e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_1^o$	656280	656131	3.119e+09	3.123e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_1^o$	720310	720072	4.212e+06	4.831e+06
$2p^4\ ^3P_0$	$2s2p^3\ ^3P_1^o$	723980	723612	1.562e+10	1.574e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_1^o$	792310	792396	6.579e+08	6.444e+08
$2p^4\ ^1S_0$	$2s2p^3\ ^3P_1^o$	993190	993286	2.285e+09	2.247e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_2^o$	645610	645489	3.469e+09	3.492e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_2^o$	709640	709430	1.234e+10	1.242e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_2^o$	781640	781755	1.007e+09	9.842e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3S_1^o$	490420	490154	5.493e+09	5.527e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3S_1^o$	554450	554095	9.894e+09	9.889e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3S_1^o$	558120	557635	1.282e+10	1.284e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3S_1^o$	626450	626419	4.674e+05	4.730e+05
$2p^4\ ^1S_0$	$2s2p^3\ ^3S_1^o$	827330	827309	3.864e+09	3.872e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^1D_2^o$	473990	473605	5.665e+08	5.764e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^1D_2^o$	538020	537546	1.549e+08	1.605e+08
$2p^4\ ^1D_2$	$2s2p^3\ ^1D_2^o$	610020	609870	2.743e+10	2.748e+10
$2p^4\ ^3P_2$	$2s2p^3\ ^1P_1^o$	359480	358985	6.465e+07	6.676e+07
$2p^4\ ^3P_1$	$2s2p^3\ ^1P_1^o$	423510	422926	3.968e+08	4.028e+08

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2p^4 \ ^3P_0$	$2s2p^3 \ ^1P_1^o$	427180	426466	3.159e+05	6.851e+05
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1P_1^o$	495510	495250	3.737e+09	3.772e+09
$2p^4 \ ^1S_0$	$2s2p^3 \ ^1P_1^o$	696390	696140	6.387e+10	6.382e+10
Mn XX					
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_0$	723090	723142	9.735e+09	9.731e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_0$	856900	856918	4.068e+09	4.071e+09
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_0$	1025510	1025856	9.019e+09	9.003e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_0$	1172570	1173004	2.365e+07	2.416e+07
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_1$	383480	383194	2.311e+07	2.528e+07
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_1$	663130	662938	8.361e+09	8.412e+09
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_1$	663510	663446	9.001e+08	8.879e+08
$2s2p^3 \ ^3P_0^o$	$2s^22p^2 \ ^3P_1$	790760	790635	1.986e+10	1.980e+10
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_1$	797320	797222	1.338e+10	1.337e+10
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_1$	811000	811044	5.347e+08	5.423e+08
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_1$	965930	966159	2.450e+10	2.452e+10
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_1$	989300	989452	3.008e+08	2.953e+08
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_1$	1112990	1113308	4.057e+09	4.042e+09
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_2$	344410	344084	2.321e+07	2.608e+07
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_2$	624060	623828	1.149e+06	7.575e+05
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_2$	624440	624336	5.182e+07	5.509e+07
$2s2p^3 \ ^3D_3^o$	$2s^22p^2 \ ^3P_2$	644290	644025	5.748e+09	5.794e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_2$	758250	758112	2.841e+09	2.807e+09
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_2$	771930	771934	1.784e+10	1.782e+10
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_2$	926860	927049	5.628e+10	5.641e+10
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_2$	950230	950342	6.477e+09	6.448e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_2$	1073920	1074198	1.542e+08	1.542e+08
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^1D_2$	230800	230433	8.403e+05	1.011e+06
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^1D_2$	510450	510177	3.601e+07	3.809e+07
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^1D_2$	510830	510685	1.435e+08	1.535e+08
$2s2p^3 \ ^3D_3^o$	$2s^22p^2 \ ^1D_2$	530680	530374	7.650e+08	7.921e+08
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^1D_2$	644640	644461	2.574e+08	2.526e+08
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^1D_2$	658320	658283	1.402e+08	1.344e+08
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^1D_2$	813250	813398	2.145e+08	2.218e+08
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^1D_2$	836620	836691	4.258e+10	4.272e+10
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^1D_2$	960310	960546	6.063e+10	6.052e+10
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^1S_0$	390010	389793	3.414e+07	3.507e+07
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^1S_0$	523820	523569	1.216e+08	1.302e+08
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^1S_0$	692430	692506	5.138e+08	5.239e+08
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^1S_0$	839490	839654	1.597e+10	1.605e+10
$2p^4 \ ^3P_2$	$2s2p^3 \ ^5S_2^o$	1102740	1102873	1.002e+09	9.755e+08
$2p^4 \ ^3P_1$	$2s2p^3 \ ^5S_2^o$	1180590	1180783	1.961e+08	1.887e+08
$2p^4 \ ^1D_2$	$2s2p^3 \ ^5S_2^o$	1255230	1255569	3.401e+07	3.309e+07

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3D_2^o$	823090	823128	1.198e+10	1.198e+10
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3D_2^o$	900940	901039	2.029e+10	2.025e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3D_2^o$	975580	975824	6.778e+08	6.757e+08
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3D_1^o$	822710	822620	2.714e+09	2.693e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3D_1^o$	900560	900530	1.330e+10	1.326e+10
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3D_1^o$	900800	900789	3.236e+10	3.223e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3D_1^o$	975200	975315	5.828e+06	4.829e+06
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3D_1^o$	1189890	1190224	1.968e+08	1.994e+08
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3D_3^o$	802860	802932	2.704e+10	2.717e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3D_3^o$	955350	955627	4.481e+09	4.440e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_0^o$	773310	773342	4.314e+09	4.313e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3P_1^o$	688900	688844	3.396e+09	3.404e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_1^o$	766750	766754	1.792e+07	1.655e+07
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3P_1^o$	766990	767013	1.700e+10	1.714e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3P_1^o$	841390	841539	9.116e+08	8.939e+08
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3P_1^o$	1056080	1056448	3.148e+09	3.102e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3P_2^o$	675220	675022	3.533e+09	3.561e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_2^o$	753070	752933	1.412e+10	1.422e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3P_2^o$	827710	827718	1.612e+09	1.579e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3S_1^o$	520290	519907	5.760e+09	5.800e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3S_1^o$	598140	597817	1.129e+10	1.128e+10
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3S_1^o$	598380	598076	1.493e+10	1.497e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3S_1^o$	672780	672602	2.424e+06	2.443e+06
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3S_1^o$	887470	887511	4.514e+09	4.525e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1D_2^o$	496920	496614	6.645e+08	6.764e+08
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1D_2^o$	574770	574525	2.433e+08	2.517e+08
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1D_2^o$	649410	649310	2.961e+10	2.969e+10
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1P_1^o$	373230	372759	7.522e+07	7.773e+07
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1P_1^o$	451080	450669	5.102e+08	5.180e+08
$2p^4 \ ^3P_0$	$2s2p^3 \ ^1P_1^o$	451320	450928	3.010e+06	4.103e+06
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1P_1^o$	525720	525454	4.110e+09	4.153e+09
$2p^4 \ ^1S_0$	$2s2p^3 \ ^1P_1^o$	740410	740362	6.936e+10	6.930e+10
Fe XXI					
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_0$	776690	776750	1.156e+10	1.156e+10
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_0$	924920	925023	4.213e+09	4.216e+09
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_0$	1095670	1096012	9.460e+09	9.444e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_0$	1261140	1261529	2.850e+07	2.902e+07
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_1$	413099	412701	3.597e+07	3.911e+07
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_1$	702839	702930	7.606e+08	7.481e+08
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_1$	703489	703550	9.240e+09	9.301e+09
$2s2p^3 \ ^3P_0^o$	$2s^22p^2 \ ^3P_1$	842479	842581	2.200e+10	2.193e+10
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_1$	851069	851203	1.602e+10	1.600e+10

