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# Multiconfiguration Dirac–Hartree–Fock energy levels, weighted oscillator strengths, transitions probabilities, lifetimes, hyperfine constants, Landé $g$ -factors and isotope shifts of Xe *LIII*

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## ABSTRACT

Energy levels, weighted oscillator strengths and transition probabilities, lifetimes, hyperfine interaction constants, Landé  $g$  factors and isotope shifts are calculated for all levels of  $1s^2$  and  $1snl$  ( $n = 2 - 7$ ) configurations of He-like xenon ion (Xe *LIII*). Multiconfigurational Dirac–Hartree–Fock (MCDHF) method is adopted for calculating these spectroscopic data. Comparisons are made with similar data obtained with FAC (Flexible Atomic Code) to assess the accuracy of the results. Transition probabilities are reported for all  $E1$ ,  $E2$ ,  $M1$  and  $M2$  transitions from the ground level. Breit interactions and quantum electrodynamics effects are estimated in extensive Relativistic Configuration Interaction (RCI) calculations. Comparisons were made with the available data in the literature and good agreement was found which confirms the reliability of our results. The accuracy of the present calculations is high enough to facilitate identification of many observed spectral lines. Almost all atomic data of He-like xenon ion presented in this paper are calculated for the first time.

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## Contents

1. Introduction.....	71
2. Theoretical method.....	72
2.1. MCDHF/RCI approach.....	72
2.2. Transition parameters.....	72
2.3. Hyperfine structure and Landé $g_j$ factors.....	72
2.4. Isotope shift.....	73
3. Method of calculations.....	73
4. Results and data evaluation.....	73
4.1. Energy levels.....	74
4.2. Radiative rates.....	74
4.3. Lifetimes.....	75
4.4. Hyperfine structure and Landé $g_j$ factors.....	75
4.5. Isotope shifts.....	75
5. Conclusion.....	75
Acknowledgements.....	76
References.....	76
Explanation of Tables.....	78
Table 1. Energies ( $E$ in $\text{cm}^{-1}$ ) relative to the ground state for the lowest 97 levels arising from the $1s^2$ and $1snl$ with $n = 2-7$ configurations of Xe <i>LIII</i> . Two calculations are performed using FAC and GRASP2K and compared with data from NIST database. The GRASP1, GRASP2 and GRASP3 are determined respectively with increasing the active set (AS) up to $n = 8$ , $n = 9$ and $n = 10$ . The last two columns denote the lifetimes (in $\text{s}^{-1}$ ) obtained from our FAC and GRASP2K calculations.....	78
Table 2. Calculated values using the GRASP2K code of the composition in LSJ coupling for all levels of interest with increasing the active set to $n = 10$ (GRASP3).....	78
Table 3. Electric dipole transitions $E1$ calculated with GRASP2K and FAC for all $n = 1-7$ configurations. For the GRASP2K calculation, the active set is expanded to $n = 10$ (GRASP3) and only the length form is considered. A comparison between the wavelengths, weighted oscillator strengths and transition probabilities is given. The relative difference between transition rates in the velocity and length gauge is given in the last column by $dT$ .....	78
Table 4. Electric quadrupole transitions $E2$ calculated with GRASP2K and FAC for all $n = 1-7$ configurations. For the GRASP2K calculation, the active set is expanded to $n = 10$ (GRASP3) and only the length form is considered. A comparison between the wavelengths, weighted oscillator strengths and transition probabilities is given. The relative difference between transition probabilities in the velocity and length gauge is given in the last column by $dT$ .....	78
Table 5. Magnetic dipole transitions $M1$ calculated with GRASP2K and FAC for all $n = 1-7$ configurations. For the GRASP2K calculation, the active set is expanded to $n = 10$ (GRASP3) and only the length form is considered. A comparison between the wavelengths, weighted oscillator strengths and transition probabilities is given.....	78
Table 6. Magnetic quadrupole transitions $M2$ calculated with GRASP2K and FAC for all $n = 1-7$ configurations. For the GRASP2K calculation, the active set is expanded to $n = 10$ (GRASP3) and only the length form is considered. A comparison between the wavelengths, weighted oscillator strengths and transition probabilities is given.....	78
Table 7. Calculated values using the GRASP2K code of the magnetic dipole $A$ , electric quadrupole $B$ and Landé $g$ -factors for all levels of interest. For this calculation, the active set expanded to $n = 10$ (GRASP3) has been considered.....	78
Table 8. Calculated values using the GRASP2K code of normal, specific mass shifts and electron densities at the nucleus for the all singly excited levels up to $n = 7$ with increasing the active set to $n = 10$ (GRASP3).....	78

## 1. Introduction

In recent years, there have been extensive spectroscopic studies, both experimental and theoretical, of helium isoelectronic sequence. An analysis of the spectra of solar, stellar and other astrophysical plasmas by many space missions, such as SOHO, Chandra and XMM Newton shows the presence of highly ionized atoms [1]. In addition, they are injected as impurities into tokamak plasmas [2,3]. In particular, high  $Z$  elements of the fifth period are being increasingly used as injected impurities for tokamak fusion plasmas. Also, the inert gas atoms show a significant importance in the diagnostics of laboratory plasmas. Furthermore, atomic data (namely energy levels, weighted oscillator strengths, radiative rates, lifetimes, hyperfine structure and Landé  $g_j$  factors and isotope shifts) are required for many ions in order to estimate the power loss from the impurities in the forthcoming fusion reactors, such as ITER project [4].

In the last few years, various theoretical and experimental research for providing atomic data for He-like ions have been carried out. But for He-like Xe, a limited number of studies has been carried out for providing atomic data for higher levels. In a recent review, Saloman [5] has listed energy levels for many ions of xenon, but unfortunately there is a paucity of data for this ion of interest.

These data are available at the National Institute of Standards and Technology (NIST) [6] database. Energy levels were calculated for the ground state and  $n = 2$  singlet states of heliumlike ions with nuclear charges in the range  $4 \leq Z \leq 92$  by Cheng et al. [7]. Plante et al. [8] performed relativistic all-order many-body calculations on the He-isoelectronic sequence in the range  $Z = 5-100$  and included Breit energy and other higher order correction terms in their calculations. Drake [9] carried out extensive two-electron quantum electrodynamics (QED) calculations using a unified method. Indelicato [10] adopted the multi-configuration Dirac-Fock (MCDHF) formalism to study the properties of He-like ions. Recently, energies and rates from  $2s3p-1s2s$  transitions were calculated for 23 ions (He-like) in the range  $Z = 14-54$  using multi-configuration Dirac-Fock wave functions by L. Natarajan et al. [11].

For correct interpretation of the experimentally observed spectra in the stellar and laboratory induced high-temperature plasmas, accurate theoretical data regarding the atomic transitions of highly ionized atoms are needed [12].

As previously published [13-15], we continue to focus on He-like ions. We report in this work the hereabove mentioned parameters for a comparatively larger number of levels/transitions by performing a large-scale multiconfiguration Dirac-Hartree-Fock

(MCDHF) [16] method to calculate the 97 lowest fine-structure levels for Xe *LIII*, in an effort to offer complete and consistent data sets of high accuracy. The calculations have been divided into two main groups, with even and odd parity. Also, wavelengths, weighted oscillator strengths, transition probabilities for the *E1*, *E2*, *M1* and *M2* radiations have been computed. Accurate interpretation of stellar spectra requires the knowledge not only of weighted oscillator strengths, but also of isotope shifts and hyperfine structures, since they cause an asymmetry and splitting of atomic transitions. So, hyperfine structures, Landé  $g_j$  factors and isotope shifts are also presented in this work.

We employ the FAC code [17] to compare some of these atomic data. The present MCDHF and FAC results are compared with each other and previous experimental and theoretical results, where available.

The configurations  $1s^2$  and  $1snl$  ( $n = 2-7, l \leq n-1$ ) are included in this calculation. Breit interactions and quantum electrodynamic (QED) effects have been added. This computational approach enables us to present a consistent and improved data set of all important transitions of the Xe *LIII* spectrum, which are useful for identifying transition lines in further investigations.

## 2. Theoretical method

### 2.1. MCDHF/RCI approach

Our calculations are performed by means of two numerical Codes. First, we employ the GRASP2K code. This is a fully relativistic code based on the Multiconfiguration Dirac–Hartree–Fock (MCDHF) method in *jj*-coupling. This method is fully described in detail by Grant [18]. Therefore, we only introduce the essential features here.

The atom is represented by an atomic state functions (ASF), which is a linear combination of configuration state functions (CSFs),

$$\psi(\gamma PJM) = \sum_{j=1}^{N_{CSF}} c_j \Phi(\gamma_j PJM), \quad (1)$$

where  $c_j$  are the mixing coefficients for the configuration  $j$ ,  $J$  and  $M$  are the angular quantum numbers and  $P$  is the parity. The label  $\gamma_j$  denotes appropriate information about the configuration state function  $j$ , such as parity, orbital occupancy and angular coupling scheme.

For the CSF, as  $\Phi(\gamma_j PJM)$ , it is an antisymmetrized linear combination of products of relativistic orbitals. One relativistic orbital can be expressed as,

$$\Phi(r) = \frac{1}{r} \begin{pmatrix} P_{n\kappa}(r) & \chi_{\kappa m}(r) \\ iQ_{n\kappa}(r) & \chi_{-\kappa m}(r) \end{pmatrix}, \quad (2)$$

where  $\kappa$  is the relativistic spherical symmetry quantum number,  $m$  is the magnetic quantum number,  $n$  is the principal quantum number,  $P_{n\kappa}(r)$  and  $Q_{n\kappa}(r)$  are the large and small component radial wavefunctions, and  $\chi_{\kappa m}(r)$  is the spinor spherical harmonic in the *lsj* coupling scheme.

These relativistic orbitals can be generated by using an appropriate Hamiltonian. In our MCDHF calculations, the Dirac–Coulomb Hamiltonian can be described as,

$$H_{DC} = \sum_{i=1}^N (c\alpha_i \cdot \mathbf{p}_i + (\beta_i - 1)c^2 + V(r_i)) + \sum_{i>j}^N \frac{1}{r_{ij}}, \quad (3)$$

where  $V(r_i)$  is the nuclear potential at radius  $r$ ,  $\alpha$  and  $\beta$  are the  $4 \times 4$  Dirac matrices,  $\mathbf{p}_i$  is the momentum operator of the electron  $i$  and  $c$  is the speed of light in atomic units. The first term describes the electron kinetic energy and the electron–nucleus interaction, and

the second term is the two-body Coulomb interactions between the electrons.

Once a set of radial orbitals like  $P_{n\kappa}(r)$  and  $Q_{n\kappa}(r)$  has been obtained by self-consistent field procedure, they are used to determine the expansion coefficients of the CSFs by diagonalizing the Hamiltonian matrix.

The transverse interaction in the low-frequency limit, or the Breit interaction [19],

$$H_{Breit} = - \sum_{i<j}^N \frac{1}{2r_{ij}} \left[ \alpha_i \cdot \alpha_j + \frac{(\alpha_i \cdot r_{ij})(\alpha_j \cdot r_{ij})}{r_{ij}^2} \right], \quad (4)$$

and leading quantum electrodynamic (QED) effects (vacuum polarization and self-energy) have been included in subsequent configuration interaction (RCI) calculations, where optimization is on a weighted sum of energies. At the end, a transformation from *jj*- to *LS*-coupling [20] can be done for practical purposes.

### 2.2. Transition parameters

Transition parameters, such as transition rates or weighted oscillator strengths, between two states  $\gamma PJ$  and  $\gamma' P' J'$  can be described in terms of the reduced transition matrix element,

$$\langle \psi(\gamma PJ) \| Q_k^{(\lambda)} \| \psi(\gamma' P' J') \rangle, \quad (5)$$

where  $Q_k^{(\lambda)}$  is the electromagnetic multipole operator of order  $k$  in Coulomb or Babushkin gauges [21]. The superscript designates the type of multipole:  $\lambda = 1$  for electric multipoles and  $\lambda = 0$  for magnetic multipoles. In cases where the wave functions of the two states  $\gamma' P' J'$  and  $\gamma PJ$  have been separately determined, the radial orbitals are not orthogonal. To deal with this complication, a transformation to a biorthonormal orbital basis was applied [22]. In the new representation, the evaluation of the matrix element has been done using standard Racah algebra techniques.

In order to ensure a rigorous accuracy assessment of results of energy levels and transition probabilities, we have performed another calculation with the widely used FAC code of Gu [17]. It is also a fully relativistic code which has higher efficiency. It enables user to carry out large-scale computations and allows finding various atomic parameters. It uses a modified Dirac–Fock–Slater central-field potential that includes an approximate treatment of the exchange interaction.

### 2.3. Hyperfine structure and Landé $g_j$ factors

The hyperfine interaction is caused by the interaction between the electrons and the electromagnetic multipole moments of the nucleus, and its Hamiltonian can be represented using the spherical tensor operators  $\mathbf{T}^{(k)}$  and  $\mathbf{M}^{(k)}$  [23],

$$H_{\text{hfs}} = \sum_{k \geq 1} \mathbf{T}^{(k)} \cdot \mathbf{M}^{(k)}. \quad (6)$$

Here,  $k = 1$  and  $k = 2$  represent the magnetic dipole and electric quadrupole interactions, respectively. For a  $N$ -electron atom, the electronic tensor operators  $\mathbf{T}^{(1)}$  and  $\mathbf{T}^{(2)}$  are the sums of the one-electron operators  $t^{(k)}$ ,

$$\mathbf{T}^{(1)} = \sum_{j=1}^N \mathbf{t}^{(1)}(j) = \sum_{j=1}^N -i\alpha \left( \alpha_j \cdot \mathbf{l}_j \mathbf{c}^{(1)}(j) \right) r_j^{-2} \quad (7)$$

and

$$\mathbf{T}^{(2)} = \sum_{j=1}^N \mathbf{t}^{(2)}(j) = \sum_{j=1}^N -\mathbf{c}^{(2)}(j) r_j^{-3}. \quad (8)$$

Here,  $i$  is the imaginary unit,  $\alpha$  is the fine-structure constant,  $\mathbf{C}^{(1)}$  and  $\mathbf{C}^{(2)}$  are spherical tensor operators, and  $\mathbf{L}$  is the orbital angular momentum operator. The nuclear tensor operators  $\mathbf{M}^{(1)}$  and  $\mathbf{M}^{(2)}$  are related to magnetic dipole moment  $\mu_I$  and electronic quadrupole moment  $Q_I$  of the nucleus with spin  $I$  through [24]

$$\mu_I = \langle IM_I(=I) | \mathbf{M}_0^{(1)} | IM_I(=I) \rangle \quad (9)$$

and

$$Q_I = \langle IM_I(=I) | \mathbf{M}_0^{(2)} | IM_I(=I) \rangle. \quad (10)$$

The nuclear magnetic dipole moments  $\mu_I$  and the nuclear quadrupole moments  $Q_I$  for the different isotopes have been taken from a compilation by Stone [25].

According to perturbation theory, the magnetic dipole and the electric quadrupole  $A_J$  and  $B_J$  are [24]

$$A_J = \frac{\mu_I}{I} \frac{1}{[J(J+1)]^{1/2}} \langle \Psi(PJ) | \mathbf{T}^{(1)} | \Psi(PJ) \rangle \quad (11)$$

and

$$B_J = 2Q \left[ \frac{J(2J-1)}{(J+1)(2J+3)} \right]^{1/2} \langle \Psi(PJ) | \mathbf{T}^{(2)} | \Psi(PJ) \rangle. \quad (12)$$

The Landé  $g_J$  factors are given by

$$g_J = \frac{2}{\sqrt{J(J+1)}} \langle \gamma J | \sum_{j=1}^N -i \frac{\sqrt{2}}{2\alpha^2} r_j (\alpha_j \mathbf{C}_j^{(1)})^{(1)} + \frac{g_s - 2}{2} \beta_j \Sigma_j | \gamma J \rangle, \quad (13)$$

where  $i$  is the imaginary unit,  $\Sigma$  the relativistic spin-matrix and  $g_s = 2.00232$  the  $g$ -factor of the electron spin corrected for QED effects. The Landé  $g_J$  factors determine the splitting of magnetic sub-levels in external magnetic fields. In addition they give information about the coupling conditions in the system [26].

#### 2.4. Isotope shift

The isotope shift (IS) for an atomic energy level is composed of the field shift (FS) and the mass shift (MS). The field shift, arising from the difference in the charge distribution between two isotopes with mass number  $A$  and  $A'$  ( $A > A'$ ), is given in the approximation of the first-order perturbation theory by [27,28]

$$\Delta E_{FS}^{A,A'} = \langle \Psi(PJM) | \sum_i \delta V_i^{N,AA'} | \Psi(PJM) \rangle. \quad (14)$$

Here,  $\delta V^{N,AA'} = V^{N,A} - V^{N,A'}$  and the nuclear potential  $V^N$  for each isotope is produced by a two-parameter Fermi nuclear model [29,30]. Neglecting the higher-order nuclear moments [31], Eq. (14) is further simplified to

$$\Delta E_{FS}^{A,A'} = F \delta \langle r^2 \rangle^{A,A'}, \quad (15)$$

where

$$F_k = \frac{2\pi}{3} \left( \frac{Ze^2}{4\pi\epsilon_0} \right) \Delta |\Psi(\mathbf{0})|_k^2 \quad (16)$$

is the field-shift factor proportional to the total electron probability density at the origin between the levels  $l$  and  $u$ ,

$$\Delta |\Psi(\mathbf{0})|_k^2 = \Delta \rho_k^e(0) = \rho_u^e(0) - \rho_l^e(0) \quad (17)$$

and  $\delta \langle r^2 \rangle^{A,A'}$  is the difference of the nuclear charge mean square radius between these two isotopes.

The mass shift between two isotopes  $A$  and  $A'$ , caused by the motion of nucleus with the finite mass, is expressed as [32,33]

$$\Delta E_{MS}^{A,A'} = \frac{M' - M}{MM'} K_{MS}. \quad (18)$$

Here,  $M$  and  $M'$  are the nuclear masses for isotopes  $A$  and  $A'$ , respectively. The electronic factor  $K_{MS}$  is defined by

$$\frac{K_{MS}}{M} \equiv \langle \Psi(PJM) | H_{MS} | \Psi(PJM) \rangle, \quad (19)$$

where

$$H_{MS} = \frac{1}{2M} \sum_{i,j} \mathbf{p}_i \cdot \mathbf{p}_j. \quad (20)$$

The mass shift operator (Eq. (20)) can be split into two parts, that is, the one-body and the two-body mass shift operators

$$H_{NMS} = \frac{1}{2M} \sum_i p_i^2 \quad (21)$$

$$H_{SMS} = \frac{1}{2M} \sum_{i \neq j} \mathbf{p}_i \cdot \mathbf{p}_j, \quad (22)$$

which are also called the normal mass shift (NMS) and the specific mass shift (SMS) operator, respectively.

### 3. Method of calculations

The MCDHF/RCI calculations have been performed in the extended optimal level (EOL) scheme for each group of atomic states using configuration expansions including all lower states of the same parity and symmetry. For the optimization of the orbitals, Dirac–Coulomb version has been used, including Breit corrections in a final configuration interaction calculation.

To build a CSF expansion, the restrictive active space methods have been also used. The idea of the active space methods is to consider only electrons from the active space and to excite them from the occupied orbitals to unoccupied ones. The orbital has been increased systematically in order to monitor the convergence of the calculation. Since the orbitals with the same principal quantum number  $n$  often have similar energies, the active set is usually enlarged in steps of orbital layers. It is convenient to refer to the  $\{1s, 2s, 2p, 3s, 3p, 3d, 4s, 4p, 4d, 4f\}$  set of orbitals as the  $n = 4$  orbital layer,  $\{1s, 2s, 2p, \dots, 5s, 5p, 5d, 5f, 5g\}$  as the  $n = 5$  layer, etc. We increase the AS in a systematic way to ensure the convergence of the atomic parameters under consideration. Only the outermost  $nl$ -orbitals are optimized while the inside ones are fixed. For example, the total number of CSF in the active set of  $n = 8$  is 3896 for even configurations and 3560 for odd configurations. For the active set of  $n = 9$ , the number of CSF increases to 6104 and 5490 for even and odd, respectively. For the last active set of consideration  $n = 10$ , the number will be 8824 and 7854 for even and odd, respectively. So, we can deduce that larger orbital sets can result in a considerable increase of computational time required for the problem, and appropriate restrictions may be necessary.

We have divided up the calculations into two parts, one where we optimized a set of orbitals for the even states and one for the odd states, i.e. the upper and lower states have been described by two independently optimized sets of orbitals. Because of this, we have to use biorthogonal transformation of the atomic state functions ASF to calculate the transition parameters. Radiative transition characteristics have been calculated for  $E1$ ,  $M1$ ,  $E2$  and  $M2$  transitions, following the relativistic configuration-interaction RCI calculation in which both the Breit interaction and the other corrections to the DC Hamiltonian are included.