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_1$	868579	868735	3.820e+08	3.891e+08
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_1$	1021819	1022191	2.533e+10	2.536e+10
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_1$	1053389	1053811	3.907e+08	3.841e+08
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_1$	1187289	1187709	4.909e+09	4.892e+09
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^3P_2$	369596	369157	3.272e+07	3.652e+07
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_2$	659336	659387	8.335e+07	8.868e+07
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^3P_2$	659986	660006	4.535e+06	5.556e+06
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^3P_2$	686186	686197	6.105e+09	6.154e+09
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_2$	807566	807659	2.681e+09	2.646e+09
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_2$	825076	825192	2.038e+10	2.037e+10
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_2$	978316	978647	6.104e+10	6.119e+10
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_2$	1009886	1010267	8.020e+09	7.988e+09
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_2$	1143786	1144165	2.491e+08	2.487e+08
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^1D_2$	242389	241853	1.307e+06	1.562e+06
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1D_2$	532129	532083	1.808e+08	1.928e+08
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^1D_2$	532779	532703	3.827e+07	4.067e+07
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^1D_2$	558979	558894	9.767e+08	1.012e+09
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1D_2$	680359	680356	2.577e+08	2.514e+08
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^1D_2$	697869	697888	1.435e+08	1.366e+08
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1D_2$	851109	851344	3.607e+08	3.721e+08
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^1D_2$	882679	882963	4.485e+10	4.502e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1D_2$	1016579	1016862	6.583e+10	6.573e+10
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1S_0$	404710	404698	4.070e+07	4.191e+07
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1S_0$	552940	552971	1.492e+08	1.598e+08
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1S_0$	723690	723959	6.511e+08	6.650e+08
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1S_0$	889160	889477	1.727e+10	1.736e+10
$2p^4\ ^3P_2$	$2s2p^3\ ^5S_2^o$	1159350	1159940	1.422e+09	1.388e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^5S_2^o$	1253550	1254085	2.381e+08	2.294e+08
$2p^4\ ^1D_2$	$2s2p^3\ ^5S_2^o$	1330150	1331255	5.282e+07	5.151e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_1^o$	869610	869710	3.455e+09	3.429e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3D_1^o$	959010	959080	3.474e+10	3.459e+10
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_1^o$	963810	963855	1.434e+10	1.430e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_1^o$	1040410	1041025	4.033e+06	3.199e+06
$2p^4\ ^1S_0$	$2s2p^3\ ^3D_1^o$	1271510	1271738	2.331e+08	2.362e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_2^o$	868960	869090	1.335e+10	1.335e+10
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_2^o$	963160	963235	2.124e+10	2.118e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	1039760	1040406	7.878e+08	7.862e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_3^o$	842760	842899	2.822e+10	2.837e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_3^o$	1013560	1014215	5.622e+09	5.574e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_0^o$	824170	824204	4.813e+09	4.812e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_1^o$	721380	721437	3.678e+09	3.690e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3P_1^o$	810780	810807	1.827e+10	1.844e+10

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_1^o$	815580	815582	1.273e+08	1.231e+08
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3P_1^o$	892180	892752	1.241e+09	1.218e+09
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3P_1^o$	1123280	1123465	4.222e+09	4.167e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3P_2^o$	703870	703905	3.629e+09	3.661e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_2^o$	798070	798050	1.598e+10	1.610e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3P_2^o$	874670	875220	2.512e+09	2.467e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3S_1^o$	550630	550450	6.005e+09	6.051e+09
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3S_1^o$	640030	639819	1.733e+10	1.738e+10
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3S_1^o$	644830	644594	1.290e+10	1.290e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3S_1^o$	721430	721764	7.002e+06	7.050e+06
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3S_1^o$	952530	952477	5.111e+09	5.124e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1D_2^o$	519060	518830	7.538e+08	7.678e+08
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1D_2^o$	613260	612975	3.767e+08	3.892e+08
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1D_2^o$	689860	690145	3.182e+10	3.191e+10
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1P_1^o$	385160	384932	8.409e+07	8.699e+07
$2p^4 \ ^3P_0$	$2s2p^3 \ ^1P_1^o$	474560	474302	9.885e+06	1.196e+07
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1P_1^o$	479360	479076	6.387e+08	6.488e+08
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1P_1^o$	555960	556247	4.499e+09	4.551e+09
$2p^4 \ ^1S_0$	$2s2p^3 \ ^1P_1^o$	787060	786959	7.549e+10	7.542e+10
Co XXII					
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_0$	833840	833675	1.372e+10	1.371e+10
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_0$	998650	998702	4.359e+09	4.362e+09
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_0$	1170450	1170819	9.874e+09	9.858e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_0$	1356870	1357369	3.314e+07	3.364e+07
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_1$	444030	443771	5.530e+07	5.979e+07
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_1$	743110	743261	6.113e+08	5.988e+08
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_1$	745550	745818	1.016e+10	1.024e+10
$2s2p^3 \ ^3P_0^o$	$2s^22p^2 \ ^3P_1$	897100	897270	2.439e+10	2.432e+10
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_1$	907920	908287	1.912e+10	1.911e+10
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_1$	929560	930033	2.432e+08	2.492e+08
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_1$	1079720	1080405	2.611e+10	2.615e+10
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_1$	1121400	1122212	4.964e+08	4.887e+08
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_1$	1266140	1266954	5.814e+09	5.796e+09
$2s2p^3 \ ^5S_2^o$	$2s^22p^2 \ ^3P_2$	396510	395847	4.569e+07	5.071e+07
$2s2p^3 \ ^3D_1^o$	$2s^22p^2 \ ^3P_2$	695590	695337	1.357e+08	1.441e+08
$2s2p^3 \ ^3D_2^o$	$2s^22p^2 \ ^3P_2$	698030	697895	2.829e+07	3.107e+07
$2s2p^3 \ ^3D_3^o$	$2s^22p^2 \ ^3P_2$	731260	731105	6.493e+09	6.546e+09
$2s2p^3 \ ^3P_1^o$	$2s^22p^2 \ ^3P_2$	860400	860364	2.509e+09	2.473e+09
$2s2p^3 \ ^3P_2^o$	$2s^22p^2 \ ^3P_2$	882040	882109	2.347e+10	2.346e+10
$2s2p^3 \ ^3S_1^o$	$2s^22p^2 \ ^3P_2$	1032200	1032481	6.615e+10	6.633e+10
$2s2p^3 \ ^1D_2^o$	$2s^22p^2 \ ^3P_2$	1073880	1074289	9.576e+09	9.544e+09
$2s2p^3 \ ^1P_1^o$	$2s^22p^2 \ ^3P_2$	1218620	1219031	3.667e+08	3.657e+08

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^1D_2$	252940	252277	1.914e+06	2.275e+06
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1D_2$	552020	551767	2.179e+08	2.317e+08
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^1D_2$	554460	554324	4.019e+07	4.296e+07
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^1D_2$	587690	587534	1.210e+09	1.255e+09
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1D_2$	716830	716793	2.389e+08	2.312e+08
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^1D_2$	738470	738539	1.270e+08	1.196e+08
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1D_2$	888630	888910	5.507e+08	5.673e+08
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^1D_2$	930310	930718	4.724e+10	4.744e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1D_2$	1075050	1075460	7.156e+10	7.145e+10
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1S_0$	418320	417901	4.673e+07	4.824e+07
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1S_0$	583130	582927	1.802e+08	1.931e+08
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1S_0$	754930	755044	8.075e+08	8.261e+08
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1S_0$	941350	941594	1.869e+10	1.879e+10
$2p^4\ ^3P_2$	$2s2p^3\ ^5S_2^o$	1217820	1218411	1.999e+09	1.955e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^5S_2^o$	1330770	1331291	2.802e+08	2.701e+08
$2p^4\ ^1D_2$	$2s2p^3\ ^5S_2^o$	1410040	1410785	7.947e+07	7.767e+07
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_1^o$	918740	918920	4.374e+09	4.343e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3D_1^o$	1019690	1019835	3.757e+10	3.739e+10
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_1^o$	1031690	1031801	1.535e+10	1.532e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_1^o$	1110960	1111295	2.084e+06	1.497e+06
$2p^4\ ^1S_0$	$2s2p^3\ ^3D_1^o$	1359500	1359989	2.672e+08	2.708e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_2^o$	916300	916363	1.478e+10	1.479e+10
$2p^4\ ^3P_1$	$2s2p^3\ ^3D_2^o$	1029250	1029243	2.233e+10	2.227e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	1108520	1108737	8.920e+08	8.910e+08
$2p^4\ ^3P_2$	$2s2p^3\ ^3D_3^o$	883070	883153	2.938e+10	2.955e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_3^o$	1075290	1075527	6.950e+09	6.893e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_0^o$	877700	877791	5.376e+09	5.376e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_1^o$	753930	753894	3.965e+09	3.983e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3P_1^o$	854880	854808	1.939e+10	1.959e+10
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_1^o$	866880	866774	3.641e+08	3.563e+08
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_1^o$	946150	946268	1.662e+09	1.633e+09
$2p^4\ ^1S_0$	$2s2p^3\ ^3P_1^o$	1194690	1194962	5.511e+09	5.448e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3P_2^o$	732290	732149	3.765e+09	3.803e+09
$2p^4\ ^3P_1$	$2s2p^3\ ^3P_2^o$	845240	845029	1.789e+10	1.803e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3P_2^o$	924510	924523	3.819e+09	3.759e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^3S_1^o$	582130	581777	6.226e+09	6.278e+09
$2p^4\ ^3P_0$	$2s2p^3\ ^3S_1^o$	683080	682691	1.998e+10	2.006e+10
$2p^4\ ^3P_1$	$2s2p^3\ ^3S_1^o$	695080	694657	1.477e+10	1.476e+10
$2p^4\ ^1D_2$	$2s2p^3\ ^3S_1^o$	774350	774151	1.579e+07	1.589e+07
$2p^4\ ^1S_0$	$2s2p^3\ ^3S_1^o$	1022890	1022845	5.625e+09	5.642e+09
$2p^4\ ^3P_2$	$2s2p^3\ ^1D_2^o$	540450	539970	8.268e+08	8.429e+08
$2p^4\ ^3P_1$	$2s2p^3\ ^1D_2^o$	653400	652849	5.739e+08	5.922e+08