### 4. Results and data evaluation

In the following subsections, the results of the calculations are presented, and compared with values available from the literature. The identification of the levels is based on the LS composition obtained by transforming from  $jj$ - to  $LS$ -coupling schemes using the  $jj2lsj$  tool integrated in the new release of GRASP2K [16].

#### 4.1. Energy levels

The calculated energy levels of  $1s^2$ ,  $1s2l$ ,  $1s3l$ ,  $1s4l$ ,  $1s5l$ ,  $1s6l$  and  $1s7l$  configurations for the He-like xenon have been tabulated in Table 1, which generate up to 97 levels. These calculations are performed by means of two codes FAC and GRASP2K. The first column of results show the results from the FAC code. The other columns of GRASP1, GRASP2 and GRASP3 show the results from the GRASP2K code. The former results are calculated as function of increasing active sets with single excitations. All the calculated energy levels have been compared with experimental values. It is obvious that, when the active space is expanded to  $n = 8$  (GRASP1) and  $n = 9$  (GRASP2), the energy levels deviate very largely from experimental values taken from the National Institute of Standards and Technology NIST compilation [6], which is entirely based on the data listed by Ref [5]. When the active space set is expanded to  $n = 10$  (GRASP3), the calculated energy levels are substantially improved. So, we can clearly find that, with the increasing of active space set, the calculated energy levels are closer to experimental values.

The average difference between the GRASP3 values and NIST is 0.002% for the 8 states listed in the NIST database. The average difference between the calculated FAC and GRASP3 level energies is within 0.006% for all 97 states in *Xe LIII* while the average difference between the calculated FAC and NIST database level energies is 0.007%. Small discrepancies can be observed in the GRASP and FAC energies mainly arise due to the different ways of calculations of electron wave-functions for radial orbitals and recoupling schemes of angular parts. Since some of energy levels are not available on NIST, our energy levels GRASP3 should be adopted in modelling applications. We may state that overall there is no discrepancy between theory and experiment and the results of GRASP3 are in good agreement with the experimental values for the energy levels of *Xe LIII*.

We compare also the lifetimes from the two calculations from the FAC and GRASP2K codes. Some large discrepancies have found for some levels like  $1s2s^1S_0$ ,  $1s2p^3P_2^o$ ,  $1s2p^1P_1^o$  when the differences are 14.54%, 6.62% and 7.00% respectively. For the others values the percentage do not exceed 2% for the almost levels.

We list in Table 2, the LSJ coupling percentage compositions for all levels of interest. The level composition in LSJ coupling values show that, the major contributions to the total wave function of a given level are those coming from the same configuration.

#### 4.2. Radiative rates

The weighted oscillator strengths  $g_{ifij}$  are related to the transition probabilities  $A_{ji}$  for a transition from  $i$  to  $j$  by the following expression

$$g_{ifij} = \frac{mc}{8\pi^2 e^2} \lambda_{ji}^2 g_i A_{ji} = 1.49 \times 10^{-16} \lambda_{ji}^2 g_i A_{ji}, \quad (23)$$

where  $m$  and  $e$  are the electron mass and charge, respectively,  $c$  is the velocity of light,  $\lambda_{ji}$  is the wavelength in Å,  $g_i$  and  $g_j$  are the statistical weights of the lower ( $i$ ) and upper ( $j$ ) levels, respectively. Similarly, the weighted oscillator strength  $g_{ifij}$  and the line strength  $S$  are related by the standard equation for the electric dipole  $E1$ -transitions,

$$A_{ji} = \frac{2.0261 \times 10^{18}}{g_j \lambda_{ji}^3} S^{E1} \quad \text{and} \quad g_{ifij} = \frac{303.75}{\lambda_{ji}} S^{E1} \quad (24)$$

for the magnetic dipole  $M1$ -transitions,

$$A_{ji} = \frac{2.6974 \times 10^{13}}{g_j \lambda_{ji}^3} S^{M1} \quad \text{and} \quad g_{ifij} = \frac{4.044 \times 10^{-3}}{\lambda_{ji}} S^{M1} \quad (25)$$

for the electric quadrupole  $E2$ -transitions,

$$A_{ji} = \frac{1.1199 \times 10^{18}}{g_j \lambda_{ji}^5} S^{E2} \quad \text{and} \quad g_{ifij} = \frac{167.89}{\lambda_{ji}^3} S^{E2} \quad (26)$$

and for the magnetic quadrupole  $M2$ -transitions,

$$A_{ji} = \frac{1.4910 \times 10^{13}}{g_j \lambda_{ji}^5} S^{M2} \quad \text{and} \quad g_{ifij} = \frac{2.236 \times 10^{-3}}{\lambda_{ji}^3} S^{M2}. \quad (27)$$

Below, we present and discuss our determined  $gf$ -values and  $A$ -values for transitions in *Xe LIII* for all types of transitions  $E1$ ,  $E2$ ,  $M1$  and  $M2$  of all levels of energies in interest  $1s^2$  and  $1snl$  ( $n = 2-7$ ). The effects of Breit and QED corrections are assessed by our calculations. We should mention that for the GRASP2K calculation, the active set is expanded to  $n = 10$  (GRASP3) and only the length form for transition probabilities has tabulated in Tables 3–6. We present in these tables the wavelengths, weighted oscillator strengths  $g_{ifij}$  and radiative rates  $A_{ji}$  for 1054 electric dipole  $E1$ , 1389 electric quadrupole  $E2$ , 1012 magnetic dipole  $M1$  and 1430 magnetic quadrupole  $M2$  transitions among the 97 levels of *Xe LIII* calculated with GRASP2K and FAC codes. However, for these transitions only the  $gf$ -values and  $A$ -values are listed and the corresponding results for  $S$ -values can be easily obtained. We also present the uncertainty of the electric transitions  $dT$  to provide an additional indicator of the accuracy of our GRASP2K results in Tables 3 and 4.

We compare our calculated transition energy of the  $1s2s^3S_1-1s2p^3P_2^o$  ( $3756964 \text{ cm}^{-1}$ ) transition with the experimental value measured by S. Martin [34] ( $3750937 \text{ cm}^{-1}$ ) and other theoretical results elaborated by Indelicato [35] ( $3752138 \text{ cm}^{-1}$ ) and Drake [9] ( $3751576 \text{ cm}^{-1}$ ). Moreover, the calculated wavelength of the former transition is  $26.617 \text{ Å}$  where the experimental value is  $26.66 \text{ Å}$ . We state that the differences are minor. Furthermore, our calculated wavelengths compared to the data from the NIST database shows a good agreement such as the case of transitions  $1s^2^1S_0-1s2p^3P_2^o$  ( $0.4104 \text{ Å}$ ) and  $1s^2^1S_0-1s2p^1P_1^o$  ( $0.4047 \text{ Å}$ ).

For almost, all strong transitions (those with  $gf \geq 0.01$ ), the  $gf$  values and  $A$ -values from GRASP2K agree to better than 10% with those of FAC, which is satisfactory. Moreover, for many strong transitions, the difference between both velocity and length forms, does not exceed 2%, giving its credit to the accuracy of calculations of wave functions from GRASP2K. To confirm that, we have plotted in Fig. 1, the uncertainty  $dT$  as a function of transition rates of type  $E1$ .

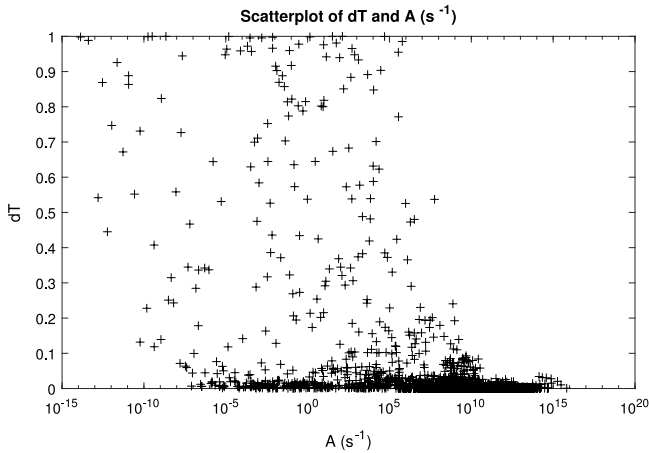
We remind that the uncertainty  $dT$  is generated by only the GRASP2K code and it is expressed by

$$dT = \frac{|A_l - A_v|}{\max(A_l, A_v)}, \quad (28)$$

where  $A_l$  and  $A_v$  are the transition rates calculated in length and velocity gauges, respectively.

However, for some weak transitions ( $gf < 0.01$ ), the situation is more unclear such as the  $1s2s^3S_1-1s4f^3F_2^o$  transition ( $gf = 3.265 \times 10^{-09}$ ) for the transition of type  $E1$ , the difference between two sets of  $A$ -values is large. We note also that we have large difference in some transitions because their transition energy is very small, such as  $1s3p^3P_1^o-1s3s^1S_0$ ,  $1s4p^3P_1^o-1s4s^1S_0$  and  $1s5p^3P_1^o-1s5s^1S_0$  for the type of  $E1$  transitions and the same case for  $E2$ ,  $M1$  and  $M2$  transitions. Hence, a slight variation in  $\Delta E$  has a considerable effect on the values of  $A$ . Moreover, the contribution of the  $A$ -values for weak transitions that required in modelling applications is (generally) small in comparison to the stronger transitions.

Therefore, on the basis of these comparisons and the above discussion, we may state that for a majority of strong  $E1$ ,  $E2$ ,  $M1$  and  $M2$  transitions, our radiative rates are accurate to better than 10%. However, for the weak transitions, this assessment of accuracy is not applied.



**Fig. 1.** The uncertainty  $dT$  by the GRASP2K code between the velocity and length forms of E1 transition rates as function of E1 transition rates  $A$ .

### 4.3. Lifetimes

The lifetime  $\tau$  for a level  $j$  is defined as follows

$$\tau_j = \frac{1}{\sum_i A_{ji}}. \quad (29)$$

Since this is a measurable parameter. It provides a check on the accuracy of the calculations. Therefore, in Table 1 we have also listed our calculated lifetimes from the GRASP2K code, which include the contributions from four types of transitions:  $E1$ ,  $E2$ ,  $M1$  and  $M2$ . To our knowledge, neither calculations nor measurements were determined for  $Xe\ LIII$  ion. We hope the present results will be useful for future comparisons and may encourage experimentalists to measure their lifetimes.

### 4.4. Hyperfine structure and Landé $g_j$ factors

The calculation of the hyperfine interaction constants and Landé  $g_j$  factors have been performed only with the GRASP2K code. In the case of our ion  $Xe\ LIII$ , the constants for the spin  $I$ , magnetic dipole moments  $\mu_I$  and the nuclear quadrupole moment  $Q_I$  were taken 1.5,  $0.691 \times \mu_N$  and  $-0.1$  barn, respectively.  $\mu_N$  is the nuclear magneton.

The active set (AS) is considered up to  $n = 10$  and  $l = 7$  for all the configurations of interest  $1snl$  ( $n = 1-7$ ). We list in Table A some of results of calculation of the magnetic dipole  $A$  and electric quadrupole  $B$  hyperfine interaction constants and Landé  $g_j$  factors for the four lowest states  $1s2s\ ^3S_1$ ,  $1s2p\ ^3P_1^o$ ,  $1s2p\ ^3P_2^o$  and  $1s2p\ ^1P_1^o$  to study the effect of increasing the AS in the hyperfine structure and the Landé  $g_j$  factors. We observe that the variation is minor. We can state that no influence of increasing set in the calculation of these hyperfine interaction constants.

In Table 7, we tabulate the hyperfine structure and Landé  $g_j$  factors for all levels of interest.

We have been unable to compare our predicted results of the hyperfine structure and Landé  $g_j$  factors with any other experimental or theoretical results because the required results are missing. However, our accurate values of Landé  $g_j$  factors and hyperfine structure constants are of great interest for atomic spectroscopy researchers.

### 4.5. Isotope shifts

The isotope shift and the electron densities at the nucleus parameters are calculated in a first-order perturbation theory using

**Table A**

Calculated values using the GRASP2K code of magnetic dipole  $A$ , electric quadrupole  $B$  and Landé  $g$ -factors with increasing the active set to  $n = 10$  (GRASP3).

AS	$1s2s\ ^3S_1$	$1s2p\ ^3P_1^o$	$1s2p\ ^3P_2^o$	$1s2p\ ^1P_1^o$
<b>Magnetic dipole <math>A</math> (in MHz)</b>				
$n = 3$	1.328E7	1.218E7	5.963E6	-5.633E6
$n = 4$	1.328E7	1.218E7	5.963E6	-5.633E6
$n = 5$	1.328E7	1.218E7	5.963E6	-5.633E6
$n = 6$	1.328E7	1.218E7	5.963E6	-5.633E6
$n = 7$	1.328E7	1.218E7	5.963E6	-5.633E6
$n = 8$	1.328E7	1.218E7	5.964E6	-5.629E6
$n = 9$	1.328E7	1.218E7	5.965E6	-5.633E6
$n = 10$	1.329E7	1.218E7	5.965E6	-5.636E6
<b>Electric quadrupole <math>B</math> (in MHz)</b>				
$n = 3$	-2.062	4603	-64830	-34880
$n = 4$	-1.8	4614	-64830	-34820
$n = 5$	-1.048	4615	-64830	-34810
$n = 6$	-0.7197	4550	-64810	-34820
$n = 7$	-0.5684	4561	-64810	-34820
$n = 8$	-0.4849	4475	-65310	-35650
$n = 9$	5.223	4480	-64910	-35320
$n = 10$	1.941	4527	-64660	-34880
<b>Landé <math>g</math>-factors</b>				
$n = 3$	1.93514	1.28539	1.459	1.15044
$n = 4$	1.93515	1.28538	1.45899	1.15047
$n = 5$	1.93515	1.28538	1.45899	1.15047
$n = 6$	1.93515	1.28539	1.45899	1.15047
$n = 7$	1.93515	1.28539	1.45899	1.15047
$n = 8$	1.93515	1.28532	1.45904	1.15036
$n = 9$	1.93516	1.28523	1.45905	1.15054
$n = 10$	1.93517	1.28519	1.45897	1.15063

the MCDHF/RCI atomic state functions as the zero-order wavefunctions. In Table B, we start by studying the effect of increasing the active set (AS) up to  $n = 10$ . For that, seven lowest levels  $1s^2\ ^1S_0$ ,  $1s2s\ ^3S_1$ ,  $1s2p\ ^3P_1^o$ ,  $1s2p\ ^3P_2^o$ ,  $1s2s\ ^1S_0$ ,  $1s2p\ ^3P_2^o$  and  $1s2p\ ^1P_1^o$  are chosen for consideration. No major effect is observed with increasing the active set. All calculations are performed with increasing the reference configurations up to  $n = 7$  when the active set AS is enlarged step by step up to  $n = 10$  and  $l = 7$ . Moreover, all these parameters are displayed in Table 8 for all the known levels belonging to the configurations  $1s^2$  and  $1snl$  with  $n = 2-7$ ,  $l \leq 6$ .

We plot the calculated specific mass shifts (SMS) using the GRASP2K code, only for the ground state  $1s^2$  with increasing the active set AS up to  $n = 10$  in Fig. 2. The result is compared with previous works, MCDHF [36], MCHF [36] and Drake [9]. Our result matches well with the result of the MCDHF work which proves the reliability of results. The difference with the other results can be explained by the different ways of calculation of codes. The GRASP2K and MCDHF are considered as relativistic codes while MCHF is a non relativistic one. The difference between the results of the two relativistic codes does not exceed 2.2% but the differences with the MCHF and Drake are approximately 15%.

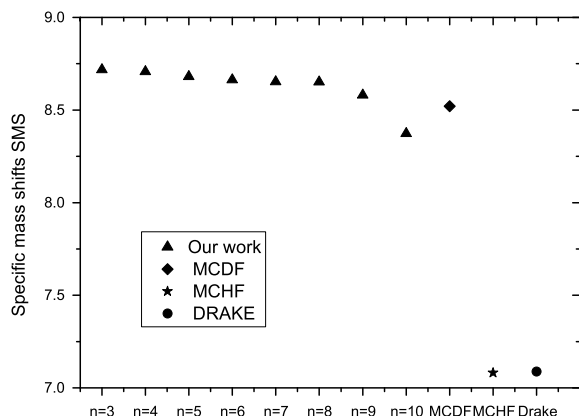
## 5. Conclusion

In the present study, fine structure energy levels, wavelengths, weighted oscillator strengths, transition probabilities for  $E1$ ,  $E2$ ,  $M1$  and  $M2$  transitions among 97 energy levels belonging to He-like xenon are presented. Additionally, lifetimes, hyperfine structure constants, Landé  $g_j$  factors and isotope shifts have been reported, although no measurements or other theoretical results are available for comparison except one work treating the calculation of only the ground state  $1s^2\ ^1S_0$ . The self-consistent field approximation and the Breit interaction Hamiltonian as well as QED effects have been included in the calculations to improve the generated wave functions. The calculated energy levels, weighted

**Table B**

Calculated values using the GRASP2K code of normal, specific mass shifts and electron densities at the nucleus for the seven lowest levels with increasing active set AS up to  $n = 10$ .

AS	$1s^2 \ ^1S_0$	$1s2s \ ^3S_1$	$1s2p \ ^3P_1^o$	$1s2p \ ^3P_0^o$	$1s2s \ ^1S_0$	$1s2p \ ^3P_2^o$	$1s2p \ ^1P_1^o$
Normal mass shift NMS (a.u.)							
$n = 3$	2862.371	1818.908	1816.760	1815.086	1816.736	1803.102	1802.086
$n = 4$	2862.365	1819.197	1816.720	1815.010	1815.793	1803.182	1801.819
$n = 5$	2862.337	1819.261	1816.695	1814.981	1815.592	1803.179	1801.750
$n = 6$	2862.332	1819.284	1816.689	1814.974	1815.522	1803.185	1801.726
$n = 7$	2862.328	1819.295	1816.686	1814.971	1815.488	1803.186	1801.717
$n = 8$	2862.349	1819.317	1818.194	1816.601	1815.483	1804.312	1803.566
$n = 9$	2862.115	1819.47	1817.501	1815.864	1815.214	1803.816	1802.661
$n = 10$	2862.115	1819.58	1817	1815.49	1815.192	1803.659	1802.099
Specific mass shift SMS (a.u.)							
$n = 3$	8.717903	0.5995701	−80.16853	−195.2675	2.357866	−205.907	83.54837
$n = 4$	8.70804	0.6207144	−80.2113	−195.2448	2.119602	−205.9269	83.36892
$n = 5$	8.680987	0.6271347	−80.20777	−195.2282	2.042898	−205.9166	83.34515
$n = 6$	8.663317	0.6302334	−80.15193	−195.1577	2.007405	−205.89	83.36138
$n = 7$	8.65289	0.6318741	−80.15315	−195.1561	1.988378	−205.8906	83.35634
$n = 8$	8.651809	0.6336825	−80.89982	−197.0734	1.980105	−207.2639	84.04787
$n = 9$	8.580615	0.65771	−80.56291	−196.2107	1.67668	−206.4653	83.54352
$n = 10$	8.37281	0.65445	−80.2194	−195.3285	1.61861	−205.8238	83.21168
Electron densities at the nucleus (a.u.)							
$n = 3$	235656.3	136365.8	120103	119991.8	136038.1	119543.4	119715.1
$n = 4$	235660.7	136377.1	120099.6	119989.3	136019.9	119540.7	119710.3
$n = 5$	235658.2	136379.7	120096.3	119986.4	136016	119537.7	119706.4
$n = 6$	235657.7	136380.8	120095.9	119986	136015.2	119537.4	119705.8
$n = 7$	235657.2	136381.3	120095.5	119985.7	136014.9	119537	119705.2
$n = 8$	235659.3	136382.9	120102.9	119998	136016.1	119534.3	119697.6
$n = 9$	235598.7	136395.2	120130	120023.1	136025.1	119570.9	119733.3
$n = 10$	235581.5	136426.2	120162.2	120117.3	136014.9	119664.2	119832.8



**Fig. 2.** Comparison of specific mass shifts (in a.u.) for the ground state  $1s^2 \ ^1S_0$  with previous works MCDF [36], MCHF [36], Drake [9].

oscillator strengths and all radiative transitions show a good agreement with other published results from the literature. In addition, we have obtained some new data for the hyperfine structure constants, Landé  $g_j$  factors and isotope shifts for this ion. The present data sets are believed to be the most comprehensive and accurate ones to date for *Xe LIII*. Our results are expected to be useful for many applications such as controlled thermonuclear fusion, laser and plasma physics as well as astrophysics.