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2p^4\ ^1D_2$	$2s2p^3\ ^1D_2^o$	732670	732343	3.397e+10	3.409e+10
$2p^4\ ^3P_2$	$2s2p^3\ ^1P_1^o$	395710	395227	9.046e+07	9.370e+07
$2p^4\ ^3P_0$	$2s2p^3\ ^1P_1^o$	496660	496141	2.221e+07	2.548e+07
$2p^4\ ^3P_1$	$2s2p^3\ ^1P_1^o$	508660	508107	7.801e+08	7.929e+08
$2p^4\ ^1D_2$	$2s2p^3\ ^1P_1^o$	587930	587601	4.899e+09	4.963e+09
$2p^4\ ^1S_0$	$2s2p^3\ ^1P_1^o$	836470	836295	8.241e+10	8.234e+10
Ni XXIII					
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_0$	894100	894125	1.625e+10	1.625e+10
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_0$	1078350	1078464	4.511e+09	4.513e+09
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_0$	1250470	1250807	1.025e+10	1.024e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_0$	1459700	1461317	3.728e+07	3.776e+07
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^3P_1$	477120	476379	8.389e+07	9.027e+07
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_1$	784330	784384	4.612e+08	4.492e+08
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^3P_1$	790230	789987	1.114e+10	1.123e+10
$2s2p^3\ ^3P_0^o$	$2s^22p^2\ ^3P_1$	955130	954951	2.708e+10	2.700e+10
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_1$	968580	968722	2.279e+10	2.277e+10
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_1$	994980	995121	1.267e+08	1.314e+08
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_1$	1140700	1141066	2.685e+10	2.690e+10
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_1$	1194870	1195238	6.167e+08	6.078e+08
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_1$	1349930	1351576	6.755e+09	6.735e+09
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^3P_2$	424968	424169	6.330e+07	6.988e+07
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^3P_2$	732178	732174	2.177e+08	2.308e+08
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^3P_2$	738078	737778	7.140e+07	7.624e+07
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^3P_2$	779478	779031	6.926e+09	6.983e+09
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_2$	916428	916512	2.331e+09	2.295e+09
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^3P_2$	942828	942911	2.723e+10	2.722e+10
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^3P_2$	1088548	1088856	7.168e+10	7.187e+10
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^3P_2$	1142718	1143028	1.104e+10	1.101e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_2$	1297778	1299366	5.020e+08	5.002e+08
$2s2p^3\ ^5S_2^o$	$2s^22p^2\ ^1D_2$	262250	261406	2.643e+06	3.128e+06
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1D_2$	569460	569411	2.514e+08	2.668e+08
$2s2p^3\ ^3D_2^o$	$2s^22p^2\ ^1D_2$	575360	575015	4.224e+07	4.544e+07
$2s2p^3\ ^3D_3^o$	$2s^22p^2\ ^1D_2$	616760	616268	1.461e+09	1.516e+09
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1D_2$	753710	753749	2.024e+08	1.936e+08
$2s2p^3\ ^3P_2^o$	$2s^22p^2\ ^1D_2$	780110	780148	9.129e+07	8.395e+07
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1D_2$	925830	926093	7.798e+08	8.029e+08
$2s2p^3\ ^1D_2^o$	$2s^22p^2\ ^1D_2$	980000	980265	4.982e+10	5.006e+10
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1D_2$	1135060	1136603	7.788e+10	7.778e+10
$2s2p^3\ ^3D_1^o$	$2s^22p^2\ ^1S_0$	430200	429081	5.168e+07	5.350e+07
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^1S_0$	614450	613420	2.146e+08	2.301e+08
$2s2p^3\ ^3S_1^o$	$2s^22p^2\ ^1S_0$	786570	785764	9.821e+08	1.007e+09
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^1S_0$	995800	996273	2.024e+10	2.035e+10

Table 2: Continued.

States		Energies (cm ⁻¹)		Transition rates (s ⁻¹)	
Upper	Lower	ΔE_{obs}	ΔE_{calc}	A_B	A_C
$2p^4 \ ^3P_2$	$2s2p^3 \ ^5S_2^o$	1277810	1278554	2.782e+09	2.726e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^5S_2^o$	1412510	1412917	3.187e+08	3.074e+08
$2p^4 \ ^1D_2$	$2s2p^3 \ ^5S_2^o$	1493710	1494686	1.161e+08	1.137e+08
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3D_1^o$	970600	970549	5.503e+09	5.466e+09
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3D_1^o$	1083300	1083183	4.096e+10	4.076e+10
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3D_1^o$	1105300	1104912	1.633e+10	1.630e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3D_1^o$	1186500	1186681	5.253e+05	2.562e+05
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3D_1^o$	1454100	1455936	2.966e+08	3.005e+08
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3D_2^o$	964700	964945	1.625e+10	1.627e+10
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3D_2^o$	1099400	1099308	2.363e+10	2.356e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3D_2^o$	1180600	1181077	9.852e+08	9.852e+08
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3D_3^o$	923300	923691	3.051e+10	3.071e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3D_3^o$	1139200	1139824	8.481e+09	8.414e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_0^o$	934500	934345	6.016e+09	6.017e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3P_1^o$	786350	786210	4.257e+09	4.282e+09
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3P_1^o$	899050	898844	2.033e+10	2.056e+10
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_1^o$	921050	920573	7.636e+08	7.512e+08
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3P_1^o$	1002250	1002342	2.193e+09	2.157e+09
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3P_1^o$	1269850	1271598	7.004e+09	6.933e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3P_2^o$	759950	759811	3.947e+09	3.993e+09
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3P_2^o$	894650	894174	1.983e+10	1.998e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3P_2^o$	975850	975943	5.670e+09	5.591e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^3S_1^o$	614230	613866	6.417e+09	6.476e+09
$2p^4 \ ^3P_0$	$2s2p^3 \ ^3S_1^o$	726930	726500	2.288e+10	2.299e+10
$2p^4 \ ^3P_1$	$2s2p^3 \ ^3S_1^o$	748930	748229	1.693e+10	1.693e+10
$2p^4 \ ^1D_2$	$2s2p^3 \ ^3S_1^o$	830130	829998	3.099e+07	3.117e+07
$2p^4 \ ^1S_0$	$2s2p^3 \ ^3S_1^o$	1097730	1099254	6.041e+09	6.060e+09
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1D_2^o$	560060	559695	8.763e+08	8.942e+08
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1D_2^o$	694760	694058	8.585e+08	8.849e+08
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1D_2^o$	775960	775827	3.602e+10	3.616e+10
$2p^4 \ ^3P_2$	$2s2p^3 \ ^1P_1^o$	405000	403357	9.376e+07	9.729e+07
$2p^4 \ ^3P_0$	$2s2p^3 \ ^1P_1^o$	517700	515990	4.018e+07	4.478e+07
$2p^4 \ ^3P_1$	$2s2p^3 \ ^1P_1^o$	539700	537720	9.317e+08	9.476e+08
$2p^4 \ ^1D_2$	$2s2p^3 \ ^1P_1^o$	620900	619488	5.308e+09	5.384e+09
$2p^4 \ ^1S_0$	$2s2p^3 \ ^1P_1^o$	888500	888744	9.031e+10	9.022e+10

Table 3: E2 and M1 transition energies in (cm^{-1}) and rates in (s^{-1}). See page 8 for Explanations of Tables.