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## Explanation of Tables

<b>Table 1.</b>	<b>Energies (<math>E</math> in <math>\text{cm}^{-1}</math>) relative to the ground state for the lowest 97 levels arising from the <math>1s^2</math> and <math>1snl</math> with <math>n = 2-7</math> configurations of Xe LIII. Two calculations are performed using FAC and GRASP2K and compared with data from NIST database. The GRASP1, GRASP2 and GRASP3 are determined respectively with increasing the active set (AS) up to <math>n = 8</math>, <math>n = 9</math> and <math>n = 10</math>. The last two columns denote the lifetimes (in <math>\text{s}^{-1}</math>) obtained from our FAC and GRASP2K calculations.</b>
Configuration	Configuration of energy level
Level	Configuration of energy level
FAC	Energy levels calculated with the FAC code
GRASP1	Energy levels calculated with the GRASP2K code up to $n = 8$
GRASP2	Energy levels calculated with the GRASP2K code up to $n = 9$
GRASP3	Energy levels calculated with the GRASP2K code up to $n = 10$
NIST	Energy levels compiled by the NIST database
Lifetimes (GRASP2K)	compilation or from current literature
Lifetimes (FAC)	Lifetimes calculated with the FAC code
Lifetimes (GRASP2K)	Lifetimes calculated with the GRASP2K code
<b>Table 2.</b>	<b>Calculated values using the GRASP2K code of the composition in LSJ coupling for all levels of interest with increasing the active set to <math>n = 10</math> (GRASP3).</b>
Level	Configuration of the level of energy
Composition in LSJ coupling	Composition in LSJ coupling for each level of energy
<b>Table 3.</b>	<b>Electric dipole transitions <math>E1</math> calculated with GRASP2K and FAC for all <math>n = 1-7</math> configurations. For the GRASP2K calculation, the active set is expanded to <math>n = 10</math> (GRASP3) and only the length form is considered. A comparison between the wavelengths, weighted oscillator strengths and transition probabilities is given. The relative difference between transition rates in the velocity and length gauge is given in the last column by <math>dT</math>.</b>
Lower	Lower state of energy
Upper	Upper state of energy
$\lambda$ (Å)	Wavelengths calculated with the GRASP2K and FAC codes
$gf$	Weighted oscillator strengths calculated with the GRASP2K and FAC codes
$A$ ( $\text{s}^{-1}$ )	Electric dipole transitions $E1$ calculated with the GRASP2K and FAC codes
$dT$	Uncertainty between the transition rates in the velocity and length gauge
<b>Table 4.</b>	<b>Electric quadrupole transitions <math>E2</math> calculated with GRASP2K and FAC for all <math>n = 1-7</math> configurations. For the GRASP2K calculation, the active set is expanded to <math>n = 10</math> (GRASP3) and only the length form is considered. A comparison between the wavelengths, weighted oscillator strengths and transition probabilities is given. The relative difference between transition probabilities in the velocity and length gauge is given in the last column by <math>dT</math>.</b>
Lower	Lower state of energy
Upper	Upper state of energy
$\lambda$ (Å)	Wavelengths calculated with the GRASP2K and FAC codes
$gf$	Weighted oscillator strengths calculated with the GRASP2K and FAC codes
$A$ ( $\text{s}^{-1}$ )	Electric dipole transitions $E2$ calculated with the GRASP2K and FAC codes
$dT$	Uncertainty between the transition rates in the velocity and length gauge
<b>Table 5.</b>	<b>Magnetic dipole transitions <math>M1</math> calculated with GRASP2K and FAC for all <math>n = 1-7</math> configurations. For the GRASP2K calculation, the active set is expanded to <math>n = 10</math> (GRASP3) and only the length form is considered. A comparison between the wavelengths, weighted oscillator strengths and transition probabilities is given.</b>
Lower	Lower state of energy
Upper	Upper state of energy
$\lambda$ (Å)	Wavelengths calculated with the GRASP2K and FAC codes
$gf$	Weighted oscillator strengths calculated with the GRASP2K and FAC codes
$A$ ( $\text{s}^{-1}$ )	Electric dipole transitions $E1$ calculated with the GRASP2K and FAC codes
<b>Table 6.</b>	<b>Magnetic quadrupole transitions <math>M2</math> calculated with GRASP2K and FAC for all <math>n = 1-7</math> configurations. For the GRASP2K calculation, the active set is expanded to <math>n = 10</math> (GRASP3) and only the length form is considered. A comparison between the wavelengths, weighted oscillator strengths and transition probabilities is given.</b>
Lower	Lower state of energy
Upper	Upper state of energy
$\lambda$ (Å)	Wavelengths calculated with the GRASP2K and FAC codes
$gf$	Weighted oscillator strengths calculated with the GRASP2K and FAC codes
$A$ ( $\text{s}^{-1}$ )	Electric dipole transitions $E1$ calculated with the GRASP2K and FAC codes
<b>Table 7.</b>	<b>Calculated values using the GRASP2K code of the magnetic dipole <math>A</math>, electric quadrupole <math>B</math> and Landé <math>g</math>-factors for all levels of interest. For this calculation, the active set expanded to <math>n = 10</math> (GRASP3) has been considered.</b>
Configuration	Configuration of the level of energy
$A$ (MHz)	Magnetic dipole $A$
$B$ (MHz)	Electric quadrupole $B$
$g_j$	Landé $g$ -factors
<b>Table 8.</b>	<b>Calculated values using the GRASP2K code of normal, specific mass shifts and electron densities at the nucleus for the all singly excited levels up to <math>n = 7</math> with increasing the active set to <math>n = 10</math> (GRASP3).</b>
Index	Index of the level of energy
Configuration	Configuration of the level of energy
$K_{NMS}$	Normal mass shifts
$K_{SMS}$	Specific mass shifts
Electron densities at the nucleus	Electron densities at the nucleus

**Table 1**

Energies ( $E$  in  $\text{cm}^{-1}$ ) relative to the ground state for the lowest 97 levels arising from the  $1s^2$  and  $1snl$  with  $n = 2-7$  configurations of Xe *LIII*. Two calculations are performed using FAC and GRASP2K and compared with data from NIST database. The GRASP1, GRASP2 and GRASP3 are determined respectively with increasing the active set (AS) up to  $n = 8$ ,  $n = 9$  and  $n = 10$ . The last two columns denote the lifetimes (in  $\text{s}^{-1}$ ) obtained from our FAC and GRASP2K calculations.

Configuration	Level	FAC	GRASP1	GRASP2	GRASP3	NIST	Lifetimes (FAC)	Lifetimes (GRASP2K)
$1s^2$	$^1S_0$	0	0	0	0	0		
$1s2s$	$^3S_1$	242981032	242992840	242996188	242999633	243004900	2.6569E-12	2.6101E-12
$1s2p$	$^3P_0$	243610281	243619151	243620649	243622562	243626600	3.3975E-16	3.3084E-16
$1s2p$	$^3P_1$	243656320	243667841	243669210	243670879	243674700	5.7419E-10	5.8607E-10
$1s2s$	$^1S_0$	243677020	243680822	243683119	243685687	243691200	6.5427E-07	7.6560E-07
$1s2p$	$^3P_2$	246740070	246751551	246753838	246756598	246756600	3.2404E-13	3.4703E-13
$1s2p$	$^1P_1$	247026227	247036525	247037250	247038566	247044900	1.3777E-16	1.4814E-16
$1s3s$	$^3S_1$	288924950	288935786	288939203	288942662		1.4006E-14	1.3954E-14
$1s3p$	$^3P_0$	2890965210	289106563	289109120	289112287		1.0612E-15	1.0241E-15
$1s3s$	$^1S_0$	289108182	289117871	289120773	289123953		1.4184E-14	1.4470E-14
$1s3p$	$^3P_1$	289107415	289119367	289121868	289124969		4.9927E-15	5.1073E-15
$1s3p$	$^3P_2$	290026737	290038530	290041366	290044705		5.7548E-15	5.9395E-15
$1s3d$	$^3D_2$	290093250	290105217	290108667	290112235		1.8090E-15	1.8193E-15
$1s3d$	$^3D_1$	290105192	290117231	290120677	290124145		1.8379E-15	1.8516E-15
$1s3p$	$^1P_0$	290107569	290119473	290121577	290124581		4.6643E-16	4.9660E-16
$1s3d$	$^3D_3$	290385275	290397902	290401352	290404821	290413200	1.9104E-15	1.9570E-15
$1s3d$	$^1D_2$	290396539	290409015	290412465	290415933		1.8837E-15	1.9162E-15
$1s4s$	$^3S_1$	304797684	304810015	304813454	304816918		2.0732E-14	2.0635E-14
$1s4p$	$^3P_0$	304866150	304879429	304882766	304886176		2.4379E-15	2.3464E-15
$1s4s$	$^1S_0$	304871588	304883666	304886805	304890134		2.0958E-14	2.1245E-14
$1s4p$	$^3P_1$	304871052	304884541	304887868	304891257		8.6891E-15	8.7915E-15
$1s4p$	$^3P_2$	305258024	305271468	305274839	305278274		9.7044E-15	9.9498E-15
$1s4d$	$^3D_2$	305287622	305299503	305302961	305306431		4.1830E-15	4.1928E-15
$1s4d$	$^3D_1$	305292454	305304374	305307831	305311301		4.2748E-15	4.2838E-15
$1s4p$	$^1P_1$	305291458	305304769	305307957	305311348		1.1013E-15	1.1689E-15
$1s4d$	$^3D_3$	305410833	305423127	305426585	305430056		4.4651E-15	4.5484E-15
$1s4f$	$^3F_3$	305411941	305425949	305428640	305431982		8.8845E-15	8.9144E-15
$1s4f$	$^3F_2$	305414511	305428553	305431218	305434552		8.8976E-15	8.9207E-15
$1s4d$	$^1D_2$	305415952	305428167	305431625	305435095		4.3461E-15	4.4234E-15
$1s4f$	$^3F_4$	305472935	305486462	305489675	305493125		9.0070E-15	9.0807E-15
$1s4f$	$^1F_3$	305474843	305488377	305491581	305495030		9.0252E-15	9.0870E-15
$1s5s$	$^3S_1$	312072452	312085468	312088918	312092385		3.2951E-14	3.2811E-14
$1s5p$	$^3P_0$	312106783	312120509	312123852	312127291		4.6828E-15	4.5019E-15
$1s5s$	$^1S_0$	312109421	312122408	312125671	312129058		3.3281E-14	3.3582E-14
$1s5p$	$^3P_1$	312109229	312123048	312126394	312129823		1.4960E-14	1.5067E-14
$1s5p$	$^3P_2$	312306662	312320496	312323875	312327320		1.6453E-14	1.6819E-14
$1s5d$	$^3D_2$	312322459	312334715	312338177	312341649		8.0273E-15	8.0351E-15
$1s5p$	$^1P_0$	312323602	312337225	312340644	312344087		2.1439E-15	2.2719E-15
$1s5d$	$^3D_1$	312324883	312337162	312340623	312344095		8.2220E-15	8.2189E-15
$1s5d$	$^3D_3$	312385482	312397978	312401440	312404912		8.6074E-15	8.7460E-15
$1s5f$	$^3F_3$	312385818	312400664	312402591	312405985		1.7108E-14	1.7138E-14
$1s5f$	$^3F_2$	312387134	312402027	312403912	312407300		1.7127E-14	1.7149E-14
$1s5d$	$^1D_2$	312388183	312400635	312404097	312407568		8.3320E-15	8.4797E-15
$1s5f$	$^3F_4$	312417093	312430652	312433874	312437344		1.7355E-14	1.7476E-14
$1s5g$	$^3G_4$	312417177	312430463	312433929	312437402		2.9246E-14	2.9310E-14
$1s5g$	$^3G_3$	312417930	312431215	312434682	312438155		2.9267E-14	2.9320E-14
$1s5f$	$^1F_3$	312418079	312431645	312434859	312438328		1.7385E-14	1.7489E-14
$1s5g$	$^3G_5$	312435809	312449135	312452602	312456074		2.9431E-14	2.9553E-14
$1s5g$	$^1G_4$	312436404	312449730	312453197	312456669		2.9447E-14	2.9560E-14
$1s6s$	$^3S_1$	315993781	316009270	316012725	316016194		5.0842E-14	5.0676E-14
$1s6p$	$^3P_0$	316015359	316030311	316032803	316036253		8.2030E-15	7.6967E-15
$1s6s$	$^1S_0$	316011643	316030412	316033745	316037162		5.1360E-14	5.1446E-14
$1s6p$	$^3P_1$	316011594	316031770	316034252	316037693		2.4183E-14	2.4286E-14
$1s6p$	$^3P_2$	316130593	316145514	316148194	316151654		2.6341E-14	2.6886E-14
$1s6d$	$^3D_2$	316140922	316152973	316156437	316159909		1.4049E-14	1.3705E-14
$1s6p$	$^1P_1$	316139182	316155139	316157859	316161294		3.6568E-15	3.9123E-15
$1s6d$	$^3D_1$	316140582	316154374	316157837	316161309		1.3703E-14	1.4021E-14
$1s6d$	$^3D_3$	316177189	316189550	316193014	316196486		1.4721E-14	1.4943E-14
$1s6f$	$^3F_3$	316177224	316192482	316193664	316197135		2.9214E-14	2.9210E-14
$1s6f$	$^3F_2$	316177216	316193297	316194426	316197896		2.9180E-14	2.9224E-14
$1s6d$	$^1D_2$	316177743	316191110	316194574	316198045		1.4208E-14	1.4457E-14
$1s6f$	$^3F_4$	316195254	316208405	316211819	316215291		2.9614E-14	2.9805E-14
$1s6g$	$^3G_4$	316195229	316208388	316211855	316215327		5.0068E-14	5.0144E-14
$1s6g$	$^3G_3$	316195229	316208825	316212291	316215764		5.0109E-14	5.0158E-14
$1s6f$	$^1F_3$	316195267	316208980	316212392	316215864		2.9665E-14	2.9824E-14
$1s6g$	$^3G_5$	316205987	316219204	316222671	316226143		5.0397E-14	5.0581E-14
$1s6h$	$^3H_5$	316205987	316219251	316222682	316226155		7.6145E-14	7.6271E-14
$1s6h$	$^3H_4$	316205987	316219534	316222964	316226437		7.6189E-14	7.6284E-14
$1s6g$	$^1G_4$	316205987	316219549	316223016	316226488		5.0429E-14	5.0591E-14
$1s6h$	$^3H_6$	316213134	316226435	316229866	316233339		7.6403E-14	7.6606E-14

(continued on next page)

Table 1 (continued)

Configuration	Level	FAC	GRASP1	GRASP2	GRASP3	NIST	Lifetimes (FAC)	Lifetimes (GRASP2K)
1s6h	$^1H_5^0$	316213134	316226670	316230099	316233572		7.6438E-14	7.6616E-14
1s7s	$^3S_1$	318347824	318362488	318365947	318369417		7.5196E-14	7.5428E-14
1s7p	$^3P_1^0$	318361378	318379168	318379301	318382488		1.2935E-14	1.2034E-14
1s7s	$^1S_0$	318358961	318375742	318379117	318382551		7.5936E-14	7.4869E-14
1s7p	$^3P_0^0$	318359030	318380144	318380220	318383393		3.6841E-14	3.6655E-14
1s7p	$^3P_2^0$	318433740	318451061	318451711	318454952		3.9905E-14	4.0394E-14
1s7d	$^3D_2$	318440253	318452794	318456259	318459731		2.1567E-14	2.1568E-14
1s7d	$^3D_1$	318440035	318453670	318457135	318460607		2.2119E-14	2.2062E-14
1s7p	$^1P_1^0$	318439121	318457447	318457914	318461036		5.7984E-15	6.1365E-15
1s7d	$^3D_3$	318463080	318475804	318479269	318482741		2.3193E-14	2.3579E-14
1s7f	$^3F_3^0$	318463096	318479601	318479839	318483171		4.5885E-14	4.5872E-14
1s7f	$^3F_2^0$	318463090	318480145	318480317	318483651		4.5848E-14	4.5866E-14
1s7d	$^1D_2$	318463439	318476795	318480260	318483731		2.2348E-14	2.2705E-14
1s7f	$^3F_4^0$	318474448	318487999	318491154	318494599		4.6540E-14	4.6813E-14
1s7g	$^3G_4$	318474415	318487681	318491148	318494620		7.8748E-14	7.8818E-14
1s7g	$^3G_3$	318474415	318487956	318491423	318494895		7.8784E-14	7.8824E-14
1s7f	$^1F_3^0$	318474457	318488359	318491517	318494961		4.6606E-14	4.6830E-14
1s7g	$^3G_5$	318481193	318494494	318497961	318501433		7.9274E-14	7.9533E-14
1s7h	$^3H_5^0$	318481193	318494511	318497969	318501442		1.2015E-13	1.2028E-13
1s7h	$^3H_4^0$	318481192	318494689	318498147	318501620		1.2018E-13	1.2030E-13
1s7g	$^1G_4$	318481192	318494712	318498178	318501651		7.9303E-14	7.9537E-14
1s7h	$^3H_6^0$	318485697	318499038	318502496	318505969		1.2057E-13	1.2083E-13
1s7i	$^3I_6$	318485696	318499030	318502497	318505969		1.6971E-13	1.6989E-13
1s7i	$^3I_5$	318485696	318499155	318502621	318506094		1.6971E-13	1.6990E-13
1s7h	$^1H_5^0$	318485697	318499185	318502643	318506116		1.2059E-13	1.2084E-13
1s7i	$^3I_7$	318488907	318502254	318505721	318509193		1.7004E-13	1.7033E-13
1s7i	$^1I_6$	318488907	318502361	318505827	318509300		1.7004E-13	1.7034E-13

**Table 2**  
Calculated values using the GRASP2K code of the composition in LSJ coupling for all levels of interest with increasing the active set to  $n = 10$  (GRASP3).

Level	Composition in LSJ coupling
$1s^2 \ ^1S_0$	$1s^2 \ ^1S_0$ 99.98%
$1s 2s \ ^3S_1$	$1s 2s \ ^3S_1$ 99.98%
$1s 2s \ ^1S_0$	$1s 2s \ ^1S_0$ 99.94%
$1s 2p \ ^3P_1^0$	$1s 2p \ ^3P_1^0$ 70.31% + $1s 2p \ ^1P_1^0$ 29.64%
$1s 2p \ ^3P_2^0$	$1s 2p \ ^3P_2^0$ 99.97%
$1s 2p \ ^3P_0^0$	$1s 2p \ ^3P_0^0$ 99.96%
$1s 2p \ ^1P_1^0$	$1s 2p \ ^1P_1^0$ 70.29% + $1s 2p \ ^3P_1^0$ 29.65%
$1s 3s \ ^3S_1$	$1s 3s \ ^3S_1$ 99.95%
$1s 3s \ ^1S_0$	$1s 3s \ ^1S_0$ 99.88%
$1s 3p \ ^3P_1^0$	$1s 3p \ ^3P_1^0$ 70.04% + $1s 3p \ ^1P_1^0$ 29.84%
$1s 3p \ ^3P_2^0$	$1s 3p \ ^3P_2^0$ 99.90%
$1s 3p \ ^3P_0^0$	$1s 3p \ ^3P_0^0$ 99.88%
$1s 3d \ ^3D_2$	$1s 3d \ ^3D_2$ 60.30% + $1s 3d \ ^1D_2$ 39.67%
$1s 3d \ ^3D_1$	$1s 3d \ ^3D_1$ 99.97%
$1s 3p \ ^1P_1^0$	$1s 3p \ ^1P_1^0$ 70.01% + $1s 3p \ ^3P_1^0$ 29.85%
$1s 3d \ ^3D_3$	$1s 3d \ ^3D_3$ 99.90%
$1s 3d \ ^1D_2$	$1s 3d \ ^1D_2$ 60.26% + $1s 3d \ ^3D_2$ 39.64%
$1s 4s \ ^3S_1$	$1s 4s \ ^3S_1$ 99.90%
$1s 4s \ ^1S_0$	$1s 4s \ ^1S_0$ 99.81%
$1s 4p \ ^3P_1^0$	$1s 4p \ ^3P_1^0$ 69.90% + $1s 4p \ ^1P_1^0$ 29.88%
$1s 4p \ ^3P_0^0$	$1s 4p \ ^3P_0^0$ 99.77% + $1s 5p \ ^3P_0^0$ 00.10%
$1s 4p \ ^3P_2^0$	$1s 4p \ ^3P_2^0$ 99.81%
$1s 4d \ ^3D_2$	$1s 4d \ ^3D_2$ 60.45% + $1s 4d \ ^1D_2$ 39.45%
$1s 4d \ ^3D_1$	$1s 4d \ ^3D_1$ 99.90%
$1s 4p \ ^1P_1^0$	$1s 4p \ ^1P_1^0$ 69.86% + $1s 4p \ ^3P_1^0$ 29.89%
$1s 4d \ ^3D_3$	$1s 4d \ ^3D_3$ 99.82%
$1s 4d \ ^3D_1$	$1s 4d \ ^3D_1$ 99.90%
$1s 4f \ ^3F_3^0$	$1s 4f \ ^3F_3^0$ 56.88% + $1s 4f \ ^1F_3^0$ 43.04%
$1s 4f \ ^3F_2^0$	$1s 4f \ ^3F_2^0$ 99.93%
$1s 4d \ ^1D_2$	$1s 4d \ ^1D_2$ 60.39% + $1s 4d \ ^3D_2$ 39.42%
$1s 4f \ ^3F_4^0$	$1s 4f \ ^3F_4^0$ 99.93%
$1s 4f \ ^1F_3^0$	$1s 4f \ ^1F_3^0$ 56.88% + $1s 4f \ ^3F_3^0$ 43.04%
$1s 5s \ ^3S_1$	$1s 5s \ ^3S_1$ 99.84%
$1s 5s \ ^1S_0$	$1s 5s \ ^1S_0$ 99.74% + $1s 6s \ ^1S_0^0$ 00.13%
$1s 5p \ ^3P_1^0$	$1s 5p \ ^3P_1^0$ 69.79% + $1s 5p \ ^1P_1^0$ 29.87%
$1s 5p \ ^3P_2^0$	$1s 5p \ ^3P_2^0$ 99.71% + $1s 6p \ ^3P_2^0$ 00.13%
$1s 5d \ ^3D_2$	$1s 5d \ ^3D_2$ 60.48% + $1s 5d \ ^1D_2$ 39.34%
$1s 5p \ ^1P_1^0$	$1s 5p \ ^1P_1^0$ 69.74% + $1s 5p \ ^3P_1^0$ 29.89% + $1s 6p \ ^1P_1^0$ 00.11%
$1s 5p \ ^3P_0^0$	$1s 5p \ ^3P_0^0$ 99.66% + $1s 6p \ ^3P_0^0$ 00.15%
$1s 5d \ ^3D_1$	$1s 5d \ ^3D_1$ 99.82%
$1s 5d \ ^3D_3$	$1s 5d \ ^3D_3$ 99.79%
$1s 5f \ ^3F_3^0$	$1s 5f \ ^3F_3^0$ 56.83% + $1s 5f \ ^1F_3^0$ 42.98%
$1s 5f \ ^3F_2^0$	$1s 5f \ ^3F_2^0$ 99.81% + $1s 6f \ ^3F_2^0$ 00.10%
$1s 5d \ ^1D_2$	$1s 5d \ ^1D_2$ 60.45% + $1s 5d \ ^3D_2$ 39.32%
$1s 5f \ ^3F_4^0$	$1s 5f \ ^3F_4^0$ 99.82%
$1s 5g \ ^3G_4$	$1s 5g \ ^3G_4$ 55.34% + $1s 5g \ ^1G_4$ 44.61%
$1s 5g \ ^3G_3$	$1s 5g \ ^3G_3$ 99.95%
$1s 5f \ ^1F_3^0$	$1s 5f \ ^1F_3^0$ 56.83% + $1s 5f \ ^3F_3^0$ 42.98%
$1s 5g \ ^3G_5$	$1s 5g \ ^3G_5$ 99.90%
$1s 5g \ ^1G_4$	$1s 5g \ ^1G_4$ 55.31% + $1s 5g \ ^3G_4$ 44.59%
$1s 6s \ ^3S_1$	$1s 6s \ ^3S_1$ 99.79% + $1s 7s \ ^3S_1$ 00.11%
$1s 6s \ ^1S_0$	$1s 6s \ ^1S_0$ 99.68% + $1s 7s \ ^1S_0$ 00.16% + $1s 5s \ ^1S_0$ 00.12%
$1s 6p \ ^3P_1^0$	$1s 6p \ ^3P_1^0$ 69.70% + $1s 6p \ ^1P_1^0$ 29.85% + $1s 7p \ ^3P_1^0$ 00.12%
$1s 6p \ ^3P_0^0$	$1s 6p \ ^3P_0^0$ 99.54% + $1s 7p \ ^3P_0^0$ 00.19% + $1s 5p \ ^3P_0^0$ 00.13%
$1s 6p \ ^3P_2^0$	$1s 6p \ ^3P_2^0$ 99.60% + $1s 7p \ ^3P_2^0$ 00.17% + $1s 5p \ ^3P_2^0$ 00.12%
$1s 6d \ ^3D_2$	$1s 6d \ ^3D_2$ 60.48% + $1s 6d \ ^1D_2$ 39.27%
$1s 6p \ ^1P_1^0$	$1s 6p \ ^1P_1^0$ 69.64% + $1s 6p \ ^3P_1^0$ 29.88% + $1s 7p \ ^1P_1^0$ 00.15% + $1s 5p \ ^1P_1^0$ 00.10%
$1s 6d \ ^3D_1$	$1s 6d \ ^3D_1$ 99.75% + $1s 7d \ ^3D_1$ 00.13%
$1s 6d \ ^3D_3$	$1s 6d \ ^3D_3$ 99.76% + $1s 7d \ ^3D_3$ 00.12%
$1s 6f \ ^3F_3^0$	$1s 6f \ ^3F_3^0$ 56.77% + $1s 6f \ ^1F_3^0$ 42.92%
$1s 6f \ ^3F_2^0$	$1s 6f \ ^3F_2^0$ 99.69% + $1s 7f \ ^3F_2^0$ 00.14%
$1s 6d \ ^1D_2$	$1s 6d \ ^1D_2$ 60.48% + $1s 6d \ ^3D_2$ 39.27%
$1s 6f \ ^3F_4^0$	$1s 6f \ ^3F_4^0$ 99.70% + $1s 7f \ ^3F_4^0$ 00.14%
$1s 6g \ ^3G_4$	$1s 6g \ ^3G_4$ 55.29% + $1s 6g \ ^1G_4$ 44.57%
$1s 6g \ ^3G_3$	$1s 6g \ ^3G_3$ 99.87%
$1s 6f \ ^1F_3^0$	$1s 6f \ ^1F_3^0$ 56.77% + $1s 6f \ ^3F_3^0$ 42.92%
$1s 6g \ ^3G_5$	$1s 6g \ ^3G_5$ 99.84%
$1s 6h \ ^3H_5^0$	$1s 6h \ ^3H_5^0$ 54.35% + $1s 6h \ ^1H_5^0$ 45.57%
$1s 6h \ ^3H_4^0$	$1s 6h \ ^3H_4^0$ 99.93%
$1s 6g \ ^1G_4$	$1s 6g \ ^1G_4$ 55.28% + $1s 6g \ ^3G_4$ 44.56%
$1s 6h \ ^3H_6^0$	$1s 6h \ ^3H_6^0$ 99.93%

(continued on next page)

Table 2 (continued)

Level	Composition in LSJ coupling
1s 6h $^1H_5^0$	1s 6h $^1H_5^0$ 54.35% + 1s 6h $^3H_5^0$ 45.57%
1s 7s $^3S_1$	1s 7s $^3S_1$ 99.86% + 1s 6s $^3S_1$ 00.10%
1s 7s $^1S_0$	1s 7s $^1S_0$ 99.80% + 1s 6s $^1S_0$ 00.15%
1s 7p $^3P_1^0$	1s 7p $^3P_1^0$ 69.68% + 1s 7p $^1P_1^0$ 29.83% + 1s 6p $^3P_1^0$ 00.11%
1s 7p $^3P_2^0$	1s 7p $^3P_2^0$ 99.57% + 1s 6p $^3P_2^0$ 00.15%
1s 7p $^3P_0^0$	1s 7p $^3P_0^0$ 99.51% + 1s 6p $^3P_0^0$ 00.17%
1s 7d $^3D_2$	1s 7d $^3D_2$ 60.56% + 1s 7d $^1D_2$ 39.28%
1s 7d $^3D_1$	1s 7d $^3D_1$ 99.84% + 1s 6d $^3D_1$ 00.13%
1s 7p $^1P_1^0$	1s 7p $^1P_1^0$ 69.63% + 1s 7p $^3P_1^0$ 29.86% + 1s 6p $^1P_1^0$ 00.13%
1s 7d $^3D_3$	1s 7d $^3D_3$ 99.84% + 1s 6d $^3D_3$ 00.12%
1s 7f $^3F_3^0$	1s 7f $^3F_3^0$ 56.72% + 1s 7f $^1F_3^0$ 42.87%
1s 7f $^3F_2^0$	1s 7f $^3F_2^0$ 99.58% + 1s 6f $^3F_2^0$ 00.13%
1s 7d $^1D_2$	1s 7d $^1D_2$ 60.56% + 1s 7d $^3D_2$ 39.28%
1s 7f $^3F_4^0$	1s 7f $^3F_4^0$ 99.59% + 1s 6f $^3F_4^0$ 00.13%
1s 7g $^3G_4$	1s 7g $^3G_4$ 55.31% + 1s 7g $^1G_4$ 44.59%
1s 7g $^3G_3$	1s 7g $^3G_3$ 99.91%
1s 7f $^1F_3^0$	1s 7f $^1F_3^0$ 56.72% + 1s 7f $^3F_3^0$ 42.87%
1s 7g $^3G_5$	1s 7g $^3G_5$ 99.91%
1s 7h $^3H_5^0$	1s 7h $^3H_5^0$ 54.29% + 1s 7h $^1H_5^0$ 45.52%
1s 7h $^3H_4^0$	1s 7h $^3H_4^0$ 99.81%
1s 7g $^1G_4$	1s 7g $^1G_4$ 55.32% + 1s 7g $^3G_4$ 44.59%
1s 7h $^3H_6^0$	1s 7h $^3H_6^0$ 99.81%
1s 7i $^3I_6$	1s 7i $^3I_6$ 53.71% + 1s 7i $^1I_6$ 46.28%
1s 7i $^3I_5$	1s 7i $^3I_5$ 99.99%
1s 7h $^1H_5^0$	1s 7h $^1H_5^0$ 54.29% + 1s 7h $^3H_5^0$ 45.52%
1s 7i $^3I_7$	1s 7i $^3I_7$ 99.99%
1s 7i $^1I_6$	1s 7i $^1I_6$ 53.71% + 1s 7i $^3I_6$ 46.28%

**Table 3**

Electric dipole transitions  $E1$  calculated with GRASP2K and FAC for all  $n = 1-7$  configurations. For the GRASP2K calculation, the active set is expanded to  $n = 10$  (GRASP3) and only the length form is considered. A comparison between the wavelengths, weighted oscillator strengths and transition probabilities is given. The relative difference between transition rates in the velocity and length gauge is given in the last column by  $dT$ .

Lower	Upper	GRASP2K			FAC			$dT$
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	
1s <sup>2</sup> 1S <sub>0</sub>	1s2p 3P <sub>1</sub> <sup>o</sup>	4.1040E-01	2.290E-01	3.023E+15	4.0874E-01	2.230E-01	2.943E+15	0.010
1s2s 3S <sub>1</sub>	1s2p 3P <sub>0</sub> <sup>o</sup>	1.6053E+02	1.112E-02	9.593E+08	1.5824E+02	1.129E-02	9.944E+08	0.193
1s2s 3S <sub>1</sub>	1s2p 3P <sub>0</sub> <sup>o</sup>	1.4898E+02	5.677E-03	1.706E+09	1.4745E+02	5.725E-03	1.741E+09	0.139
1s2p 3P <sub>0</sub> <sup>o</sup>	1s2s 1S <sub>0</sub>	1.5842E+03	4.752E-04	1.263E+06	1.4920E+03	4.997E-04	1.484E+06	0.365
1s2s 3S <sub>1</sub>	1s2p 3P <sub>2</sub> <sup>o</sup>	2.6617E+01	1.713E-01	3.226E+11	2.6489E+01	1.725E-01	3.252E+11	0.028
1s <sup>2</sup> 1S <sub>0</sub>	1s2p 1P <sub>1</sub> <sup>o</sup>	4.0470E-01	4.975E-01	6.750E+15	4.0309E-01	5.349E-01	7.257E+15	0.001
1s2s 3S <sub>1</sub>	1s2p 1P <sub>1</sub> <sup>o</sup>	2.4759E+01	3.299E-02	1.196E+11	2.4615E+01	3.310E-02	1.204E+11	0.014
1s2s 1S <sub>0</sub>	1s2p 1P <sub>1</sub> <sup>o</sup>	2.9825E+01	6.507E-02	1.626E+11	2.9731E+01	6.480E-02	1.616E+11	0.019
1s2p 3P <sub>0</sub> <sup>o</sup>	1s3s 3S <sub>1</sub>	2.2065E+00	3.037E-02	1.387E+13	2.1974E+00	3.067E-02	1.400E+13	0.001
1s2p 3P <sub>0</sub> <sup>o</sup>	1s3s 3S <sub>1</sub>	2.2089E+00	1.488E-02	6.779E+12	2.1996E+00	1.466E-02	6.681E+12	0.001
1s2p 3P <sub>0</sub> <sup>o</sup>	1s3s 3S <sub>1</sub>	2.3705E+00	1.089E-01	4.309E+13	2.3604E+00	1.085E-01	4.294E+13	0.000
1s2p 1P <sub>1</sub> <sup>o</sup>	1s3s 3S <sub>1</sub>	2.3864E+00	1.988E-02	7.761E+12	2.3765E+00	1.946E-02	7.596E+12	0.002
1s <sup>2</sup> 1S <sub>0</sub>	1s3p 3P <sub>1</sub> <sup>o</sup>	3.4580E-01	4.196E-02	7.798E+14	3.4443E-01	4.008E-02	7.449E+14	0.015
1s2s 3S <sub>1</sub>	1s3p 3P <sub>0</sub> <sup>o</sup>	2.1686E+00	2.902E-01	1.372E+14	2.1593E+00	2.946E-01	1.393E+14	0.003
1s2s 1S <sub>0</sub>	1s3p 3P <sub>0</sub> <sup>o</sup>	2.2014E+00	1.285E-01	5.894E+13	2.1924E+00	1.253E-01	5.750E+13	0.006
1s3s 3S <sub>1</sub>	1s3p 3P <sub>0</sub> <sup>o</sup>	5.8954E+02	1.889E-02	1.208E+08	5.8484E+02	1.901E-02	1.225E+08	0.179
1s2p 3P <sub>0</sub> <sup>o</sup>	1s3s 3S <sub>1</sub>	2.1977E+00	1.194E-02	1.649E+13	2.1885E+00	1.243E-02	1.717E+13	0.005
1s2p 1P <sub>1</sub> <sup>o</sup>	1s3s 1S <sub>0</sub>	2.3761E+00	4.454E-02	5.262E+13	2.3662E+00	4.514E-02	5.332E+13	0.002
1s3p 3P <sub>0</sub> <sup>o</sup>	1s3s 3S <sub>0</sub>	8.5719E+03	5.545E-04	5.034E+04	7.6765E+03	6.142E-04	6.893E+04	1.000
1s2s 3S <sub>1</sub>	1s3p 3P <sub>0</sub> <sup>o</sup>	2.1680E+00	1.376E-01	1.953E+14	2.1587E+00	1.407E-01	1.997E+14	0.003
1s3s 3S <sub>1</sub>	1s3p 3P <sub>0</sub> <sup>o</sup>	5.4853E+02	9.695E-03	2.149E+08	5.4572E+02	9.712E-03	2.156E+08	0.148
1s2s 3S <sub>1</sub>	1s3p 3P <sub>2</sub> <sup>o</sup>	2.1256E+00	5.650E-01	1.668E+14	2.1165E+00	5.828E-01	1.721E+14	0.003
1s3s 3S <sub>1</sub>	1s3p 3P <sub>2</sub> <sup>o</sup>	9.0741E+01	3.059E-01	4.957E+10	9.0375E+01	3.069E-01	4.970E+10	0.026
1s2p 3P <sub>1</sub> <sup>o</sup>	1s3d 3D <sub>2</sub>	2.1510E+00	1.556E+00	4.485E+14	2.1422E+00	1.568E+00	4.520E+14	0.001
1s2p 3P <sub>1</sub> <sup>o</sup>	1s3d 3D <sub>2</sub>	2.3065E+00	3.054E-01	7.659E+13	2.2968E+00	3.049E-01	7.645E+13	0.001
1s2p 1P <sub>1</sub> <sup>o</sup>	1s3d 3D <sub>2</sub>	2.3216E+00	5.348E-02	1.324E+13	2.3121E+00	5.146E-02	1.273E+13	0.002
1s3p 3P <sub>0</sub> <sup>o</sup>	1s3d 3D <sub>2</sub>	1.0002E+02	1.760E-01	2.348E+10	9.9770E+01	1.757E-01	2.335E+10	0.002
1s3p 3P <sub>0</sub> <sup>o</sup>	1s3d 3D <sub>2</sub>	1.4830E+03	2.141E-03	1.298E+06				0.003
1s2p 3P <sub>1</sub> <sup>o</sup>	1s3d 3D <sub>1</sub>	2.1505E+00	3.325E-01	1.598E+14	2.1416E+00	3.373E-01	1.621E+14	0.001
1s2p 3P <sub>0</sub> <sup>o</sup>	1s3d 3D <sub>1</sub>	2.1527E+00	6.302E-01	3.024E+14	2.1437E+00	6.350E-01	3.046E+14	0.001
1s2p 3P <sub>2</sub> <sup>o</sup>	1s3d 3D <sub>1</sub>	2.3059E+00	3.362E-02	1.406E+13	2.2962E+00	3.352E-02	1.401E+13	0.001
1s2p 1P <sub>1</sub> <sup>o</sup>	1s3d 3D <sub>1</sub>	2.3210E+00	1.511E-01	6.236E+13	2.3114E+00	1.497E-01	6.179E+13	0.002
1s3p 3P <sub>0</sub> <sup>o</sup>	1s3d 3D <sub>1</sub>	9.8828E+01	3.812E-02	8.679E+09	9.8590E+01	3.804E-02	8.628E+09	0.006
1s3p 3P <sub>0</sub> <sup>o</sup>	1s3d 3D <sub>1</sub>	1.0008E+02	7.109E-02	1.578E+10	9.9796E+01	7.095E-02	1.570E+10	0.006
1s3p 3P <sub>0</sub> <sup>o</sup>	1s3d 3D <sub>1</sub>	1.2588E+03	2.725E-04	3.823E+05				0.053
1s <sup>2</sup> 1S <sub>0</sub>	1s3p 3P <sub>1</sub> <sup>o</sup>	3.4460E-01	9.869E-02	1.847E+15	3.4323E-01	1.055E-01	1.975E+15	0.020
1s2s 3S <sub>1</sub>	1s3p 1P <sub>1</sub> <sup>o</sup>	2.1220E+00	9.943E-02	4.910E+13	2.1129E+00	1.031E-01	5.095E+13	0.004
1s2s 1S <sub>0</sub>	1s3p 3P <sub>0</sub> <sup>o</sup>	2.1534E+00	2.439E-01	1.170E+14	2.1446E+00	2.435E-01	1.167E+14	0.004
1s3s 3S <sub>1</sub>	1s3p 1P <sub>1</sub> <sup>o</sup>	8.4608E+01	5.893E-02	1.830E+10	8.4198E+01	5.901E-02	1.835E+10	0.020
1s3s 1S <sub>0</sub>	1s3p 1P <sub>1</sub> <sup>o</sup>	9.9937E+01	1.175E-01	2.616E+10	9.9635E+01	1.170E-01	2.599E+10	0.026
1s3d 3D <sub>2</sub>	1s3p 1P <sub>1</sub> <sup>o</sup>	8.0349E+03	6.680E-05	2.301E+03				0.383
1s3d 3D <sub>1</sub>	1s3p 1P <sub>1</sub> <sup>o</sup>	2.2947E+05	6.878E-06	2.904E-01				0.978
1s2p 3P <sub>2</sub> <sup>o</sup>	1s3d 3D <sub>3</sub>	2.2910E+00	2.807E+00	5.095E+14	2.2814E+00	2.875E+00	5.219E+14	0.001
1s3p 3P <sub>2</sub> <sup>o</sup>	1s3d 3D <sub>3</sub>	2.7769E+02	1.088E-01	1.345E+09	2.7772E+02	1.082E-01	1.326E+09	0.004
1s2p 3P <sub>0</sub> <sup>o</sup>	1s3d 1D <sub>2</sub>	2.1371E+00	2.237E-03	6.534E+11	2.1283E+00	2.733E-03	7.982E+11	0.001
1s2p 3P <sub>2</sub> <sup>o</sup>	1s3d 1D <sub>2</sub>	2.2905E+00	1.988E-01	5.056E+13	2.2809E+00	2.036E-01	5.177E+13	0.001
1s2p 1P <sub>1</sub> <sup>o</sup>	1s3d 1D <sub>2</sub>	2.3053E+00	1.814E+00	4.553E+14	2.2959E+00	1.836E+00	4.607E+14	0.001
1s3p 3P <sub>1</sub> <sup>o</sup>	1s3d 1D <sub>2</sub>	7.6708E+01	2.981E-04	6.759E+07	7.6517E+01	2.967E-04	6.704E+07	0.000
1s3p 3P <sub>2</sub> <sup>o</sup>	1s3d 1D <sub>2</sub>	2.6938E+02	7.955E-03	1.463E+08	2.6926E+02	7.908E-03	1.442E+08	0.018
1s3p 1P <sub>1</sub> <sup>o</sup>	1s3d 1D <sub>2</sub>	3.4323E+02	5.654E-02	6.403E+08	3.4458E+02	5.610E-02	6.249E+08	0.015
1s2p 3P <sub>1</sub> <sup>o</sup>	1s4s 3S <sub>1</sub>	1.6341E+00	6.721E-03	5.596E+12	1.6274E+00	6.812E-03	5.671E+12	0.003
1s2p 3P <sub>0</sub> <sup>o</sup>	1s4s 3S <sub>1</sub>	1.6354E+00	3.290E-03	2.735E+12	1.6286E+00	3.273E-03	2.721E+12	0.000
1s2p 3P <sub>2</sub> <sup>o</sup>	1s4s 3S <sub>1</sub>	1.7223E+00	2.273E-02	1.703E+13	1.7151E+00	2.261E-02	1.694E+13	0.001
1s2p 1P <sub>1</sub> <sup>o</sup>	1s4s 3S <sub>1</sub>	1.7308E+00	4.129E-03	3.065E+12	1.7236E+00	4.044E-03	3.001E+12	0.002
1s3p 3P <sub>0</sub> <sup>o</sup>	1s4s 3S <sub>1</sub>	6.3675E+00	7.121E-02	3.905E+12	6.3413E+00	7.108E-02	3.897E+12	0.000
1s3p 3P <sub>0</sub> <sup>o</sup>	1s4s 3S <sub>1</sub>	6.3727E+00	3.469E-02	1.899E+12	6.3462E+00	3.391E-02	1.856E+12	0.001
1s3p 3P <sub>2</sub> <sup>o</sup>	1s4s 3S <sub>1</sub>	6.7695E+00	2.464E-01	1.195E+13	6.7412E+00	2.453E-01	1.190E+13	0.001
1s3p 1P <sub>1</sub> <sup>o</sup>	1s4s 3S <sub>1</sub>	6.8063E+00	4.518E-02	2.169E+12	6.7783E+00	4.436E-02	2.128E+12	0.001
1s <sup>2</sup> 1S <sub>0</sub>	1s4p 3P <sub>1</sub> <sup>o</sup>	3.2790E-01	1.510E-02	3.121E+14	3.2662E-01	1.433E-02	2.962E+14	0.013
1s2s 3S <sub>1</sub>	1s4p 3P <sub>0</sub> <sup>o</sup>	1.6159E+00	6.856E-02	5.839E+13	1.6090E+00	6.888E-02	5.866E+13	0.002
1s2s 1S <sub>0</sub>	1s4p 3P <sub>0</sub> <sup>o</sup>	1.6340E+00	2.993E-02	2.492E+13	1.6273E+00	2.929E-02	2.438E+13	0.006
1s3s 3S <sub>1</sub>	1s4p 3P <sub>0</sub> <sup>o</sup>	6.2721E+00	3.224E-01	1.822E+13	6.2463E+00	3.272E-01	1.849E+13	0.002
1s3s 1S <sub>0</sub>	1s4p 3P <sub>1</sub> <sup>o</sup>	6.3443E+00	1.439E-01	7.951E+12	6.3190E+00	1.408E-01	7.778E+12	0.003
1s3d 3D <sub>2</sub>	1s4p 3P <sub>0</sub> <sup>o</sup>	6.7686E+00	7.309E-02	3.547E+12	6.7403E+00	7.330E-02	3.557E+12	0.000
1s3d 3D <sub>1</sub>	1s4p 3P <sub>0</sub> <sup>o</sup>	6.7741E+00	1.585E-02	7.680E+11	6.7458E+00	1.555E-02	7.537E+11	0.002
1s3d 1D <sub>2</sub>	1s4p 3P <sub>1</sub> <sup>o</sup>	6.9107E+00	1.013E-04	4.717E+09				0.003
1s4s 3S <sub>1</sub>	1s4p 3P <sub>0</sub> <sup>o</sup>	1.4439E+03	2.625E-02	2.800E+07	1.4544E+03	2.601E-02	2.711E+07	0.173
1s2p 3P <sub>1</sub> <sup>o</sup>	1s4s 1S <sub>0</sub>	1.6322E+00	2.684E-03	6.721E+12	1.6254E+00	2.783E-03	6.967E+12	0.005