States		Type	Energies (cm^{-1})		A (s^{-1})
Upper	Lower		ΔE_{exp}	ΔE_{calc}	
F IV					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	614	613	4.682e-10
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	25238	25372	8.111e-06
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	388	386	1.043e-10
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	25012	25145	1.752e-05
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	24624	24759	1.355e-04
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	52927	53156	2.390e-03
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	28303	28398	2.279e+00
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	226	227	2.103e-04
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	388	386	7.775e-04
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	25012	25145	3.385e-02
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	53315	53543	1.106e+00
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	24624	24759	9.914e-02
Ne V					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	1109	1109	4.850e-09
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	30290	30428	2.338e-05
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	698	697	1.071e-09
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	29879	30017	5.272e-05
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	29181	29320	3.797e-04
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	62806	63033	6.820e-03
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	33625	33713	2.841e+00
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	411	411	1.251e-03
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	698	697	4.569e-03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	29879	30017	1.309e-01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	63504	63730	4.203e+00
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	29181	29320	3.735e-01
Na VI					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	1859	1855	3.735e-08
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	35498	35645	5.908e-05
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	1161	1161	8.024e-09
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	34800	34951	1.382e-04
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	33639	33790	9.244e-04
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	72555	72791	1.702e-02
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	38916	39001	3.410e+00
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	698	695	6.021e-03
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	1161	1161	2.107e-02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	34800	34951	4.269e-01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	73716	73952	1.335e+01
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	33639	33790	1.178e+00

Table 3: Continued.

States		Type	Energies (cm ⁻¹)		A (s ⁻¹)
Upper	Lower		ΔE_{exp}	ΔE_{calc}	
Mg VII					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	2924	2928	2.293e-07
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	40948	41097	1.352e-04
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	1817	1816	4.709e-08
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	39841	39985	3.276e-04
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	38024	38169	2.021e-03
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	82229	82457	3.848e-02
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	44205	44288	3.991e+00
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	1107	1112	2.469e-02
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	1817	1816	8.066e-02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	39841	39985	1.225e+00
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	84046	84273	3.701e+01
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	38024	38169	3.246e+00
Al VIII					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	4420	4414	1.178e-06
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	46720	46871	2.866e-04
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	2710	2706	2.271e-07
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	45010	45162	7.202e-04
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	42300	42457	4.059e-03
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	91840	92052	8.057e-02
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	49540	49596	4.590e+00
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	1710	1709	8.945e-02
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	2710	2706	2.663e-01
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	45010	45162	3.185e+00
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	94550	94758	9.222e+01
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	42300	42457	8.041e+00
Si IX					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	6414	6411	5.235e-06
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	52926	53070	5.715e-04
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	3869	3870	9.312e-07
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	50381	50530	1.496e-03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	46512	46660	7.612e-03
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	101385	101606	1.589e-01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	54873	54946	5.212e+00
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	2545	2540	2.935e-01
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	3869	3870	7.781e-01
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	50381	50530	7.665e+00
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	105254	105477	2.108e+02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	46512	46660	1.828e+01

Table 3: Continued.

States		Type	Energies (cm ⁻¹)		A (s ⁻¹)
Upper	Lower		ΔE_{exp}	ΔE_{calc}	
P X					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	9045	9027	2.065e-05
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	59690	59825	1.085e-03
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	5353	5350	3.323e-06
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	55998	56148	2.974e-03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	50645	50798	1.350e-02
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	110915	111163	2.983e-01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	60270	60365	5.864e+00
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	3692	3676	8.879e-01
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	5353	5350	2.050e+00
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	55998	56148	1.734e+01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	116268	116513	4.485e+02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	50645	50798	3.874e+01
S XI					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	12388	12383	7.361e-05
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	67146	67290	1.987e-03
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	7180	7181	1.050e-05
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	61938	62088	5.718e-03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	54758	54907	2.292e-02
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	120541	120762	5.406e-01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	65783	65855	6.558e+00
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	5208	5203	2.509e+00
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	7180	7181	4.933e+00
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	61938	62088	3.730e+01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	127721	127943	8.988e+02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	54758	54907	7.742e+01
Cl XII					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	16629	16610	2.408e-04
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	75530	75660	3.508e-03
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	9389	9389	2.974e-05
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	68290	68439	1.073e-02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	58901	59050	3.753e-02
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	130288	130515	9.466e-01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	71387	71465	7.295e+00
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	7240	7221	6.683e+00
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	9389	9389	1.096e+01
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	68290	68439	7.699e+01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	139677	139904	1.712e+03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	58901	59050	1.473e+02

Table 3: Continued.

States		Type	Energies (cm ⁻¹)		A (s ⁻¹)
Upper	Lower		ΔE_{exp}	ΔE_{calc}	
Ar XIII					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	21850	21845	7.306e-04
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	85032	85165	6.015e-03
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	11991	11991	7.624e-05
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	75173	75311	1.978e-02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	63182	63320	5.989e-02
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	140288	140522	1.614e+00
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	77106	77202	8.084e+00
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	9859	9854	1.690e+01
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	11991	11991	2.262e+01
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	75173	75311	1.535e+02
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	152279	152513	3.121e+03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	63182	63320	2.691e+02
K XIV					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	35923	35911	5.546e-03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	108600	108730	1.634e-02
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	18364	18364	3.803e-04
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	91041	91182	6.480e-02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	72677	72819	1.459e-01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	161747	161925	4.398e+00
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	89070	89106	9.807e+00
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	17559	17547	9.409e+01
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	18364	18364	7.886e+01
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	91041	91182	5.606e+02
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	180111	180289	9.301e+03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	72677	72819	8.164e+02
Ca XV					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	35923	35911	5.546e-03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	108600	108730	1.634e-02
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	18364	18364	3.803e-04
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	91041	91182	6.480e-02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	72677	72819	1.459e-01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	161747	161925	4.398e+00
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	89070	89106	9.807e+00
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	17559	17547	9.409e+01
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	18364	18364	7.886e+01
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	91041	91182	5.606e+02
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	180111	180289	9.301e+03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	72677	72819	8.164e+02

Table 3: Continued.

States		Type	Energies (cm ⁻¹)		A (s ⁻¹)
Upper	Lower		ΔE_{exp}	ΔE_{calc}	
Sc XVI					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	45026	45030	1.404e-02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	123360	123484	2.589e-02
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	22067	22081	7.460e-04
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	100401	100535	1.160e-01
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	78334	78454	2.267e-01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	173694	173727	7.069e+00
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	95360	95273	1.072e+01
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	22959	22949	2.086e+02
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	22067	22081	1.341e+02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	100401	100535	1.033e+03
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	195761	195808	1.535e+04
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	78334	78454	1.372e+03
Ti XVII					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	55730	55732	3.383e-02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	140660	140762	3.991e-02
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	26072	26086	1.348e-03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	111002	111116	2.064e-01
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	84930	85030	3.545e-01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	186450	186594	1.119e+01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	101520	101564	1.165e+01
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	29658	29646	4.450e+02
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	26072	26086	2.150e+02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	111002	111116	1.862e+03
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	212522	212680	2.469e+04
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	84930	85030	2.266e+03
V XVIII					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	68190	68160	7.784e-02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	160910	161021	5.976e-02
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	30230	30310	2.255e-03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	122950	123170	3.657e-01
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	92720	92860	5.618e-01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	200810	200813	1.749e+01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	108090	107953	1.256e+01
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	37960	37850	9.153e+02
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	30230	30310	3.261e+02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	122950	123170	3.286e+03
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	231040	231123	3.884e+04
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	92720	92860	3.695e+03

Table 3: Continued.