(continued on next page)

Table 3 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	gf	$A$ ( $s^{-1}$ )	
1s2p $^1P_1^o$	1s4s $^1S_0$	1.7286E+00	9.390E-03	2.096E+13	1.7214E+00	9.412E-03	2.100E+13	0.002
1s3p $^3P_1^o$	1s4s $^1S_0$	6.3380E+00	2.847E-02	4.727E+12	6.3116E+00	2.931E-02	4.867E+12	0.002
1s3p $^1P_1^o$	1s4s $^1S_0$	6.7725E+00	1.006E-01	1.463E+13	6.7444E+00	1.020E-01	1.484E+13	0.001
1s4p $^3P_1^o$	1s4s $^1S_0$	2.5265E+04	6.429E-04	6.718E+03	1.8312E+04	8.806E-04	1.736E+04	0.482
1s2s $^3S_1$	1s4p $^3P_0^o$	1.6157E+00	3.257E-02	8.322E+13	1.6089E+00	3.284E-02	8.391E+13	0.003
1s3s $^3S_1$	1s4p $^3P_0^o$	6.2701E+00	1.531E-01	2.598E+13	6.2444E+00	1.569E-01	2.661E+13	0.003
1s3d $^3D_1$	1s4p $^3P_0^o$	6.7718E+00	2.941E-02	4.278E+12	6.7435E+00	2.941E-02	4.277E+12	0.002
1s4s $^3S_1$	1s4p $^3P_0^o$	1.3452E+03	1.349E-02	4.973E+07	1.3572E+03	1.332E-02	4.783E+07	0.146
1s2s $^3S_1$	1s4p $^3P_2^o$	1.6057E+00	1.450E-01	7.505E+13	1.5989E+00	1.491E-01	7.718E+13	0.003
1s3s $^3S_1$	1s4p $^3P_2^o$	6.1216E+00	6.028E-01	2.146E+13	6.0965E+00	6.147E-01	2.187E+13	0.003
1s3d $^3D_2$	1s4p $^3P_2^o$	6.5936E+00	8.587E-03	2.635E+11	6.5661E+00	8.500E-03	2.607E+11	0.000
1s3d $^3D_1$	1s4p $^3P_2^o$	6.5989E+00	9.266E-04	2.839E+10	6.5713E+00	9.191E-04	2.815E+10	0.003
1s3d $^3D_3$	1s4p $^3P_2^o$	6.7234E+00	9.374E-02	2.766E+12	6.6951E+00	9.195E-02	2.713E+12	0.001
1s3d $^1D_2$	1s4p $^3P_2^o$	6.7284E+00	6.658E-03	1.962E+11	6.7001E+00	6.480E-03	1.909E+11	0.003
1s4s $^3S_1$	1s4p $^3P_2^o$	2.1675E+02	4.308E-01	1.223E+10	2.1631E+02	4.309E-01	1.218E+10	0.025
1s2p $^3P_0^o$	1s4d $^3D_2$	1.6212E+00	2.941E-01	1.493E+14	1.6144E+00	2.954E-01	1.499E+14	0.001
1s2p $^3P_1^o$	1s4d $^3D_2$	1.7079E+00	5.276E-02	2.413E+13	1.7079E+00	5.191E-02	2.374E+13	0.001
1s2p $^1P_1^o$	1s4d $^3D_2$	1.7162E+00	8.902E-03	4.032E+12	1.7091E+00	8.758E-03	3.966E+12	0.002
1s3p $^3P_0^o$	1s4d $^3D_2$	6.1751E+00	1.295E+00	4.531E+13	6.1494E+00	1.301E+00	4.554E+13	0.001
1s3p $^3P_1^o$	1s4d $^3D_2$	6.5523E+00	2.758E-01	8.571E+12	6.5248E+00	2.781E-01	8.643E+12	0.001
1s3p $^1P_1^o$	1s4d $^3D_2$	6.5868E+00	4.612E-02	1.418E+12	6.5595E+00	4.379E-02	1.346E+12	0.001
1s4p $^3P_1^o$	1s4d $^3D_2$	2.3795E+02	3.169E-01	7.465E+09	2.3625E+02	3.177E-01	7.531E+09	0.000
1s4p $^3P_2^o$	1s4d $^3D_2$	3.5515E+03	3.857E-03	4.079E+05				0.046
1s2p $^3P_1^o$	1s4d $^3D_1$	1.6210E+00	6.298E-02	5.329E+13	1.6143E+00	6.329E-02	5.354E+13	0.001
1s2p $^3P_0^o$	1s4d $^3D_1$	1.6223E+00	1.192E-01	1.007E+14	1.6155E+00	1.195E-01	1.009E+14	0.001
1s2p $^3P_2^o$	1s4d $^3D_1$	1.7078E+00	5.792E-03	4.416E+12	1.7006E+00	5.679E-03	4.329E+12	0.001
1s2p $^1P_1^o$	1s4d $^3D_1$	1.7161E+00	2.583E-02	1.950E+13	1.7090E+00	2.527E-02	1.907E+13	0.002
1s3p $^3P_0^o$	1s4d $^3D_1$	6.1732E+00	2.754E-01	1.607E+13	6.1476E+00	2.797E-01	1.631E+13	0.001
1s3p $^3P_1^o$	1s4d $^3D_1$	6.1781E+00	5.239E-01	3.052E+13	6.1522E+00	5.268E-01	3.068E+13	0.001
1s3p $^3P_2^o$	1s4d $^3D_1$	6.5502E+00	3.014E-02	1.562E+12	6.5227E+00	3.037E-02	1.573E+12	0.001
1s3p $^1P_1^o$	1s4d $^3D_1$	6.5847E+00	1.379E-01	7.069E+12	6.5574E+00	1.381E-01	7.082E+12	0.001
1s4p $^3P_0^o$	1s4d $^3D_1$	2.3523E+02	6.848E-02	2.752E+09	2.3358E+02	6.867E-02	2.774E+09	0.006
1s4p $^3P_1^o$	1s4d $^3D_1$	2.3807E+02	1.279E-01	5.016E+09	2.3629E+02	1.282E-01	5.063E+09	0.005
1s4p $^3P_2^o$	1s4d $^3D_1$	3.0279E+03	4.889E-04	1.186E+05				0.032
1s <sup>2</sup> $^1S_0$	1s4p $^1P_1^o$	3.2750E-01	3.647E-02	7.559E+14	3.2616E-01	3.896E-02	8.074E+14	0.028
1s2s $^3S_1$	1s4p $^1P_1^o$	1.6048E+00	2.578E-02	2.226E+13	1.5980E+00	2.662E-02	2.298E+13	0.003
1s2s $^1S_0$	1s4p $^1P_1^o$	1.6227E+00	6.199E-02	5.234E+13	1.6161E+00	6.223E-02	5.253E+13	0.004
1s3s $^3S_1$	1s4p $^1P_1^o$	6.1092E+00	1.059E-01	6.309E+12	6.0840E+00	1.087E-01	6.475E+12	0.003
1s3s $^1S_0$	1s4p $^1P_1^o$	6.1776E+00	2.605E-01	1.518E+13	6.1529E+00	2.580E-01	1.502E+13	0.002
1s3d $^3D_2$	1s4p $^1P_1^o$	6.5793E+00	1.389E-03	7.134E+10	6.5517E+00	1.599E-03	8.215E+10	0.004
1s3d $^3D_1$	1s4p $^1P_1^o$	6.5845E+00	4.203E-03	2.156E+11	6.5569E+00	4.162E-03	2.134E+11	0.003
1s3d $^1D_2$	1s4p $^1P_1^o$	6.7135E+00	5.832E-02	2.877E+12	6.6851E+00	5.917E-02	2.918E+12	0.003
1s4s $^3S_1$	1s4p $^1P_1^o$	2.0225E+02	8.298E-02	4.510E+09	2.0166E+02	8.289E-02	4.493E+09	0.022
1s4s $^1S_0$	1s4p $^1P_1^o$	2.3741E+02	1.660E-01	6.547E+09	2.3715E+02	1.651E-01	6.471E+09	0.032
1s4d $^3D_2$	1s4p $^1P_1^o$	2.0339E+04	1.101E-04	5.916E+02				0.306
1s4d $^3D_1$	1s4p $^1P_1^o$	2.1218E+06	3.210E-06	1.585E-03				0.996
1s2p $^3P_2^o$	1s4d $^3D_3$	1.7043E+00	5.008E-01	1.643E+14	1.6972E+00	5.104E-01	1.674E+14	0.001
1s3p $^3P_2^o$	1s4d $^3D_3$	6.4997E+00	2.449E+00	5.523E+13	6.4725E+00	2.491E+00	5.619E+13	0.001
1s4p $^3P_2^o$	1s4d $^3D_3$	6.5884E+02	1.960E-01	4.302E+08	6.5162E+02	1.972E-01	4.388E+08	0.008
1s3d $^3D_2$	1s4f $^3F_3^o$	6.5275E+00	4.625E+00	1.034E+14	6.5002E+00	4.642E+00	1.038E+14	0.001
1s3d $^3D_3$	1s4f $^3F_3^o$	6.6546E+00	3.174E-01	6.829E+12	6.6265E+00	3.157E-01	6.793E+12	0.001
1s3d $^1D_2$	1s4f $^3F_3^o$	6.6595E+00	1.909E-02	4.102E+11	6.6315E+00	1.914E-02	4.113E+11	0.001
1s4d $^3D_2$	1s4f $^3F_3^o$	7.9649E+02	9.484E-02	1.425E+08	8.0096E+02	9.391E-02	1.383E+08	0.017
1s4d $^3D_3$	1s4f $^3F_3^o$	5.1914E+04	9.767E-05	3.453E+01				0.674
1s2s $^3S_1$	1s4f $^3F_2^o$	1.6017E+00	3.265E-09	1.698E+06	1.5949E+00	1.924E-08	1.000E+07	0.151
1s3s $^3S_1$	1s4f $^3F_2^o$	6.0636E+00	3.445E-06	1.250E+08				0.008
1s3d $^3D_2$	1s4f $^3F_2^o$	6.5264E+00	3.322E-01	1.040E+13	6.4991E+00	3.338E-01	1.045E+13	0.000
1s3d $^3D_1$	1s4f $^3F_2^o$	6.5315E+00	2.975E+00	9.304E+13	6.5041E+00	2.983E+00	9.330E+13	0.000
1s3d $^1D_2$	1s4f $^3F_2^o$	6.6535E+00	1.590E-02	4.793E+11	6.6254E+00	1.582E-02	4.767E+11	0.000
1s3d $^1D_1$	1s4f $^3F_2^o$	6.6584E+00	2.213E-01	6.660E+12	6.6303E+00	2.198E-01	6.613E+12	0.001
1s4s $^3S_1$	1s4f $^3F_2^o$	1.6191E+02	3.320E-07	1.689E+04	1.6143E+02	3.195E-07	1.622E+04	0.102
1s4d $^3D_2$	1s4f $^3F_2^o$	7.8052E+02	6.988E-03	1.530E+07	7.8473E+02	6.922E-03	1.486E+07	0.012
1s4d $^3D_1$	1s4f $^3F_2^o$	8.1135E+02	5.989E-02	1.214E+08	8.1580E+02	5.930E-02	1.178E+08	0.014
1s4d $^3D_3$	1s4f $^3F_2^o$	2.2242E+04	1.126E-05	3.037E+01				0.079
1s2p $^3P_0^o$	1s4d $^1D_2$	1.6178E+00	3.977E-04	2.027E+11	1.6111E+00	4.270E-04	2.176E+11	0.002
1s2p $^3P_1^o$	1s4d $^1D_2$	1.7042E+00	3.537E-02	1.625E+13	1.6970E+00	3.597E-02	1.652E+13	0.001
1s2p $^1P_1^o$	1s4d $^1D_2$	1.7124E+00	3.214E-01	1.462E+14	1.7053E+00	3.266E-01	1.485E+14	0.001
1s3p $^3P_0^o$	1s4d $^1D_2$	6.1264E+00	1.393E-03	4.950E+10	6.1011E+00	1.823E-03	6.480E+10	0.001
1s3p $^3P_1^o$	1s4d $^1D_2$	6.4976E+00	1.724E-01	5.448E+12	6.4704E+00	1.755E-01	5.545E+12	0.001
1s3p $^1P_1^o$	1s4d $^1D_2$	6.5315E+00	1.593E+00	4.980E+13	6.5045E+00	1.594E+00	4.985E+13	0.001
1s4p $^3P_0^o$	1s4d $^1D_2$	1.8218E+02	4.542E-04	1.826E+07	1.8111E+02	4.521E-04	1.823E+07	0.010

(continued on next page)