States		Type	Energies (cm ⁻¹)		A (s ⁻¹)
Upper	Lower		ΔE_{exp}	ΔE_{calc}	
Cr XIX					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	82458	82464	1.716e-01
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	184600	184749	8.684e-02
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	34647	34676	3.504e-03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	136789	136961	6.446e-01
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	102142	102285	9.053e-01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	216342	216691	2.699e+01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	114200	114406	1.343e+01
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	47811	47788	1.819e+03
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	34647	34676	4.694e+02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	136789	136961	5.678e+03
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	250989	251367	5.994e+04
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	102142	102285	5.963e+03
Mn XX					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	98650	98806	3.640e-01
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	212260	212457	1.224e-01
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	39070	39110	5.090e-03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	152680	152761	1.130e+00
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	113610	113651	1.485e+00
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	234430	234543	4.124e+01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	120820	120892	1.424e+01
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	59580	59696	3.497e+03
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	39070	39110	6.441e+02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	152680	152761	9.615e+03
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	273500	273653	9.092e+04
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	113610	113651	9.543e+03
Fe XXI					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	117354	117364	7.450e-01
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	244561	244667	1.673e-01
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	43503	43544	6.964e-03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	170710	170847	1.967e+00
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	127207	127303	2.478e+00
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	254626	254688	6.248e+01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	127419	127385	1.497e+01
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	73851	73820	6.518e+03
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	43503	43544	8.472e+02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	170710	170847	1.596e+04
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	298129	298232	1.359e+05
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	127207	127303	1.516e+04

Table 3: Continued.

States		Type	Energies (cm ⁻¹)		A (s ⁻¹)
Upper	Lower		ΔE_{exp}	ΔE_{calc}	
Co XXII					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	138250	138338	1.477e+00
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	281820	281909	2.223e-01
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	47520	47924	9.041e-03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	191090	191494	3.400e+00
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	143570	143571	4.192e+00
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	277270	277437	9.400e+01
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	133700	133866	1.563e+01
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	90730	90415	1.180e+04
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	47520	47924	1.074e+03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	191090	191494	2.599e+04
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	324790	325360	2.004e+05
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	143570	143571	2.390e+04
Ni XXIII					
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	161922	161951	2.845e+00
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	324640	324714	2.875e-01
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	52152	52210	1.122e-02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	214870	214973	5.828e+00
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	162718	162763	7.157e+00
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	301978	303092	1.407e+02
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	139260	140330	1.624e+01
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	109770	109741	2.078e+04
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	52152	52210	1.320e+03
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	214870	214973	4.157e+04
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	354130	355302	2.920e+05
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	162718	162763	3.739e+04

Table 4: Hyperfine interaction constants A_J and B_J in MHz and Landé g_J factors from multireference RCI calculations. See page 8 for Explanation of Tables.

Level	J	A_J	B_J	g_J
F IV computed for ^{19}F with $I=1/2$ and $\mu=2.628868$ nm.				
$2s^2 2p^2 \ ^3P$	1	-8.298e+01		1.500
	2	3.708e+03		1.500
$2s^2 2p^2 \ ^1D$	2	5.887e+03		1.000
$2s 2p^3 \ ^5S^o$	2	1.574e+04		2.000
$2s 2p^3 \ ^3D^o$	3	1.561e+04		1.333
	2	8.869e+03		1.166
	1	-1.195e+04		0.500
$2s 2p^3 \ ^3P^o$	2	1.866e+04		1.500
	1	2.234e+04		1.500
$2s 2p^3 \ ^1D^o$	2	5.812e+03		1.000
$2s 2p^3 \ ^3S^o$	1	-1.877e+04		2.000
$2s 2p^3 \ ^1P^o$	1	5.861e+03		1.000
$2p^4 \ ^3P$	2	1.920e+03		1.500
	1	-1.580e+03		1.500
$2p^4 \ ^1D$	2	5.760e+03		1.000
Ne V computed for ^{20}Ne with $I=3/2$, $\mu=-0.661797$ nm and $Q=0.103$ b.				
$2s^2 2p^2 \ ^3P$	1	1.215e+01	8.517e+01	1.500
	2	-4.796e+02	-1.709e+02	1.499
$2s^2 2p^2 \ ^1D$	2	-7.617e+02	3.360e+02	1.000
$2s 2p^3 \ ^5S^o$	2	-1.957e+03	-4.515e-03	1.999
$2s 2p^3 \ ^3D^o$	3	-1.964e+03	-5.277e+00	1.333
	2	-1.122e+03	9.369e+00	1.166
	1	1.454e+03	4.150e+00	0.500
$2s 2p^3 \ ^3P^o$	2	-2.331e+03	-6.885e+00	1.499
	1	-2.807e+03	-8.637e+00	1.499
$2s 2p^3 \ ^1D^o$	2	-7.563e+02	-6.932e+00	1.000
$2s 2p^3 \ ^3S^o$	1	2.303e+03	-1.069e-02	1.999
$2s 2p^3 \ ^1P^o$	1	-7.569e+02	6.084e+00	1.000
$2p^4 \ ^3P$	2	-2.681e+02	1.553e+02	1.499
	1	1.864e+02	-7.747e+01	1.500
$2p^4 \ ^1D$	2	-7.516e+02	-3.209e+02	1.000

Table 4: Continued.

Level	J	A_J	B_J	g_J
Na VI computed for ^{23}Na with $I=3/2$, $\mu=2.2176556$ nm and $Q=0.104$ b.				
$2s^2 2p^2 \ ^3P$	1	-6.486e+01	1.257e+02	1.499
	2	2.349e+03	-2.522e+02	1.499
$2s^2 2p^2 \ ^1D$	2	3.714e+03	4.969e+02	1.000
$2s2p^3 \ ^5S^o$	2	9.292e+03	-9.907e-03	1.999
$2s2p^3 \ ^3D^o$	3	9.406e+03	-5.823e+00	1.333
	2	5.396e+03	2.282e+01	1.167
	1	-6.783e+03	1.082e+01	0.500
$2s2p^3 \ ^3P^o$	2	1.109e+04	-1.963e+01	1.499
	1	1.342e+04	-1.604e+01	1.499
$2s2p^3 \ ^1D^o$	2	3.711e+03	-1.043e+01	1.000
$2s2p^3 \ ^3S^o$	1	-1.079e+04	-2.637e-02	1.998
$2s2p^3 \ ^1P^o$	1	3.690e+03	8.609e+00	1.001
$2p^4 \ ^3P$	2	1.392e+03	2.323e+02	1.499
	1	-8.286e+02	-1.159e+02	1.500
$2p^4 \ ^1D$	2	3.701e+03	-4.765e+02	1.000
Mg VII computed for ^{25}Mg with $I=5/2$, $\mu=-0.85545$ nm and $Q=0.199$ b.				
$2s^2 2p^2 \ ^3P$	1	2.255e+01	3.367e+02	1.499
	2	-7.632e+02	-6.746e+02	1.498
$2s^2 2p^2 \ ^1D$	2	-1.197e+03	1.332e+03	1.000
$2s2p^3 \ ^5S^o$	2	-2.940e+03	-3.880e-02	1.999
$2s2p^3 \ ^3D^o$	3	-2.995e+03	-1.197e+01	1.333
	2	-1.725e+03	8.989e+01	1.167
	1	2.115e+03	4.379e+01	0.501
$2s2p^3 \ ^3P^o$	1	-4.266e+03	-5.507e+01	1.498
	2	-3.511e+03	-8.241e+01	1.499
$2s2p^3 \ ^1D^o$	2	-1.204e+03	-2.773e+01	1.000
$2s2p^3 \ ^3S^o$	1	3.372e+03	-1.107e-01	1.997
$2s2p^3 \ ^1P^o$	1	-1.188e+03	2.192e+01	1.001
$2p^4 \ ^3P$	2	-4.710e+02	6.277e+02	1.499
	1	2.454e+02	-3.136e+02	1.499
$2p^4 \ ^1D$	2	-1.205e+03	-1.282e+03	1.000

Table 4: Continued.