Table 3 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	A (s <sup>-1</sup> )	$\lambda$ (Å)	gf	A (s <sup>-1</sup> )	
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4d <sup>1</sup> D <sub>2</sub>	6.3767E+02	1.428E-02	4.685E+07	6.3050E+02	1.435E-02	4.775E+07	0.013
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 4d <sup>1</sup> D <sub>2</sub>	8.0810E+02	1.027E-01	2.098E+08	7.9983E+02	1.033E-01	2.136E+08	0.014
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 4d <sup>1</sup> D <sub>2</sub>	3.2125E+04	1.005E-05	1.300E+01				0.305
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 4d <sup>1</sup> D <sub>2</sub>	1.8409E+05	1.913E-05	7.530E-01				0.815
1s 3d <sup>3</sup> D <sub>3</sub>	1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	6.6276E+00	6.440E+00	1.087E+14	6.5997E+00	6.489E+00	1.094E+14	0.000
1s 4d <sup>3</sup> D <sub>3</sub>	1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.5856E+03	6.582E-02	1.940E+07	1.6034E+03	6.481E-02	1.852E+07	0.023
1s 3d <sup>3</sup> D <sub>2</sub>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	6.5007E+00	1.376E-04	3.102E+09				0.001
1s 3d <sup>3</sup> D <sub>3</sub>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	6.6268E+00	2.397E-01	5.202E+12	6.5989E+00	2.415E-01	5.241E+12	0.000
1s 3d <sup>1</sup> D <sub>2</sub>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	6.6317E+00	4.771E+00	1.034E+14	6.6038E+00	4.802E+00	1.040E+14	0.000
1s 4d <sup>3</sup> D <sub>2</sub>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	5.3023E+02	7.960E-06	2.698E+04	5.3185E+02	8.835E-06	2.951E+04	0.047
1s 4d <sup>3</sup> D <sub>3</sub>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.5391E+03	2.525E-03	1.016E+06	1.5556E+03	2.486E-03	9.708E+05	0.009
1s 4d <sup>1</sup> D <sub>2</sub>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.6685E+03	4.632E-02	1.585E+07	1.6908E+03	4.551E-02	1.504E+07	0.015
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>1</sub>	1.4605E+00	2.662E-03	2.774E+12	1.4544E+00	2.703E-03	2.817E+12	0.002
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>1</sub>	1.4615E+00	1.303E-03	1.356E+12	1.4554E+00	1.301E-03	1.354E+12	0.001
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>1</sub>	1.5306E+00	8.845E-03	8.395E+12	1.5241E+00	8.802E-03	8.353E+12	0.002
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>1</sub>	1.5372E+00	1.606E-03	1.511E+12	1.5308E+00	1.572E-03	1.479E+12	0.002
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>1</sub>	4.3516E+00	1.619E-02	1.901E+12	4.3336E+00	1.622E-02	1.904E+12	0.001
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>1</sub>	4.3540E+00	7.886E-03	9.249E+11	4.3359E+00	7.777E-03	9.119E+11	0.001
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>1</sub>	4.5356E+00	5.271E-02	5.697E+12	4.5167E+00	5.254E-02	5.678E+12	0.000
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>1</sub>	4.5521E+00	9.615E-03	1.032E+12	4.5333E+00	9.475E-03	1.016E+12	0.001
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>1</sub>	1.3877E+01	1.166E-01	1.346E+12	1.3818E+01	1.159E-01	1.339E+12	0.001
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>1</sub>	1.3887E+01	5.665E-02	6.532E+11	1.3827E+01	5.525E-02	6.371E+11	0.002
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>1</sub>	1.4675E+01	3.952E-01	4.080E+12	1.4612E+01	3.932E-01	4.060E+12	0.001
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>1</sub>	1.4747E+01	7.255E-02	7.417E+11	1.4684E+01	7.130E-02	7.289E+11	0.001
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>1</sub>	1.5020E+01	4.244E-08	4.183E+05				0.057
1s <sup>2</sup> S <sub>0</sub>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	3.2030E-01	7.183E-03	1.556E+14	3.1904E-01	6.799E-03	1.472E+14	0.011
1s 2s <sup>3</sup> S <sub>1</sub>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.4466E+00	2.787E-02	2.961E+13	1.4405E+00	2.788E-02	2.962E+13	0.002
1s 2s <sup>1</sup> S <sub>0</sub>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.4611E+00	1.211E-02	1.261E+13	1.4551E+00	1.185E-02	1.234E+13	0.006
1s 3s <sup>3</sup> S <sub>1</sub>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.3132E+00	8.123E-02	9.709E+12	4.2953E+00	8.191E-02	9.788E+12	0.002
1s 3s <sup>1</sup> S <sub>0</sub>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.3472E+00	3.579E-02	4.210E+12	4.3296E+00	3.517E-02	4.136E+12	0.002
1s 3d <sup>3</sup> D <sub>2</sub>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.5423E+00	1.400E-02	1.509E+12	4.5233E+00	1.405E-02	1.514E+12	0.001
1s 3d <sup>3</sup> D <sub>1</sub>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.5448E+00	3.044E-03	3.276E+11	4.5258E+00	2.992E-03	3.221E+11	0.004
1s 3d <sup>1</sup> D <sub>2</sub>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.6059E+00	1.856E-05	1.945E+09				0.012
1s 4s <sup>3</sup> S <sub>1</sub>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.3679E+01	3.607E-01	4.285E+12	1.3623E+01	3.658E-01	4.346E+12	0.002
1s 4s <sup>1</sup> S <sub>0</sub>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.3818E+01	1.618E-01	1.884E+12	1.3762E+01	1.583E-01	1.843E+12	0.001
1s 4d <sup>3</sup> D <sub>2</sub>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.4661E+01	1.771E-01	1.832E+12	1.4602E+01	1.772E-01	1.832E+12	0.000
1s 4d <sup>3</sup> D <sub>1</sub>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.4671E+01	3.825E-02	3.951E+11	1.4612E+01	3.753E-02	3.875E+11	0.002
1s 4d <sup>1</sup> D <sub>2</sub>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.4943E+01	2.115E-04	2.106E+09	1.4882E+01	1.298E-04	1.292E+09	0.007
1s 5s <sup>3</sup> S <sub>1</sub>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	2.8648E+03	3.352E-02	9.081E+06	2.9004E+03	3.303E-02	8.656E+06	0.158
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>0</sub>	1.4597E+00	1.072E-03	3.357E+12	1.4537E+00	1.107E-03	3.465E+12	0.007
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>0</sub>	1.5363E+00	3.681E-03	1.040E+13	1.5300E+00	3.664E-03	1.035E+13	0.003
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>0</sub>	4.3447E+00	6.572E-03	2.322E+12	4.3266E+00	6.732E-03	2.378E+12	0.001
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>0</sub>	4.5445E+00	2.173E-02	7.020E+12	4.5257E+00	2.187E-02	7.061E+12	0.000
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>0</sub>	1.4807E+01	4.696E-02	1.643E+12	1.3747E+01	4.812E-02	1.684E+12	0.000
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>0</sub>	1.4668E+01	1.615E-01	5.008E+12	1.4605E+01	1.637E-01	5.077E+12	0.000
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5s <sup>3</sup> S <sub>0</sub>	5.6589E+04	7.282E-04	1.517E+03	3.7737E+04	1.084E-03	5.038E+03	0.577
1s 2s <sup>3</sup> S <sub>1</sub>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.4465E+00	1.324E-02	4.222E+13	1.4404E+00	1.328E-02	4.235E+13	0.003
1s 3s <sup>3</sup> S <sub>1</sub>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.3127E+00	3.863E-02	1.385E+13	4.2949E+00	3.919E-02	1.405E+13	0.003
1s 3d <sup>3</sup> D <sub>1</sub>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.5443E+00	5.643E-03	1.823E+12	4.5253E+00	5.635E-03	1.819E+12	0.004
1s 4s <sup>3</sup> S <sub>1</sub>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.3675E+01	1.715E-01	6.118E+12	1.3619E+01	1.758E-01	6.271E+12	0.003
1s 4d <sup>3</sup> D <sub>1</sub>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.4666E+01	7.131E-02	2.212E+12	1.4607E+01	7.119E-02	2.206E+12	0.002
1s 5s <sup>3</sup> S <sub>1</sub>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	2.6711E+03	1.723E-02	1.611E+07	2.7075E+03	1.693E-02	1.527E+07	0.131
1s 2s <sup>3</sup> S <sub>1</sub>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.4424E+00	6.070E-02	3.892E+13	1.4363E+00	6.235E-02	3.998E+13	0.002
1s 3s <sup>3</sup> S <sub>1</sub>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.2763E+00	1.651E-01	1.205E+13	4.2586E+00	1.679E-01	1.225E+13	0.003
1s 3d <sup>3</sup> D <sub>2</sub>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.5014E+00	1.723E-03	1.135E+11	4.4826E+00	1.717E-03	1.130E+11	0.002
1s 3d <sup>3</sup> D <sub>1</sub>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.5039E+00	1.857E-04	1.222E+10	4.4850E+00	1.847E-04	1.214E+10	0.005
1s 3d <sup>3</sup> D <sub>3</sub>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.5615E+00	1.853E-02	1.188E+12	4.5423E+00	1.822E-02	1.168E+12	0.002
1s 3d <sup>1</sup> D <sub>2</sub>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.5638E+00	1.318E-03	8.443E+10	4.5447E+00	1.283E-03	8.220E+10	0.005
1s 4s <sup>3</sup> S <sub>1</sub>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3315E+01	6.598E-01	4.965E+12	1.3261E+01	6.702E-01	5.041E+12	0.003
1s 4d <sup>3</sup> D <sub>2</sub>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.4243E+01	2.163E-02	1.422E+11	1.4186E+01	2.133E-02	1.402E+11	0.001
1s 4d <sup>3</sup> D <sub>1</sub>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.4253E+01	2.338E-03	1.535E+10	1.4196E+01	2.306E-03	1.513E+10	0.002
1s 4d <sup>3</sup> D <sub>3</sub>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.4499E+01	2.318E-01	1.471E+12	1.4440E+01	2.276E-01	1.444E+12	0.001
1s 4d <sup>1</sup> D <sub>2</sub>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.4509E+01	1.640E-02	1.039E+11	1.4450E+01	1.598E-02	1.012E+11	0.002
1s 5s <sup>3</sup> S <sub>1</sub>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.2565E+02	5.519E-01	4.064E+09	4.2515E+02	5.512E-01	4.033E+09	0.022
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	1.4552E+00	1.097E-01	6.914E+13	1.4491E+00	1.101E-01	6.935E+13	0.001
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	1.5247E+00	1.907E-02	1.094E+13	1.5183E+00	1.865E-02	1.070E+13	0.002
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	1.5313E+00	3.170E-03	1.803E+12	1.5250E+00	3.140E-03	1.786E+12	0.002
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	4.3049E+00	3.188E-01	2.295E+13	4.2870E+00	3.199E-01	2.302E+13	0.001
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	4.4849E+00	6.198E-02	4.111E+12	4.4661E+00	6.194E-02	4.107E+12	0.001
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	4.5010E+00	1.016E-02	6.693E+11	4.4823E+00	9.871E-03	6.499E+11	0.002
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	1.3413E+01	1.225E+00	9.083E+12	1.3354E+01	1.230E+00	9.125E+12	0.000

(continued on next page)



Table 3 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	
1s4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>2</sub>	1.4158E+01	2.724E-01	1.813E+12	1.4095E+01	2.756E-01	1.835E+12	0.001
1s4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>2</sub>	1.4224E+01	4.478E-02	2.952E+11	1.4162E+01	4.221E-02	2.784E+11	0.001
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>2</sub>	1.4473E+01	6.876E-02	4.380E+11	1.4409E+01	6.894E-02	4.392E+11	0.001
1s4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>2</sub>	1.4478E+01	5.008E-03	3.187E+10	1.4414E+01	5.000E-03	3.183E+10	0.000
1s4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>2</sub>	1.4606E+01	5.098E-06	3.188E+07				0.008
1s5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>2</sub>	4.6651E+02	4.431E-01	2.716E+09	4.6168E+02	4.458E-01	2.766E+09	0.001
1s5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>2</sub>	6.9791E+03	5.402E-03	1.480E+05				0.074
1s <sup>2</sup> <sup>1</sup> S <sub>0</sub>	1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	3.2010E-01	1.758E-02	3.812E+14	3.1882E-01	1.876E-02	4.069E+14	0.030
1s2s <sup>3</sup> S <sub>1</sub>	1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.4421E+00	1.083E-02	1.158E+13	1.4360E+00	1.116E-02	1.193E+13	0.002
1s2s <sup>1</sup> S <sub>0</sub>	1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.4565E+00	2.585E-02	2.709E+13	1.4505E+00	2.600E-02	2.724E+13	0.003
1s3s <sup>3</sup> S <sub>1</sub>	1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.2732E+00	2.926E-02	3.563E+12	4.2555E+00	2.990E-02	3.640E+12	0.003
1s3s <sup>1</sup> S <sub>0</sub>	1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.3066E+00	7.083E-02	8.491E+12	4.2891E+00	7.040E-02	8.437E+12	0.001
1s3d <sup>3</sup> D <sub>2</sub>	1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.4980E+00	2.798E-04	3.075E+10	4.4792E+00	3.159E-04	3.471E+10	0.006
1s3d <sup>3</sup> D <sub>1</sub>	1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.5005E+00	8.523E-04	9.356E+10	4.4816E+00	8.478E-04	9.306E+10	0.006
1s3d <sup>1</sup> D <sub>2</sub>	1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.5603E+00	1.161E-02	1.241E+12	4.5411E+00	1.171E-02	1.251E+12	0.006
1s4s <sup>3</sup> S <sub>1</sub>	1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.3285E+01	1.158E-01	1.458E+12	1.3231E+01	1.184E-01	1.491E+12	0.003
1s4s <sup>1</sup> S <sub>0</sub>	1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.3416E+01	2.856E-01	3.528E+12	1.3362E+01	2.818E-01	3.479E+12	0.000
1s4d <sup>3</sup> D <sub>2</sub>	1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.4209E+01	3.407E-03	3.752E+10	1.4152E+01	3.849E-03	4.237E+10	0.003
1s4d <sup>3</sup> D <sub>1</sub>	1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.4219E+01	1.055E-02	1.160E+11	1.4162E+01	1.040E-02	1.144E+11	0.003
1s4d <sup>1</sup> D <sub>2</sub>	1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.4474E+01	1.448E-01	1.537E+12	1.4415E+01	1.466E-01	1.555E+12	0.003
1s5s <sup>3</sup> S <sub>1</sub>	1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	3.9729E+02	1.063E-01	1.497E+09	3.9647E+02	1.060E-01	1.487E+09	0.020
1s5s <sup>1</sup> S <sub>0</sub>	1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.6505E+02	2.128E-01	2.188E+09	4.6491E+02	2.116E-01	2.159E+09	0.040
1s5d <sup>3</sup> D <sub>2</sub>	1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.1006E+04	1.481E-04	1.958E+02				0.294
1s2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>1</sub>	1.4551E+00	2.353E-02	2.470E+13	1.4491E+00	2.355E-02	2.472E+13	0.001
1s2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>1</sub>	1.4562E+00	4.450E-02	4.666E+13	1.4501E+00	4.454E-02	4.669E+13	0.001
1s2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>1</sub>	1.5247E+00	2.091E-03	2.000E+12	1.5182E+00	2.036E-03	1.947E+12	0.002
1s2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>1</sub>	1.5313E+00	9.303E-03	8.822E+12	1.5249E+00	9.050E-03	8.580E+12	0.002
1s3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>1</sub>	4.3044E+00	6.792E-02	8.151E+12	4.2865E+00	6.846E-02	8.213E+12	0.001
1s3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>1</sub>	4.3068E+00	1.290E-01	1.546E+13	4.2888E+00	1.293E-01	1.550E+13	0.001
1s3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>1</sub>	4.4844E+00	6.769E-03	7.484E+11	4.4656E+00	6.748E-03	7.460E+11	0.002
1s3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>1</sub>	4.5005E+00	3.073E-02	3.374E+12	4.4818E+00	3.056E-02	3.354E+12	0.002
1s4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>1</sub>	1.3409E+01	2.602E-01	3.218E+12	1.3350E+01	2.644E-01	3.271E+12	0.001
1s4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>1</sub>	1.3418E+01	4.953E-01	6.116E+12	1.3359E+01	4.977E-01	6.148E+12	0.001
1s4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>1</sub>	1.4153E+01	2.966E-02	3.292E+11	1.4090E+01	2.999E-02	3.330E+11	0.001
1s4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>1</sub>	1.4219E+01	1.367E-01	1.504E+12	1.4157E+01	1.374E-01	1.512E+12	0.001
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>1</sub>	1.4473E+01	4.410E-02	4.681E+11	1.4409E+01	4.432E-02	4.706E+11	0.000
1s5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>1</sub>	4.6125E+02	9.567E-02	9.998E+08	4.5655E+02	9.626E-02	1.018E+09	0.006
1s5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>1</sub>	4.6670E+02	1.788E-01	1.825E+09	4.6173E+02	1.798E-01	1.860E+09	0.005
1s5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>1</sub>	5.9615E+03	6.837E-04	4.277E+04				0.014
1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>1</sub>	1.4006E+07	1.340E-06	1.521E-05				0.999
1s2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>3</sub>	1.5233E+00	1.832E-01	7.522E+13	1.5168E+00	1.864E-01	7.654E+13	0.000
1s3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>3</sub>	4.4722E+00	5.674E-01	2.703E+13	4.4535E+00	5.745E-01	2.737E+13	0.001
1s4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>3</sub>	1.4032E+01	2.380E+00	1.152E+13	1.3970E+01	2.417E+00	1.170E+13	0.000
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>3</sub>	1.4341E+01	3.955E-03	1.833E+10	1.4279E+01	3.981E-03	1.844E+10	0.001
1s4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>3</sub>	1.4347E+01	1.850E-04	8.566E+08				0.000
1s4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>3</sub>	1.4468E+01	8.764E-02	3.990E+11	1.4405E+01	8.760E-02	3.988E+11	0.001
1s4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>3</sub>	1.4472E+01	3.270E-03	1.488E+10	1.4409E+01	3.258E-03	1.482E+10	0.000
1s5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5d <sup>3</sup> D <sub>3</sub>	1.2888E+03	2.743E-01	1.574E+08	1.2633E+03	2.786E-01	1.649E+08	0.012
1s3d <sup>3</sup> D <sub>2</sub>	1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.4855E+00	7.286E-01	3.451E+13	4.4667E+00	7.301E-01	3.457E+13	0.001
1s3d <sup>3</sup> D <sub>3</sub>	1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.5452E+00	4.817E-02	2.222E+12	4.5260E+00	4.762E-02	2.196E+12	0.001
1s3d <sup>1</sup> D <sub>2</sub>	1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.5475E+00	2.879E-03	1.327E+11	4.5283E+00	2.884E-03	1.329E+11	0.001
1s4d <sup>3</sup> D <sub>2</sub>	1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4085E+01	3.989E+00	1.916E+13	1.4028E+01	3.999E+00	1.920E+13	0.000
1s4d <sup>3</sup> D <sub>3</sub>	1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4335E+01	2.801E-01	1.299E+12	1.4276E+01	2.797E-01	1.296E+12	0.001
1s4d <sup>1</sup> D <sub>2</sub>	1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4345E+01	1.780E-02	8.244E+10	1.4286E+01	1.789E-02	8.283E+10	0.001
1s5d <sup>3</sup> D <sub>2</sub>	1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.5543E+03	1.737E-01	6.852E+07	1.5716E+03	1.710E-01	6.544E+07	0.010
1s5d <sup>3</sup> D <sub>3</sub>	1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.3195E+04	1.950E-04	2.140E+01				0.340
1s2s <sup>3</sup> S <sub>1</sub>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4408E+00	3.299E-09	2.120E+06	1.4347E+00	1.307E-08	8.404E+06	0.290
1s3s <sup>3</sup> S <sub>1</sub>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.2617E+00	5.278E-07	3.876E+07				0.035
1s3d <sup>3</sup> D <sub>2</sub>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.4853E+00	5.238E-02	3.474E+12	4.4664E+00	5.249E-02	3.480E+12	0.000
1s3d <sup>3</sup> D <sub>1</sub>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.4877E+00	4.685E-01	3.103E+13	4.4688E+00	4.693E-01	3.108E+13	0.000
1s3d <sup>3</sup> D <sub>3</sub>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.5449E+00	2.415E-03	1.560E+11	4.5257E+00	2.384E-03	1.539E+11	0.001
1s3d <sup>1</sup> D <sub>2</sub>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.5472E+00	3.357E-02	2.166E+12	4.5280E+00	3.314E-02	2.138E+12	0.001
1s4s <sup>3</sup> S <sub>1</sub>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.3175E+01	3.531E-06	2.714E+07				0.018
1s4d <sup>3</sup> D <sub>2</sub>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4083E+01	2.874E-01	1.933E+12	1.4025E+01	2.887E-01	1.941E+12	0.000
1s4d <sup>3</sup> D <sub>1</sub>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4092E+01	2.568E+00	1.725E+13	1.4035E+01	2.571E+00	1.726E+13	0.000
1s4d <sup>3</sup> D <sub>3</sub>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4332E+01	1.400E-02	9.090E+10	1.4273E+01	1.398E-02	9.080E+10	0.000
1s4d <sup>1</sup> D <sub>2</sub>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4343E+01	1.944E-01	1.261E+12	1.4284E+01	1.937E-01	1.256E+12	0.000
1s5s <sup>3</sup> S <sub>1</sub>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.1755E+02	6.658E-07	8.808E+03	3.1643E+02	6.490E-07	8.574E+03	0.156
1s5d <sup>3</sup> D <sub>2</sub>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.5232E+03	1.282E-02	7.370E+06	1.5396E+03	1.263E-02	7.049E+06	0.006
1s5d <sup>3</sup> D <sub>1</sub>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.5821E+03	1.098E-01	5.852E+07	1.5996E+03	1.081E-01	5.590E+07	0.005
1s5d <sup>3</sup> D <sub>3</sub>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.1865E+04	2.141E-05	1.630E+01				0.064

(continued on next page)

Table 3 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	gf	$A$ ( $s^{-1}$ )	
1s 2p $^3P_1^0$	1s 5d $^1D_2$	1.4538E+00	1.438E-04	9.078E+10	1.4478E+00	1.474E-04	9.306E+10	0.001
1s 2p $^3P_2^0$	1s 5d $^1D_2$	1.5232E+00	1.293E-02	7.432E+12	1.5168E+00	1.311E-02	7.537E+12	0.000
1s 2p $^1P_1^0$	1s 5d $^1D_2$	1.5298E+00	1.173E-01	6.689E+13	1.5234E+00	1.193E-01	6.803E+13	0.000
1s 3p $^3P_1^0$	1s 5d $^1D_2$	4.2927E+00	3.366E-04	2.437E+10	4.2749E+00	3.884E-04	2.811E+10	0.001
1s 3p $^3P_2^0$	1s 5d $^1D_2$	4.4717E+00	3.994E-02	2.665E+12	4.4529E+00	4.038E-02	2.694E+12	0.001
1s 3p $^1P_1^0$	1s 5d $^1D_2$	4.4877E+00	3.668E-01	2.429E+13	4.4691E+00	3.683E-01	2.439E+13	0.001
1s 4p $^3P_1^0$	1s 5d $^1D_2$	1.3295E+01	1.171E-03	8.835E+09	1.3238E+01	1.596E-03	1.204E+10	0.001
1s 4p $^3P_2^0$	1s 5d $^1D_2$	1.4027E+01	1.671E-01	1.133E+12	1.3965E+01	1.698E-01	1.152E+12	0.001
1s 4p $^1P_1^0$	1s 5d $^1D_2$	1.4092E+01	1.553E+00	1.043E+13	1.4031E+01	1.548E+00	1.040E+13	0.001
1s 4f $^3F_3^0$	1s 5d $^1D_2$	1.4336E+01	2.568E-04	1.667E+09	1.4273E+01	2.695E-04	1.750E+09	0.000
1s 4f $^3F_2^0$	1s 5d $^1D_2$	1.4341E+01	2.746E-03	1.781E+10	1.4279E+01	2.764E-03	1.793E+10	0.001
1s 4f $^1F_3^0$	1s 5d $^1D_2$	1.4467E+01	6.463E-02	4.120E+11	1.4403E+01	6.487E-02	4.136E+11	0.000
1s 5p $^3P_1^0$	1s 5d $^1D_2$	3.5679E+02	5.880E-04	6.162E+06	3.5385E+02	5.862E-04	6.193E+06	0.019
1s 5p $^3P_2^0$	1s 5d $^1D_2$	1.2461E+03	1.996E-02	1.715E+07	1.2214E+03	2.024E-02	1.794E+07	0.011
1s 5p $^1P_1^0$	1s 5d $^1D_2$	1.5753E+03	1.443E-01	7.759E+07	1.5418E+03	1.468E-01	8.171E+07	0.014
1s 5f $^3F_3^0$	1s 5d $^1D_2$	6.3169E+04	1.871E-05	6.254E+00				0.202
1s 5f $^3F_2^0$	1s 5d $^1D_2$	3.7392E+05	3.369E-05	3.214E-01				0.434
1s 3d $^3D_3$	1s 5f $^3F_4^0$	4.5387E+00	9.978E-01	3.590E+13	4.5196E+00	1.005E+00	3.616E+13	0.001
1s 4d $^3D_3$	1s 5f $^3F_4^0$	1.4271E+01	5.607E+00	2.040E+13	1.4212E+01	5.633E+00	2.049E+13	0.000
1s 5d $^3D_3$	1s 5f $^3F_4^0$	3.0834E+03	1.209E-01	9.428E+06	3.1501E+03	1.178E-01	8.729E+06	0.017
1s 4f $^3F_3^0$	1s 5g $^3G_4$	1.4275E+01	8.976E+00	3.265E+13	1.4214E+01	8.998E+00	3.272E+13	0.000
1s 4f $^3F_4^0$	1s 5g $^3G_4$	1.4400E+01	3.232E-01	1.155E+12	1.4339E+01	3.220E-01	1.150E+12	0.000
1s 4f $^1F_3^0$	1s 5g $^3G_4$	1.4404E+01	9.104E-03	3.252E+10	1.4343E+01	9.083E-03	3.244E+10	0.000
1s 5f $^3F_3^0$	1s 5g $^3G_4$	3.1830E+03	6.601E-02	4.829E+06	3.1753E+03	6.588E-02	4.802E+06	0.007
1s 5f $^3F_4^0$	1s 5g $^3G_4$	1.7265E+06	4.338E-06	1.079E-03				0.584
1s 2p $^3P_2^0$	1s 5g $^3G_3$	1.5225E+00	1.816E-10	7.464E+04	1.5161E+00	8.545E-11	3.512E+04	0.372
1s 3p $^3P_2^0$	1s 5g $^3G_3$	4.4656E+00	2.805E-11	1.340E+03	4.4470E+00	2.636E-10	1.259E+04	0.160
1s 4p $^3P_2^0$	1s 5g $^3G_3$	1.3967E+01	7.568E-07	3.697E+06				0.002
1s 4f $^3F_3^0$	1s 5g $^3G_3$	1.4273E+01	3.312E-01	1.549E+12	1.4213E+01	3.319E-01	1.552E+12	0.000
1s 4f $^3F_2^0$	1s 5g $^3G_3$	1.4278E+01	6.649E+00	3.108E+13	1.4218E+01	6.662E+00	3.113E+13	0.000
1s 4f $^3F_4^0$	1s 5g $^3G_3$	1.4399E+01	9.264E-03	4.258E+10	1.4338E+01	9.232E-03	4.243E+10	0.001
1s 4f $^1F_3^0$	1s 5g $^3G_3$	1.4403E+01	2.515E-01	1.155E+12	1.4341E+01	2.504E-01	1.150E+12	0.000
1s 5p $^3P_2^0$	1s 5g $^3G_3$	9.0225E+02	3.193E-08	3.737E+01				0.058
1s 5f $^3F_3^0$	1s 5g $^3G_3$	3.1085E+03	2.495E-03	2.460E+05	3.1008E+03	2.490E-03	2.446E+05	0.029
1s 5f $^3F_2^0$	1s 5g $^3G_3$	3.2410E+03	4.801E-02	4.356E+06	3.2333E+03	4.792E-02	4.331E+06	0.023
1s 5f $^3F_4^0$	1s 5g $^3G_3$	1.2333E+05	1.738E-06	1.089E-01				0.822
1s 3d $^3D_2$	1s 5f $^1F_3^0$	4.4790E+00	2.109E-05	1.002E+09				0.005
1s 3d $^3D_3$	1s 5f $^1F_3^0$	4.5385E+00	3.715E-02	1.719E+12	4.5194E+00	3.740E-02	1.730E+12	0.000
1s 3d $^1D_2$	1s 5f $^1F_3^0$	4.5408E+00	7.388E-01	3.414E+13	4.5217E+00	7.440E-01	3.438E+13	0.000
1s 4d $^3D_2$	1s 5f $^1F_3^0$	1.4022E+01	2.073E-04	1.005E+09				0.003
1s 4d $^3D_3$	1s 5f $^1F_3^0$	1.4269E+01	2.086E-01	9.761E+11	1.4210E+01	2.096E-01	9.810E+11	0.000
1s 4d $^1D_2$	1s 5f $^1F_3^0$	1.4279E+01	4.156E+00	1.943E+13	1.4221E+01	4.169E+00	1.948E+13	0.000
1s 5d $^3D_2$	1s 5f $^1F_3^0$	1.0343E+03	1.740E-05	1.550E+04	1.0413E+03	1.923E-05	1.675E+04	0.068
1s 5d $^3D_3$	1s 5f $^1F_3^0$	2.9925E+03	4.638E-03	4.936E+05	3.0547E+03	4.522E-03	4.579E+05	0.007
1s 5d $^1D_2$	1s 5f $^1F_3^0$	3.2509E+03	8.494E-02	7.658E+06	3.3306E+03	8.255E-02	7.031E+06	0.005
1s 5g $^3G_4$	1s 5f $^1F_3^0$	1.0795E+05	1.971E-06	1.612E-01				0.573
1s 5g $^3G_3$	1s 5f $^1F_3^0$	5.7657E+05	1.010E-05	2.896E-02				0.888
1s 4f $^3F_4^0$	1s 5g $^3G_5$	1.4362E+01	1.142E+01	3.356E+13	1.4301E+01	1.146E+01	3.369E+13	0.000
1s 5f $^3F_4^0$	1s 5g $^3G_5$	5.3388E+03	4.992E-02	1.062E+06	5.3203E+03	4.988E-02	1.059E+06	0.007
1s 4f $^3F_3^0$	1s 5g $^1G_4$	1.4236E+01	8.057E-07	2.947E+06				0.006
1s 4f $^3F_4^0$	1s 5g $^1G_4$	1.4361E+01	2.606E-01	9.364E+11	1.4299E+01	2.616E-01	9.402E+11	0.000
1s 4f $^1F_3^0$	1s 5g $^1G_4$	1.4364E+01	9.081E+00	3.262E+13	1.4303E+01	9.114E+00	3.273E+13	0.000
1s 5f $^3F_3^0$	1s 5g $^1G_4$	1.9730E+03	2.721E-09	5.180E-01				0.788
1s 5f $^3F_4^0$	1s 5g $^1G_4$	5.1744E+03	1.176E-03	3.255E+04	5.1563E+03	1.174E-03	3.246E+04	0.043
1s 5f $^1F_3^0$	1s 5g $^1G_4$	5.4521E+03	3.888E-02	9.694E+05	5.4339E+03	3.884E-02	9.667E+05	0.028
1s 2p $^3P_1^0$	1s 6s $^3S_1$	1.3813E+00	1.347E-03	1.569E+12	1.3756E+00	1.386E-03	1.615E+12	0.002
1s 2p $^3P_0^0$	1s 6s $^3S_1$	1.3823E+00	6.594E-04	7.674E+11	1.3765E+00	6.489E-04	7.550E+11	0.002
1s 2p $^3P_2^0$	1s 6s $^3S_1$	1.4438E+00	4.439E-03	4.734E+12	1.4378E+00	4.423E-03	4.716E+12	0.004
1s 2p $^1P_1^0$	1s 6s $^3S_1$	1.4497E+00	8.068E-04	8.535E+11	1.4438E+00	7.972E-04	8.432E+11	0.002
1s 3p $^3P_1^0$	1s 6s $^3S_1$	3.7169E+00	6.581E-03	1.059E+12	3.7018E+00	6.645E-03	1.069E+12	0.001
1s 3p $^3P_0^0$	1s 6s $^3S_1$	3.7187E+00	3.203E-03	5.150E+11	3.7035E+00	3.126E-03	5.024E+11	0.002
1s 3p $^3P_2^0$	1s 6s $^3S_1$	3.8504E+00	2.103E-02	3.154E+12	3.8346E+00	2.093E-02	3.139E+12	0.000
1s 3p $^1P_1^0$	1s 6s $^3S_1$	3.8623E+00	3.830E-03	5.708E+11	3.8466E+00	3.799E-03	5.660E+11	0.001
1s 4p $^3P_1^0$	1s 6s $^3S_1$	8.9847E+00	2.684E-02	7.392E+11	8.9484E+00	2.691E-02	7.410E+11	0.001
1s 4p $^3P_0^0$	1s 6s $^3S_1$	8.9888E+00	1.303E-02	3.586E+11	8.9523E+00	1.267E-02	3.487E+11	0.002
1s 4p $^3P_2^0$	1s 6s $^3S_1$	9.3128E+00	8.539E-02	2.189E+12	9.2750E+00	8.504E-02	2.179E+12	0.001
1s 4p $^1P_1^0$	1s 6s $^3S_1$	9.3416E+00	1.559E-02	3.972E+11	9.3040E+00	1.546E-02	3.938E+11	0.001
1s 4f $^3F_2^0$	1s 6s $^3S_1$	9.4503E+00	5.582E-09	1.390E+05				0.099
1s 5p $^3P_1^0$	1s 6s $^3S_1$	2.5714E+01	1.642E-01	5.522E+11	2.5617E+01	1.636E-01	5.499E+11	0.001
1s 5p $^3P_0^0$	1s 6s $^3S_1$	2.5731E+01	7.964E-02	2.675E+11	2.5633E+01	7.696E-02	2.582E+11	0.002
1s 5p $^3P_2^0$	1s 6s $^3S_1$	2.7109E+01	5.492E-01	1.662E+12	2.7006E+01	5.457E-01	1.649E+12	0.002

(continued on next page)

Table 3 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	gf	$A$ ( $s^{-1}$ )	
1s 5p $^1P_0^o$	1s 6s $^3S_1$	2.7232E+01	1.009E-01	3.024E+11	2.7131E+01	9.952E-02	2.980E+11	0.002
1s 5f $^3F_2^o$	1s 6s $^3S_1$	2.7709E+01	1.281E-07	3.709E+05				0.078
1s $^2S_0$	1s 6p $^3P_0^o$	3.1640E-01	3.992E-03	8.865E+13	3.1509E-01	3.640E-03	8.082E+13	0.009
1s 2s $^3S_1$	1s 6p $^3P_1^o$	1.3692E+00	1.433E-02	1.699E+13	1.3634E+00	1.449E-02	1.718E+13	0.002
1s 2s $^1S_0$	1s 6p $^3P_1^o$	1.3822E+00	6.212E-03	7.230E+12	1.3765E+00	5.890E-03	6.853E+12	0.006
1s 3s $^3S_1$	1s 6p $^3P_0^o$	3.6909E+00	3.452E-02	5.634E+12	3.6756E+00	3.517E-02	5.739E+12	0.002
1s 3s $^1S_0$	1s 6p $^3P_1^o$	3.7158E+00	1.517E-02	2.443E+12	3.7007E+00	1.445E-02	2.326E+12	0.000
1s 3d $^3D_2$	1s 6p $^3P_0^o$	3.8574E+00	5.268E-03	7.872E+11	3.8413E+00	5.279E-03	7.887E+11	0.003
1s 3d $^3D_1$	1s 6p $^3P_1^o$	3.8592E+00	1.151E-03	1.719E+11	3.8431E+00	1.141E-03	1.704E+11	0.008
1s 3d $^1D_2$	1s 6p $^3P_0^o$	3.9032E+00	6.779E-06	9.894E+08	3.8868E+00	6.128E-06	1.186E+09	0.029
1s 4s $^3S_1$	1s 6p $^3P_0^o$	8.9132E+00	9.266E-02	2.593E+12	8.8765E+00	9.472E-02	2.650E+12	0.003
1s 4s $^1S_0$	1s 6p $^3P_0^o$	8.9717E+00	4.111E-02	1.136E+12	8.9354E+00	3.919E-02	1.082E+12	0.003
1s 4d $^3D_2$	1s 6p $^3P_0^o$	9.3198E+00	9.3198E+00	9.005E+11	9.2819E+00	3.513E-02	8.989E+11	0.001
1s 4d $^3D_1$	1s 6p $^3P_0^o$	9.3241E+00	7.616E-03	1.948E+11	9.2861E+00	7.573E-03	1.936E+11	0.004
1s 4d $^1D_2$	1s 6p $^3P_0^o$	9.4329E+00	4.037E-05	1.009E+09	9.3943E+00	4.947E-05	1.235E+09	0.020
1s 5s $^3S_1$	1s 6p $^3P_0^o$	2.5356E+01	4.018E-01	1.390E+12	2.5254E+01	4.122E-01	1.425E+12	0.003
1s 5s $^1S_0$	1s 6p $^3P_0^o$	2.5594E+01	1.810E-01	6.145E+11	2.5493E+01	1.720E-01	5.836E+11	0.002
1s 5d $^3D_2$	1s 6p $^3P_0^o$	2.7067E+01	2.978E-01	9.037E+11	2.6964E+01	2.966E-01	8.996E+11	0.001
1s 5d $^3D_1$	1s 6p $^3P_0^o$	2.7084E+01	6.418E-02	1.945E+11	2.6981E+01	6.366E-02	1.927E+11	0.002
1s 5d $^1D_2$	1s 6p $^3P_0^o$	2.7558E+01	3.306E-04	9.680E+08	2.7452E+01	3.795E-04	1.110E+09	0.010
1s 6s $^3S_1$	1s 6p $^3P_0^o$	4.9854E+03	4.082E-02	3.652E+06	4.6146E+03	4.469E-02	4.627E+06	0.127
1s 2p $^3P_0^o$	1s 6s $^1S_0$	1.3809E+00	5.496E-04	1.922E+12	1.3753E+00	5.629E-04	1.968E+12	0.010
1s 2p $^1P_0^o$	1s 6s $^1S_0$	1.4493E+00	1.870E-03	5.937E+12	1.4434E+00	1.844E-03	5.856E+12	0.004
1s 3p $^3P_0^o$	1s 6s $^1S_0$	3.7140E+00	2.696E-03	1.304E+12	3.6994E+00	2.744E-03	1.326E+12	0.003
1s 3p $^1P_0^o$	1s 6s $^1S_0$	3.8591E+00	8.737E-03	3.913E+12	3.8440E+00	8.725E-03	3.905E+12	0.000
1s 4p $^3P_0^o$	1s 6s $^1S_0$	8.9678E+00	1.099E-02	9.117E+11	8.9340E+00	1.117E-02	9.258E+11	0.001
1s 4p $^1P_0^o$	1s 6s $^1S_0$	9.3233E+00	3.529E-02	2.708E+12	9.2885E+00	3.544E-02	2.716E+12	0.002
1s 5p $^3P_0^o$	1s 6s $^1S_0$	2.5576E+01	6.646E-02	6.777E+11	2.5500E+01	6.781E-02	6.879E+11	0.002
1s 5p $^1P_0^o$	1s 6s $^1S_0$	2.7078E+01	2.249E-01	2.046E+12	2.6999E+01	2.273E-01	2.063E+12	0.002
1s 6p $^3P_0^o$	1s 6s $^1S_0$	1.0994E+05	7.948E-04	4.387E+02				0.884
1s 2s $^3S_1$	1s 6p $^3P_0^o$	1.3691E+00	6.808E-03	2.423E+13	1.3635E+00	6.812E-03	2.423E+13	0.003
1s 3s $^3S_1$	1s 6p $^3P_0^o$	3.6907E+00	1.641E-02	8.037E+12	3.6761E+00	1.659E-02	8.122E+12	0.004
1s 3d $^3D_1$	1s 6p $^3P_0^o$	3.8590E+00	2.133E-03	9.554E+11	3.8436E+00	2.122E-03	9.501E+11	0.008
1s 4s $^3S_1$	1s 6p $^3P_0^o$	8.9120E+00	4.409E-02	3.703E+12	8.8795E+00	4.483E-02	3.760E+12	0.004
1s 4d $^3D_1$	1s 6p $^3P_0^o$	9.3228E+00	1.419E-02	1.089E+12	9.2894E+00	1.414E-02	1.084E+12	0.004
1s 5s $^3S_1$	1s 6p $^3P_0^o$	2.5347E+01	1.912E-01	1.986E+12	2.5278E+01	1.959E-01	2.028E+12	0.004
1s 5d $^3D_1$	1s 6p $^3P_0^o$	2.7074E+01	1.200E-01	1.092E+12	2.7009E+01	1.194E-01	1.083E+12	0.002
1s 6s $^3S_1$	1s 6p $^3P_0^o$	4.6513E+03	2.098E-02	6.469E+06	5.5898E+03	1.731E-02	3.664E+06	0.099
1s 2s $^3S_1$	1s 6p $^3P_2^o$	1.3670E+00	3.166E-02	2.260E+13	1.3612E+00	3.251E-02	2.320E+13	0.002
1s 3s $^3S_1$	1s 6p $^3P_2^o$	3.6753E+00	7.231E-02	7.141E+12	3.6601E+00	7.353E-02	7.261E+12	0.003
1s 3d $^3D_2$	1s 6p $^3P_2^o$	3.8403E+00	6.550E-04	5.925E+10	3.8243E+00	6.596E-04	5.965E+10	0.005
1s 3d $^3D_1$	1s 6p $^3P_2^o$	3.8421E+00	7.089E-05	6.406E+09	3.8260E+00	6.699E-05	6.053E+09	0.009
1s 3d $^3D_3$	1s 6p $^3P_2^o$	3.8840E+00	7.016E-03	6.205E+11	3.8677E+00	6.917E-03	6.116E+11	0.006
1s 3d $^1D_2$	1s 6p $^3P_2^o$	3.8856E+00	5.021E-04	4.437E+10	3.8694E+00	4.897E-04	4.326E+10	0.008
1s 4s $^3S_1$	1s 6p $^3P_2^o$	8.8224E+00	1.843E-01	3.158E+12	8.7863E+00	1.868E-01	3.201E+12	0.004
1s 4d $^3D_2$	1s 6p $^3P_2^o$	9.2206E+00	4.521E-03	7.093E+10	9.1833E+00	4.502E-03	7.061E+10	0.003
1s 4d $^3D_1$	1s 6p $^3P_2^o$	9.2248E+00	4.885E-04	7.658E+09	9.1874E+00	4.667E-04	7.314E+09	0.004
1s 4d $^3D_3$	1s 6p $^3P_2^o$	9.3270E+00	4.766E-02	7.308E+11	9.2888E+00	4.696E-02	7.199E+11	0.003
1s 4d $^1D_2$	1s 6p $^3P_2^o$	9.3314E+00	3.377E-03	5.174E+10	9.2933E+00	3.309E-03	5.068E+10	0.004
1s 5s $^3S_1$	1s 6p $^3P_2^o$	2.4635E+01	7.249E-01	1.594E+12	2.4537E+01	7.351E-01	1.615E+12	0.003
1s 5d $^3D_2$	1s 6p $^3P_2^o$	2.6247E+01	3.725E-02	7.213E+10	2.6148E+01	3.678E-02	7.116E+10	0.001
1s 5d $^3D_1$	1s 6p $^3P_2^o$	2.6264E+01	4.030E-03	7.794E+09	2.6164E+01	3.868E-03	7.475E+09	0.002
1s 5d $^3D_3$	1s 6p $^3P_2^o$	2.6690E+01	3.948E-01	7.394E+11	2.6588E+01	3.879E-01	7.258E+11	0.001
1s 5d $^1D_2$	1s 6p $^3P_2^o$	2.6709E+01	2.789E-02	5.215E+10	2.6607E+01	2.727E-02	5.096E+10	0.002
1s 5g $^3G_3$	1s 6p $^3P_2^o$	2.6929E+01	1.344E-08	2.472E+04				0.016
1s 6s $^3S_1$	1s 6p $^3P_2^o$	7.3822E+02	6.713E-01	1.643E+09	7.2782E+02	6.786E-01	1.694E+09	0.015
1s 2p $^3P_0^o$	1s 6d $^3D_2$	1.3786E+00	5.406E-02	3.795E+13	1.3729E+00	5.423E-02	3.806E+13	0.001
1s 2p $^3P_2^o$	1s 6d $^3D_2$	1.4409E+00	9.245E-03	5.941E+12	1.4348E+00	9.097E-03	5.845E+12	0.003
1s 2p $^1P_0^o$	1s 6d $^3D_2$	1.4467E+00	1.528E-03	9.741E+11	1.4407E+00	1.426E-03	9.093E+11	0.001
1s 3p $^3P_0^o$	1s 6d $^3D_2$	3.6972E+00	1.326E-01	1.294E+13	3.6817E+00	1.329E-01	1.297E+13	0.000
1s 3p $^3P_2^o$	1s 6d $^3D_2$	3.8292E+00	2.492E-02	2.268E+12	3.8130E+00	2.499E-02	2.274E+12	0.001
1s 3p $^1P_0^o$	1s 6d $^3D_2$	3.8409E+00	4.051E-03	3.663E+11	3.8249E+00	3.732E-03	3.374E+11	0.002
1s 4p $^3P_0^o$	1s 6d $^3D_2$	8.8702E+00	3.276E-01	5.555E+12	8.8316E+00	3.287E-01	5.575E+12	0.000
1s 4p $^3P_2^o$	1s 6d $^3D_2$	9.1898E+00	6.652E-02	1.051E+12	9.1496E+00	6.733E-02	1.063E+12	0.000
1s 4p $^1P_0^o$	1s 6d $^3D_2$	9.2178E+00	1.079E-02	1.693E+11	9.1778E+00	9.804E-03	1.539E+11	0.001
1s 4f $^3F_2^o$	1s 6d $^3D_2$	9.3215E+00	1.216E-02	1.867E+11	9.2809E+00	1.219E-02	1.871E+11	0.001
1s 4f $^3F_0^o$	1s 6d $^3D_2$	9.3237E+00	8.868E-04	1.361E+10	9.2831E+00	8.928E-04	1.370E+10	0.000
1s 4f $^1F_0^o$	1s 6d $^3D_2$	9.3766E+00	9.857E-07	1.496E+07				0.011
1s 5p $^3P_0^o$	1s 6d $^3D_2$	2.4798E+01	1.222E+00	2.651E+12	2.4683E+01	1.227E+00	2.664E+12	0.000
1s 5p $^3P_2^o$	1s 6d $^3D_2$	2.6092E+01	2.792E-01	5.472E+11	2.5970E+01	2.851E-01	5.591E+11	0.000
1s 5p $^1P_0^o$	1s 6d $^3D_2$	2.6207E+01	4.553E-02	8.843E+10	2.6085E+01	4.028E-02	7.831E+10	0.001