Level	J	A_J	B_J	g_J
Al VIII computed for ^{27}Al with $I=5/2$, $\mu=3.6415069$ nm and $Q=0.1402$ b.				
$2s^2 2p^2 \ ^3P$	1	-1.384e+02	3.207e+02	1.499
	2	4.421e+03	-6.411e+02	1.498
$2s^2 2p^2 \ ^1D$	2	6.842e+03	1.269e+03	1.001
$2s 2p^3 \ ^5S^o$	2	-1.662e+04	-5.160e-02	1.999
$2s 2p^3 \ ^3D^o$	3	1.701e+04	-9.017e+00	1.333
	2	9.838e+03	1.183e+02	1.167
	1	-1.180e+04	5.841e+01	0.501
$2s 2p^3 \ ^3P^o$	1	2.419e+04	-6.735e+01	1.497
	2	1.984e+04	-1.120e+02	1.498
$2s 2p^3 \ ^1D^o$	2	6.949e+03	-2.570e+01	1.000
$2s 2p^3 \ ^3S^o$	1	-1.882e+04	-1.552e-01	1.995
$2s 2p^3 \ ^1P^o$	1	6.777e+03	1.979e+01	1.003
$2p^4 \ ^3P$	2	2.799e+03	6.013e+02	1.498
	1	-1.304e+03	-3.011e+02	1.499
$2p^4 \ ^1D$	2	6.981e+03	-1.225e+03	1.001
Si IX computed for ^{29}Si with $I=1/2$ and $\mu=-0.55529$ nm.				
$2s^2 2p^2 \ ^3P$	1	1.475e+02	3.008e+03	1.499
	2	-4.475e+03	-5.987e+03	1.497
$2s^2 2p^2 \ ^1D$	2	-6.805e+03	1.189e+04	1.001
$2s 2p^3 \ ^5S^o$	2	-1.643e+04	-6.306e-01	1.999
$2s 2p^3 \ ^3D^o$	3	-1.688e+04	-6.853e+01	1.332
	2	-9.809e+03	1.471e+03	1.168
	1	1.153e+04	7.323e+02	0.503
$2s 2p^3 \ ^3P^o$	1	-2.396e+04	-8.037e+02	1.496
	2	-1.957e+04	-1.417e+03	1.497
$2s 2p^3 \ ^1D^o$	2	-6.989e+03	-2.321e+02	1.000
$2s 2p^3 \ ^3S^o$	1	1.835e+04	-2.010e+00	1.993
$2s 2p^3 \ ^1P^o$	1	-6.703e+03	1.758e+02	1.005
$2p^4 \ ^3P$	2	-2.871e+03	5.653e+03	1.497
	1	1.218e+03	-2.842e+03	1.499
$2p^4 \ ^1D$	2	-7.046e+03	-1.151e+04	1.001

Table 4: Continued.

Level	J	A_J	B_J	g_J
P X computed for ^{31}P with $I=1/2$ and $\mu=1.1316$ nm.				
$2s^2 2p^2 \ ^3P$	1	-4.104e+02		1.499
	2	1.187e+04		1.495
$2s^2 2p^2 \ ^1D$	2	1.765e+04		1.003
$2s 2p^3 \ ^5S^o$	2	4.256e+04		1.998
$2s 2p^3 \ ^3D^o$	2	2.563e+04		1.169
	3	4.385e+04		1.332
	1	-2.954e+04		0.505
$2s 2p^3 \ ^3P^o$	1	6.205e+04		1.494
	2	5.050e+04		1.496
$2s 2p^3 \ ^1D^o$	2	1.838e+04		1.000
$2s 2p^3 \ ^3S^o$	1	-4.679e+04		1.989
$2s 2p^3 \ ^1P^o$	1	1.721e+04		1.008
$2p^4 \ ^3P$	2	7.641e+03		1.496
	1	-2.995e+03		1.499
$2p^4 \ ^1D$	2	1.858e+04		1.002
S XI computed for ^{33}S with $I=3/2$, $\mu=0.6438212$ nm and $Q=-0.084$ b.				
$2s^2 2p^2 \ ^3P$	1	-1.044e+02	-4.091e+02	1.499
	2	2.883e+03	7.989e+02	1.493
$2s^2 2p^2 \ ^1D$	2	4.167e+03	-1.604e+03	1.005
$2s 2p^3 \ ^5S^o$	2	1.008e+04	1.009e-01	1.998
$2s 2p^3 \ ^3D^o$	2	6.135e+03	-3.218e+02	1.170
	3	1.041e+04	6.477e+00	1.332
	1	-6.920e+03	-1.624e+02	0.507
$2s 2p^3 \ ^3P^o$	1	1.468e+04	1.699e+02	1.492
	2	1.190e+04	3.157e+02	1.494
$2s 2p^3 \ ^1D^o$	2	4.416e+03	2.900e+01	1.000
$2s 2p^3 \ ^3S^o$	1	-1.088e+04	4.149e-01	1.984
$2s 2p^3 \ ^1P^o$	1	3.995e+03	-2.153e+01	1.012
$2p^4 \ ^3P$	2	1.847e+03	-7.649e+02	1.494
	1	-6.768e+02	3.901e+02	1.499
$2p^4 \ ^1D$	2	4.474e+03	1.564e+03	1.004

Table 4: Continued.

Level	J	A_J	B_J	g_J
Cl XII computed for ^{35}Cl with $I=3/2$, $\mu=0.8218743$ nm and $Q=-0.0824899$ b.				
$2s^2 2p^2 \ ^3P$	1	-1.761e+02	-4.980e+02	1.499
	2	4.654e+03	9.552e+02	1.489
$2s^2 2p^2 \ ^1D$	2	6.500e+03	-1.936e+03	1.008
$2s 2p^3 \ ^5S^o$	2	1.584e+04	7.945e-02	1.997
$2s 2p^3 \ ^3D^o$	2	9.758e+03	-4.794e+02	1.172
	1	-1.074e+04	-2.440e+02	0.511
	3	1.639e+04	6.717e+00	1.332
$2s 2p^3 \ ^3P^o$	1	2.299e+04	2.521e+02	1.488
	2	1.856e+04	4.725e+02	1.491
$2s 2p^3 \ ^1D^o$	2	7.040e+03	3.391e+01	1.001
$2s 2p^3 \ ^3S^o$	1	-1.669e+04	5.231e-01	1.977
$2s 2p^3 \ ^1P^o$	1	6.066e+03	-2.488e+01	1.018
$2p^4 \ ^3P$	2	2.943e+03	-9.235e+02	1.492
	1	-1.021e+03	4.766e+02	1.499
$2p^4 \ ^1D$	2	7.134e+03	1.897e+03	1.005
K XIV computed for ^{39}K with $I=3/2$, $\mu=0.39150731$ nm and $Q=0.049$ b.				
$2s^2 2p^2 \ ^3P$	1	-1.411e+02	4.363e+02	1.498
	2	3.440e+03	-7.845e+02	1.478
$2s^2 2p^2 \ ^1D$	2	4.395e+03	1.646e+03	1.018
$2s 2p^3 \ ^5S^o$	2	1.102e+04	2.755e-01	1.995
$2s 2p^3 \ ^3D^o$	2	7.013e+03	5.919e+02	1.178
	1	-7.258e+03	3.078e+02	0.524
	3	1.143e+04	-4.418e+00	1.331
$2s 2p^3 \ ^3P^o$	1	1.577e+04	-3.137e+02	1.477
	2	1.257e+04	-5.860e+02	1.482
$2s 2p^3 \ ^1D^o$	2	5.059e+03	-2.814e+01	1.003
$2s 2p^3 \ ^3S^o$	1	-1.084e+04	-9.024e-02	1.956
$2s 2p^3 \ ^1P^o$	1	3.718e+03	1.941e+01	1.036
$2p^4 \ ^3P$	2	2.080e+03	7.851e+02	1.485
	1	-6.636e+02	-4.200e+02	1.498
$2p^4 \ ^1D$	2	5.089e+03	-1.640e+03	1.011

Table 4: Continued.

Level	J	A_J	B_J	g_J
Ca XV computed for ^{40}Ca with $I=7/2$, $\mu=-1.317643$ nm and $Q=-0.043$ b.				
$2s^2 2p^2 \ ^3P$	1	2.598e+02	-4.570e+02	1.498
	2	-6.107e+03	7.789e+02	1.470
$2s^2 2p^2 \ ^1D$	2	-7.384e+03	-1.682e+03	1.026
$2s2p^3 \ ^5S^o$	2	-1.892e+04	-7.490e-01	1.994
$2s2p^3 \ ^3D^o$	2	-1.229e+04	-7.151e+02	1.183
	1	1.223e+04	-3.772e+02	0.534
	3	-1.963e+04	4.061e+00	1.331
$2s2p^3 \ ^3P^o$	1	-2.677e+04	3.830e+02	1.469
	2	-2.117e+04	7.086e+02	1.476
$2s2p^3 \ ^3S^o$	1	1.773e+04	-5.062e-01	1.941
$2s2p^3 \ ^1D^o$	2	-8.856e+03	2.945e+01	1.004
$2s2p^3 \ ^1P^o$	1	-5.750e+03	-1.887e+01	1.048
$2p^4 \ ^3P$	2	-3.584e+03	-8.040e+02	1.481
	1	1.109e+03	4.411e+02	1.498
$2p^4 \ ^1D$	2	-8.825e+03	1.701e+03	1.015
Sc XVI computed for ^{45}Sc with $I=7/2$, $\mu=4.756487$ nm and $Q=-0.22$ b.				
$2s^2 2p^2 \ ^3P$	1	-1.186e+03	-2.764e+03	1.498
	2	2.695e+04	4.377e+03	1.459
$2s^2 2p^2 \ ^1D$	2	3.063e+04	-9.842e+03	1.036
$2s2p^3 \ ^5S^o$	2	8.059e+04	-9.327e+00	1.993
$2s2p^3 \ ^3D^o$	2	5.358e+04	-4.897e+03	1.188
	1	-5.095e+04	-2.627e+03	0.546
	3	8.363e+04	2.187e+01	1.331
$2s2p^3 \ ^3P^o$	1	1.123e+05	2.661e+03	1.459
	2	8.798e+04	4.853e+03	1.469
$2s2p^3 \ ^3S^o$	1	-7.102e+04	-9.439e+00	1.923
$2s2p^3 \ ^1D^o$	2	3.860e+04	1.827e+02	1.007
$2s2p^3 \ ^1P^o$	1	2.120e+04	-1.032e+02	1.062
$2p^4 \ ^3P$	2	1.530e+04	-4.728e+03	1.476
	1	-4.618e+03	2.673e+03	1.498
$2p^4 \ ^1D$	2	3.792e+04	1.016e+04	1.019

Table 4: Continued.

Level	J	A_J	B_J	g_J
Ti XVII computed for ^{47}Ti with $I=5/2$, $\mu=-0.78848$ nm and $Q=0.29$ b.				
$2s^2 2p^2 \ ^3P$	1	3.448e+02	4.271e+03	1.497
	2	-7.595e+03	-6.124e+03	1.446
$2s^2 2p^2 \ ^1D$	2	-8.072e+03	1.457e+04	1.048
$2s 2p^3 \ ^5S^o$	2	-2.190e+04	2.652e+01	1.991
$2s 2p^3 \ ^3D^o$	2	-1.494e+04	8.416e+03	1.195
	1	1.350e+04	4.601e+03	0.560
	3	-2.272e+04	-2.992e+01	1.330
$2s 2p^3 \ ^3P^o$	1	-2.992e+04	-4.651e+03	1.447
	2	-2.319e+04	-8.333e+03	1.460
$2s 2p^3 \ ^3S^o$	1	1.787e+04	3.037e+01	1.904
$2s 2p^3 \ ^1D^o$	2	-1.078e+04	-3.023e+02	1.010
$2s 2p^3 \ ^1P^o$	1	-4.713e+03	1.389e+02	1.079
$2p^4 \ ^3P$	2	-4.160e+03	7.063e+03	1.471
	1	1.232e+03	-4.138e+03	1.498
$2p^4 \ ^1D$	2	-1.038e+04	-1.546e+04	1.024
V XVIII computed for ^{51}V with $I=7/2$, $\mu=5.1487057$ nm and $Q=-0.043$ b.				
$2s^2 2p^2 \ ^3P$	1	-2.000e+03	-7.364e+02	1.497
	2	4.271e+04	9.255e+02	1.431
$2s^2 2p^2 \ ^1D$	2	4.229e+04	-2.383e+03	1.063
$2s 2p^3 \ ^5S^o$	2	1.188e+05	-7.830e+00	1.988
$2s 2p^3 \ ^3D^o$	2	8.322e+04	-1.587e+03	1.202
	1	-7.119e+04	-8.856e+02	0.578
	3	1.231e+05	4.724e+00	1.330
$2s 2p^3 \ ^3P^o$	1	1.584e+05	8.945e+02	1.433
	2	1.212e+05	1.569e+03	1.450
$2s 2p^3 \ ^3S^o$	1	-8.808e+04	-9.274e+00	1.881
$2s 2p^3 \ ^1D^o$	2	6.040e+04	5.799e+01	1.014
$2s 2p^3 \ ^1P^o$	1	1.914e+04	-1.921e+02	1.096
$2p^4 \ ^3P$	2	2.257e+04	-1.171e+03	1.464
	1	-6.582e+03	7.147e+02	1.497
$2p^4 \ ^1D$	2	5.660e+04	2.620e+03	1.030

Table 4: Continued.

Level	J	A_J	B_J	g_J
Cr XIX computed for ^{52}Cr with $I=3/2$, $\mu=-0.47454$ nm and $Q=-0.15$ b.				
$2s^2 2p^2 \ ^3P$	1	5.307e+02	-2.966e+03	1.497
	2	-1.099e+04	3.134e+03	1.414
$2s^2 2p^2 \ ^1D$	2	-1.012e+04	-9.009e+03	1.080
$2s 2p^3 \ ^5S^o$	2	-2.952e+04	-5.135e+01	1.985
$2s 2p^3 \ ^3D^o$	2	-2.125e+04	-6.879e+03	1.209
	1	1.717e+04	-3.923e+03	0.597
	3	-3.057e+04	1.681e+01	1.330
$2s 2p^3 \ ^3P^o$	1	-3.825e+04	3.961e+03	1.418
	2	-2.881e+04	6.780e+03	1.439
$2s 2p^3 \ ^3S^o$	1	1.944e+04	-6.044e+01	1.857
$2s 2p^3 \ ^1D^o$	2	-1.560e+04	2.757e+02	1.020
$2s 2p^3 \ ^1P^o$	1	-3.013e+03	-5.430e+01	1.115
$2p^4 \ ^3P$	2	-5.609e+03	-4.513e+03	1.458
	1	1.618e+03	2.884e+03	1.497
$2p^4 \ ^1D$	2	-1.413e+04	1.035e+04	1.035
Mn XX computed for ^{55}Mn with $I=5/2$, $\mu=3.4532$ nm and $Q=0.33$ b.				
$2s^2 2p^2 \ ^3P$	1	-2.840e+03	7.487e+03	1.497
	2	5.700e+04	-6.289e+03	1.395
$2s^2 2p^2 \ ^1D$	2	4.885e+04	2.113e+04	1.098
$2s 2p^3 \ ^5S^o$	2	1.482e+05	2.027e+02	1.981
$2s 2p^3 \ ^3D^o$	2	1.095e+05	1.841e+04	1.218
	1	-8.351e+04	1.074e+04	0.619
	3	1.531e+05	-3.845e+01	1.329
$2s 2p^3 \ ^3P^o$	1	1.855e+05	-1.084e+04	1.402
	2	1.371e+05	-1.807e+04	1.426
$2s 2p^3 \ ^3S^o$	1	-8.411e+04	2.310e+02	1.831
$2s 2p^3 \ ^1D^o$	2	8.184e+04	-8.533e+02	1.027
$2s 2p^3 \ ^1P^o$	1	5.860e+03	6.207e+01	1.134
$2p^4 \ ^3P$	2	2.814e+04	1.084e+04	1.451
	1	-8.052e+03	-7.289e+03	1.497
$2p^4 \ ^1D$	2	7.108e+04	-2.559e+04	1.042

Table 4: Continued.

Level	J	A_J	B_J	g_J
Fe XXI computed for ^{57}Fe with $I=1/2$ and $\mu=0.090623$ nm.				
$2s^2 2p^2 \ ^3P$	1	-4.536e+02		1.496
	2	8.807e+03		1.376
$2s^2 2p^2 \ ^1D$	2	7.046e+03		1.116
$2s 2p^3 \ ^5S^o$	2	2.225e+04		1.977
$2s 2p^3 \ ^3D^o$	1	-1.216e+04		0.643
	2	1.685e+04		1.227
	3	2.293e+04		1.329
$2s 2p^3 \ ^3P^o$	1	2.678e+04		1.385
	2	1.934e+04		1.411
$2s 2p^3 \ ^3S^o$	1	-1.046e+04		1.804
$2s 2p^3 \ ^1D^o$	2	1.292e+04		1.036
$2s 2p^3 \ ^1P^o$	1	-5.495e+02		1.152
$2p^4 \ ^3P$	2	4.221e+03		1.444
	1	-1.202e+03		1.496
$2p^4 \ ^1D$	2	1.068e+04		1.048
Co XXII computed for ^{59}Co with $I=7/2$, $\mu=4.627$ nm and $Q=0.41$ b.				
$2s^2 2p^2 \ ^3P$	1	-4.004e+03	1.204e+04	1.496
	2	7.501e+04	-4.706e+03	1.357
$2s^2 2p^2 \ ^1D$	2	5.628e+04	2.858e+04	1.134
$2s 2p^3 \ ^5S^o$	2	1.848e+05	7.247e+02	1.971
$2s 2p^3 \ ^3D^o$	1	-9.823e+04	1.950e+04	0.668
	2	1.431e+05	3.200e+04	1.236
	3	1.899e+05	-5.153e+01	1.329
$2s 2p^3 \ ^3P^o$	1	2.128e+05	-1.973e+04	1.368
	2	1.493e+05	-3.093e+04	1.395
$2s 2p^3 \ ^3S^o$	1	-6.787e+04	7.397e+02	1.776
$2s 2p^3 \ ^1D^o$	2	1.135e+05	-2.253e+03	1.047
$2s 2p^3 \ ^1P^o$	1	-1.646e+04	-2.285e+02	1.170
$2p^4 \ ^3P$	2	3.504e+04	1.560e+04	1.437
	1	-9.959e+03	-1.175e+04	1.496
$2p^4 \ ^1D$	2	8.868e+04	-3.935e+04	1.054

Table 4: Continued.

Level	J	A_J	B_J	g_J
Ni XXIII computed for ^{61}Ni with $I=3/2$, $\mu=-0.75002$ nm and $Q=0.162$ b.				
$2s^2 2p^2 \ ^3P$	1	1.822e+03	5.372e+03	1.496
	2	-3.286e+04	-9.344e+02	1.338
$2s^2 2p^2 \ ^1D$	2	-2.325e+04	1.159e+04	1.152
$2s 2p^3 \ ^5S^o$	2	-7.933e+04	4.628e+02	1.963
$2s 2p^3 \ ^3D^o$	1	4.117e+04	9.078e+03	0.694
	2	-6.259e+04	1.458e+04	1.246
	3	-8.121e+04	-2.112e+01	1.328
$2s 2p^3 \ ^3P^o$	1	-8.686e+04	-9.200e+03	1.352
	2	-5.878e+04	-1.393e+04	1.378
$2s 2p^3 \ ^3S^o$	1	2.064e+04	4.409e+02	1.749
$2s 2p^3 \ ^1D^o$	2	-5.174e+04	-1.313e+03	1.060
$2s 2p^3 \ ^1P^o$	1	1.206e+04	-1.965e+02	1.186
$2p^4 \ ^3P$	2	-1.501e+04	6.551e+03	1.430
	1	4.271e+03	-5.248e+03	1.496
$2p^4 \ ^1D$	2	-3.798e+04	-1.715e+04	1.061

Table 5: Comparison of transition rates from different calculations. See page 9 for Explanation of Tables.

Upper	Lower	This work		HFR	CIV3	MCHF+BP
		A_B	A_C	A	A	A
F IV						
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_0$	8.165e+08	8.119e+08	8.912e+08	8.779e+08	8.277e+08
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_0$	6.082e+04	6.433e+04		3.180e+04	6.328e+04
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	2.924e+05	2.813e+05		2.730e+05	2.921e+05
$2p^4\ ^1D_2$	$2s2p^3\ ^1D_2^o$	3.242e+09	3.223e+09	3.884e+09	3.487e+09	3.213e+09
Na VI						
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_0$	1.250e+09	1.247e+09	1.285e+09	1.328e+08	1.287e+09
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_0$	1.232e+05	1.334e+05		7.941e+04	1.223e+05
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	1.798e+06	1.753e+06		1.720e+06	1.738e+06
$2p^4\ ^1D_2$	$2s2p^3\ ^1D_2^o$	5.627e+09	5.613e+09	6.265e+09	6.069e+09	5.393e+09
Al VIII						
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_0$	1.694e+09	1.692e+09	1.784e+09	1.786e+09	1.747e+09
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_0$	2.633e+05	2.874e+05		2.008e+05	2.579e+05
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	7.532e+06	7.388e+06		7.282e+06	7.314e+06
$2p^4\ ^1D_2$	$2s2p^3\ ^1D_2^o$	8.232e+09	8.221e+09	8.959e+09	8.830e+09	7.912e+09
P X						
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_0$	2.144e+09	2.143e+09	2.182e+09	2.246e+09	
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_0$	5.997e+05	6.542e+05		5.035e+05	
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	2.430e+07	2.392e+07		2.359e+07	
$2p^4\ ^1D_2$	$2s2p^3\ ^1D_2^o$	1.106e+10	1.105e+10	1.187e+10	1.178e+10	
Ar XIII						
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_0$	2.808e+09	2.807e+09	2.784e+09	2.927e+09	
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_0$	2.244e+06	2.382e+06		2.010e+06	
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	9.790e+07	9.686e+07		9.537e+07	
$2p^4\ ^1D_2$	$2s2p^3\ ^1D_2^o$	1.579e+10	1.579e+10	1.670e+10	1.664e+10	
Ti XVII						
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_0$	3.592e+09	3.594e+09	3.606e+09		
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_0$	1.068e+07	1.105e+07			
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	3.622e+08	3.600e+08	3.447e+08		
$2p^4\ ^1D_2$	$2s2p^3\ ^1D_2^o$	2.321e+10	2.325e+10	2.429e+10		
Fe XXI						
$2s2p^3\ ^3P_1^o$	$2s^22p^2\ ^3P_0$	4.213e+10	4.216e+10	4.186e+10		
$2s2p^3\ ^1P_1^o$	$2s^22p^2\ ^3P_0$	2.850e+07	2.902e+07			
$2p^4\ ^1D_2$	$2s2p^3\ ^3D_2^o$	7.878e+08	7.862e+08	7.262e+08		
$2p^4\ ^1D_2$	$2s2p^3\ ^1D_2^o$	3.182e+10	3.191e+10	3.311e+10		

Table 6: Comparison of E2 and M1 rates in (s^{-1}) for Mg VII. See page 9 for Explanations of Tables.

Upper	Lower	Type	This work A	MCHF+BP A
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_0$	E2	2.293e-07	2.328e-07
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_0$	E2	1.352e-04	1.277e-04
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	E2	4.709e-08	4.684e-08
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	E2	3.276e-04	3.534e-04
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	E2	2.021e-03	1.965e-03
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_2$	E2	3.848e-02	3.809e-02
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^1D_2$	E2	3.991e+00	3.890e+00
$2s^2 2p^2 \ ^3P_1$	$2s^2 2p^2 \ ^3P_0$	M1	2.469e-02	2.546e-02
$2s^2 2p^2 \ ^3P_2$	$2s^2 2p^2 \ ^3P_1$	M1	8.066e-02	8.031e-02
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_1$	M1	1.225e+00	1.237e+00
$2s^2 2p^2 \ ^1S_0$	$2s^2 2p^2 \ ^3P_1$	M1	3.701e+01	3.710e+01
$2s^2 2p^2 \ ^1D_2$	$2s^2 2p^2 \ ^3P_2$	M1	3.246e+00	3.224e+00

Table 7: Landé g_J -factors for some ions in the sequence. See page 9 for Explanations of Tables.

Level	F IV	Na VI	Al VIII	P X	Ar XIII	Ti XVII	Fe XXI
$2s^2 2p^2 \ ^3P_2$	1.500	1.499	1.497	1.495	1.485	1.446	1.376
$2s^2 2p^2 \ ^1D_2$	1.000	1.000	1.001	1.003	1.012	1.048	1.116
$2s 2p^3 \ ^3P_1^o$	1.500	1.499	1.497	1.494	1.483	1.445	1.385
$2s 2p^3 \ ^1P_1^o$	1.000	1.001	1.002	1.008	1.026	1.079	1.152