(continued on next page)

Table 3 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>2</sub>	2.6639E+01	1.774E-01	3.335E+11	2.6517E+01	1.775E-01	3.339E+11	0.001
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>2</sub>	2.6648E+01	1.291E-02	2.426E+10	2.6526E+01	1.297E-02	2.439E+10	0.000
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>2</sub>	2.6870E+01	1.399E-05	2.585E+07				0.010
1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>2</sub>	8.0869E+02	5.619E-01	1.146E+09	7.9302E+02	5.686E-01	1.196E+09	0.003
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>2</sub>	1.2110E-01	6.859E-03	6.234E+04	9.6399E+03	8.661E-03	1.232E+05	0.102
1s <sup>2</sup> S <sub>0</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	3.1620E-01	9.840E-03	2.187E+14	3.1497E-01	1.063E-02	2.362E+14	0.031
1s 2s <sup>3</sup> S <sub>1</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.3668E+00	5.663E-03	6.739E+12	1.3611E+00	5.637E-03	6.708E+12	0.001
1s 2s <sup>1</sup> S <sub>0</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.3798E+00	1.346E-02	1.572E+13	1.3742E+00	1.374E-02	1.604E+13	0.003
1s 3s <sup>3</sup> S <sub>1</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	3.6740E+00	1.286E-02	2.118E+12	3.6589E+00	1.267E-02	2.087E+12	0.003
1s 3s <sup>1</sup> S <sub>0</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	3.6986E+00	3.101E-02	5.041E+12	3.6837E+00	3.125E-02	5.077E+12	0.002
1s 3d <sup>3</sup> D <sub>2</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	3.8389E+00	1.069E-04	1.613E+10	3.8230E+00	1.372E-04	2.069E+10	0.011
1s 3d <sup>3</sup> D <sub>1</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	3.8407E+00	3.272E-04	4.932E+10	3.8248E+00	3.122E-04	4.705E+10	0.011
1s 3d <sup>1</sup> D <sub>2</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	3.8842E+00	4.432E-03	6.532E+11	3.8681E+00	4.442E-03	6.545E+11	0.010
1s 4s <sup>3</sup> S <sub>1</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	8.8149E+00	3.260E-02	9.327E+11	8.7796E+00	3.204E-02	9.164E+11	0.003
1s 4s <sup>1</sup> S <sub>0</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	8.8722E+00	7.942E-02	2.243E+12	8.8372E+00	7.964E-02	2.248E+12	0.004
1s 4d <sup>3</sup> D <sub>2</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	9.2125E+00	7.164E-04	1.877E+10	9.1760E+00	9.080E-04	2.377E+10	0.007
1s 4d <sup>3</sup> D <sub>1</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	9.2166E+00	2.227E-03	5.828E+10	9.1801E+00	2.117E-03	5.539E+10	0.006
1s 4d <sup>1</sup> D <sub>2</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	9.3230E+00	2.999E-02	7.671E+11	9.2858E+00	3.019E-02	7.720E+11	0.005
1s 5s <sup>3</sup> S <sub>1</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	2.4577E+01	1.271E-01	4.677E+11	2.4485E+01	1.249E-01	4.593E+11	0.003
1s 5s <sup>1</sup> S <sub>0</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	2.4800E+01	3.145E-01	1.137E+12	2.4710E+01	3.143E-01	1.134E+12	0.004
1s 5d <sup>3</sup> D <sub>2</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	2.6180E+01	5.800E-03	1.881E+10	2.6089E+01	7.458E-03	2.415E+10	0.003
1s 5d <sup>3</sup> D <sub>1</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	2.6197E+01	1.815E-02	5.882E+10	2.6105E+01	1.715E-02	5.550E+10	0.003
1s 5d <sup>1</sup> D <sub>2</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	2.6640E+01	2.473E-01	7.746E+11	2.6546E+01	2.497E-01	7.814E+11	0.003
1s 6s <sup>3</sup> S <sub>1</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	6.8918E+02	1.292E-01	6.050E+08	6.8482E+02	1.256E-01	5.907E+08	0.015
1s 6s <sup>1</sup> S <sub>0</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	8.0559E+02	2.588E-01	8.867E+08	7.8073E+02	2.693E-01	9.741E+08	0.057
1s 6d <sup>3</sup> D <sub>2</sub>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	7.2196E+04	1.839E-04	7.843E+01				0.369
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	1.3786E+00	1.160E-02	1.357E+13	1.3729E+00	1.157E-02	1.354E+13	0.001
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	1.3795E+00	2.193E-02	2.563E+13	1.3737E+00	2.194E-02	2.563E+13	0.001
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	1.4408E+00	1.013E-03	1.085E+12	1.4348E+00	9.908E-04	1.061E+12	0.004
1s 2p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	1.4467E+00	4.506E-03	4.787E+12	1.4407E+00	4.362E-03	4.633E+12	0.003
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	3.6970E+00	2.828E-02	4.600E+12	3.6817E+00	2.835E-02	4.611E+12	0.001
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	3.6987E+00	5.368E-02	8.725E+12	3.6834E+00	5.377E-02	8.738E+12	0.001
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	3.8290E+00	2.722E-03	4.128E+11	3.8131E+00	2.724E-03	4.131E+11	0.002
1s 3p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	3.8407E+00	1.233E-02	1.858E+12	3.8249E+00	1.218E-02	1.836E+12	0.002
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	8.8691E+00	6.971E-02	1.970E+12	8.8318E+00	7.019E-02	1.983E+12	0.001
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	8.8731E+00	1.325E-01	3.743E+12	8.8357E+00	1.329E-01	3.755E+12	0.001
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	9.1886E+00	7.247E-03	1.908E+11	9.1499E+00	7.347E-03	1.934E+11	0.001
1s 4p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	9.2166E+00	3.316E-02	8.679E+11	9.1781E+00	3.306E-02	8.654E+11	0.001
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	9.3225E+00	7.803E-03	1.996E+11	9.2834E+00	7.840E-03	2.005E+11	0.000
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	2.4789E+01	2.595E-01	9.388E+11	2.4685E+01	2.631E-01	9.519E+11	0.001
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	2.4805E+01	4.939E-01	1.785E+12	2.4700E+01	4.967E-01	1.794E+12	0.001
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	2.6083E+01	3.034E-02	9.915E+10	2.5972E+01	3.115E-02	1.018E+11	0.001
1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	2.6197E+01	1.405E-01	4.553E+11	2.6087E+01	1.410E-01	4.568E+11	0.001
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	2.6638E+01	1.138E-01	3.567E+11	2.6529E+01	1.142E-01	3.577E+11	0.000
1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	7.9964E+02	1.213E-01	4.217E+08	7.9517E+02	1.225E-01	4.272E+08	0.006
1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	8.0896E+02	2.267E-01	7.701E+08	7.7196E+02	2.370E-01	8.770E+08	0.005
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	1.0358E+04	8.674E-04	1.798E+04				0.007
1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>1</sub>	6.7159E+06	6.153E-06	3.033E-04				0.995
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>3</sub>	1.4401E+00	8.934E-02	4.105E+13	1.4340E+00	9.091E-02	4.176E+13	0.000
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>3</sub>	3.8238E+00	2.308E-01	1.504E+13	3.8077E+00	2.333E-01	1.520E+13	0.000
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>3</sub>	9.1590E+00	5.989E-01	6.802E+12	9.1192E+00	6.053E-01	6.877E+12	0.000
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>3</sub>	9.2898E+00	7.076E-04	7.813E+09	9.2496E+00	7.143E-04	7.889E+09	0.001
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>3</sub>	9.2920E+00	3.269E-05	3.608E+08				0.001
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>3</sub>	9.3429E+00	1.559E-02	1.702E+11	9.3023E+00	1.557E-02	1.700E+11	0.001
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>3</sub>	9.3445E+00	5.815E-04	6.346E+09	9.3039E+00	5.794E-04	6.324E+09	0.000
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>3</sub>	2.5845E+01	2.417E+00	3.448E+12	2.5726E+01	2.453E+00	3.503E+12	0.000
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>3</sub>	2.6382E+01	1.034E-02	1.416E+10	2.6263E+01	1.037E-02	1.421E+10	0.001
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>3</sub>	2.6391E+01	4.907E-04	6.713E+08	2.6272E+01	4.885E-04	6.687E+08	0.000
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>3</sub>	2.6602E+01	2.275E-01	3.063E+11	2.6482E+01	2.272E-01	3.062E+11	0.001
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>3</sub>	2.6609E+01	8.482E-03	1.142E+10	2.6489E+01	8.453E-03	1.138E+10	0.000
1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>3</sub>	2.2306E+03	3.482E-01	6.669E+07	2.1370E+03	3.618E-01	7.486E+07	0.018
1s 3d <sup>3</sup> D <sub>2</sub>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.8336E+00	2.524E-01	1.637E+13	3.8174E+00	2.527E-01	1.638E+13	0.001
1s 3d <sup>3</sup> D <sub>3</sub>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.8771E+00	1.644E-02	1.042E+12	3.8607E+00	1.627E-02	1.031E+12	0.002
1s 3d <sup>1</sup> D <sub>2</sub>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.8788E+00	9.798E-04	6.205E+10	3.8624E+00	9.022E-04	5.714E+10	0.001
1s 4d <sup>3</sup> D <sub>2</sub>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.1821E+00	8.572E-01	9.689E+12	9.1440E+00	8.586E-01	9.702E+12	0.001
1s 4d <sup>3</sup> D <sub>3</sub>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.2876E+00	5.814E-02	6.423E+11	9.2486E+00	5.812E-02	6.419E+11	0.001
1s 4d <sup>1</sup> D <sub>2</sub>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.2919E+00	3.683E-03	4.065E+10	9.2530E+00	3.427E-03	3.782E+10	0.000
1s 5d <sup>3</sup> D <sub>2</sub>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.5937E+01	3.743E+00	5.302E+12	2.5831E+01	3.751E+00	5.311E+12	0.000
1s 5d <sup>3</sup> D <sub>3</sub>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.6370E+01	2.663E-01	3.649E+11	2.6261E+01	2.675E-01	3.665E+11	0.001
1s 5d <sup>1</sup> D <sub>2</sub>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.6388E+01	1.732E-02	2.370E+10	2.6279E+01	1.612E-02	2.205E+10	0.000
1s 5g <sup>3</sup> G <sub>4</sub>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.6598E+01	7.014E-02	9.448E+10	2.6482E+01	7.027E-02	9.468E+10	0.001

(continued on next page)

Table 3 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	gf	$A$ ( $s^{-1}$ )	
1s 5g $^3G_3$	1s 6f $^3F_3^0$	2.6603E+01	2.597E-03	3.497E+09	2.6487E+01	2.606E-03	3.509E+09	0.002
1s 5g $^1G_4$	1s 6f $^3F_3^0$	2.6735E+01	2.453E-10	3.270E+02				0.683
1s 6d $^3D_2$	1s 6f $^3F_3^0$	2.6863E+03	2.445E-01	3.228E+07	2.7429E+03	2.382E-01	2.991E+07	0.009
1s 6d $^3D_3$	1s 6f $^3F_3^0$	1.5394E+05	2.876E-04	1.156E+01				0.292
1s 2s $^3S_1$	1s 6f $^3F_2^0$	1.3662E+00	2.099E-09	1.500E+06				0.160
1s 3s $^3S_1$	1s 6f $^3F_2^0$	3.6690E+00	1.653E-07	1.638E+07				0.106
1s 3d $^3D_2$	1s 6f $^3F_2^0$	3.8335E+00	1.815E-02	1.648E+12	3.8174E+00	1.816E-02	1.648E+12	0.000
1s 3d $^3D_1$	1s 6f $^3F_2^0$	3.8353E+00	1.623E-01	1.472E+13	3.8192E+00	1.624E-01	1.473E+13	0.000
1s 3d $^3D_3$	1s 6f $^3F_2^0$	3.8770E+00	8.259E-04	7.330E+10	3.8607E+00	8.130E-04	7.215E+10	0.004
1s 3d $^1D_2$	1s 6f $^3F_2^0$	3.8787E+00	1.146E-02	1.016E+12	3.8624E+00	1.127E-02	9.996E+11	0.001
1s 4s $^3S_1$	1s 6f $^3F_2^0$	8.7866E+00	7.760E-07	1.341E+07				0.060
1s 4d $^3D_2$	1s 6f $^3F_2^0$	9.1815E+00	6.181E-02	9.781E+11	9.1440E+00	6.194E-02	9.799E+11	0.000
1s 4d $^3D_1$	1s 6f $^3F_2^0$	9.1856E+00	5.516E-01	8.722E+12	9.1480E+00	5.521E-01	8.727E+12	0.000
1s 4d $^3D_3$	1s 6f $^3F_2^0$	9.2869E+00	2.907E-03	4.496E+10	9.2486E+00	2.903E-03	4.489E+10	0.000
1s 4d $^1D_2$	1s 6f $^3F_2^0$	9.2913E+00	4.034E-02	6.234E+11	9.2530E+00	4.006E-02	6.189E+11	0.001
1s 5s $^3S_1$	1s 6f $^3F_2^0$	2.4358E+01	3.345E-06	7.522E+06				0.037
1s 5d $^3D_2$	1s 6f $^3F_2^0$	2.5932E+01	2.700E-01	5.357E+11	2.5831E+01	2.711E-01	5.374E+11	0.000
1s 5d $^3D_1$	1s 6f $^3F_2^0$	2.5948E+01	2.411E+00	4.776E+12	2.5848E+01	2.411E+00	4.775E+12	0.000
1s 5d $^3D_3$	1s 6f $^3F_2^0$	2.6365E+01	1.328E-02	2.549E+10	2.6261E+01	1.336E-02	2.563E+10	0.000
1s 5d $^1D_2$	1s 6f $^3F_2^0$	2.6383E+01	1.846E-01	3.537E+11	2.6280E+01	1.840E-01	3.525E+11	0.000
1s 5g $^3G_3$	1s 6f $^3F_2^0$	2.6598E+01	5.191E-02	9.789E+10	2.6488E+01	5.205E-02	9.813E+10	0.002
1s 6s $^3S_1$	1s 6f $^3F_2^0$	5.5035E+02	9.794E-07	4.314E+03				0.252
1s 6d $^3D_2$	1s 6f $^3F_2^0$	2.6325E+03	1.805E-02	3.475E+06	2.7436E+03	1.736E-02	3.051E+06	0.007
1s 6d $^3D_1$	1s 6f $^3F_2^0$	2.7332E+03	1.546E-01	2.760E+07	2.7182E+03	1.547E-01	2.770E+07	0.001
1s 6d $^3D_3$	1s 6f $^3F_2^0$	7.0900E+04	3.077E-05	8.167E+00				0.051
1s 2p $^3P_0^0$	1s 6d $^1D_2$	1.3779E+00	6.889E-05	4.840E+10	1.3722E+00	5.228E-05	3.673E+10	0.008
1s 2p $^3P_2^0$	1s 6d $^1D_2$	1.4401E+00	6.303E-03	4.055E+12	1.4340E+00	6.314E-03	4.061E+12	0.000
1s 2p $^1P_1^0$	1s 6d $^1D_2$	1.4459E+00	5.724E-02	3.652E+13	1.4399E+00	5.833E-02	3.721E+13	0.000
1s 3p $^3P_0^0$	1s 6d $^1D_2$	3.6920E+00	1.380E-04	1.350E+10	3.6767E+00	1.115E-04	1.091E+10	0.003
1s 3p $^3P_2^0$	1s 6d $^1D_2$	3.8236E+00	1.625E-02	1.483E+12	3.8077E+00	1.618E-02	1.476E+12	0.001
1s 3p $^1P_1^0$	1s 6d $^1D_2$	3.8353E+00	1.489E-01	1.351E+13	3.8195E+00	1.498E-01	1.359E+13	0.001
1s 4p $^3P_0^0$	1s 6d $^1D_2$	8.8403E+00	3.141E-04	5.361E+09	8.8028E+00	2.765E-04	4.721E+09	0.003
1s 4p $^3P_2^0$	1s 6d $^1D_2$	9.1577E+00	4.208E-02	6.694E+11	9.1187E+00	4.197E-02	6.676E+11	0.001
1s 4p $^1P_1^0$	1s 6d $^1D_2$	9.1855E+00	3.883E-01	6.139E+12	9.1467E+00	3.889E-01	6.149E+12	0.001
1s 4f $^3F_3^0$	1s 6d $^1D_2$	9.2884E+00	4.663E-05	7.211E+08	9.2491E+00	5.670E-05	8.767E+08	0.000
1s 4f $^3F_2^0$	1s 6d $^1D_2$	9.2907E+00	4.915E-04	7.596E+09	9.2513E+00	4.896E-04	7.566E+09	0.000
1s 4f $^1F_3^0$	1s 6d $^1D_2$	9.3432E+00	1.150E-02	1.758E+11	9.3035E+00	1.152E-02	1.761E+11	0.000
1s 5p $^3P_0^0$	1s 6d $^1D_2$	2.4566E+01	1.099E-03	2.430E+09	2.4460E+01	1.147E-03	2.538E+09	0.003
1s 5p $^3P_2^0$	1s 6d $^1D_2$	2.5835E+01	1.695E-01	3.387E+11	2.5723E+01	1.700E-01	3.399E+11	0.001
1s 5p $^1P_1^0$	1s 6d $^1D_2$	2.5947E+01	1.579E+00	3.130E+12	2.5836E+01	1.574E+00	3.121E+12	0.001
1s 5f $^3F_3^0$	1s 6d $^1D_2$	2.6371E+01	6.778E-04	1.300E+09	2.6259E+01	8.212E-04	1.575E+09	0.001
1s 5f $^3F_2^0$	1s 6d $^1D_2$	2.6380E+01	7.165E-03	1.373E+10	2.6269E+01	7.091E-03	1.359E+10	0.000
1s 5f $^1F_3^0$	1s 6d $^1D_2$	2.6598E+01	1.678E-01	3.164E+11	2.6485E+01	1.682E-01	3.173E+11	0.000
1s 6p $^3P_0^0$	1s 6d $^1D_2$	6.1807E+02	7.142E-04	2.494E+06	6.1320E+02	1.025E-03	3.607E+06	0.033
1s 6p $^3P_2^0$	1s 6d $^1D_2$	2.1556E+03	2.532E-02	7.269E+06	2.1118E+03	2.540E-02	7.534E+06	0.009
1s 6p $^1P_1^0$	1s 6d $^1D_2$	2.7210E+03	1.836E-01	3.308E+07	2.5822E+03	1.928E-01	3.826E+07	0.017
1s 6f $^3F_3^0$	1s 6d $^1D_2$	1.0989E+05	2.647E-05	2.924E+00				0.645
1s 6f $^3F_2^0$	1s 6d $^1D_2$	6.7056E+05	4.571E-05	1.356E-01				0.206
1s 3d $^3D_3$	1s 6f $^3F_4^0$	3.8744E+00	3.435E-01	1.696E+13	3.8580E+00	3.460E-01	1.708E+13	0.001
1s 4d $^3D_3$	1s 6f $^3F_4^0$	9.2719E+00	1.185E+00	1.022E+13	9.2331E+00	1.190E+00	1.026E+13	0.001
1s 5d $^3D_3$	1s 6f $^3F_4^0$	2.6244E+01	5.292E+00	5.695E+12	2.6136E+01	5.311E+00	5.713E+12	0.000
1s 5g $^3G_4$	1s 6f $^3F_4^0$	2.6470E+01	2.307E-03	2.440E+09	2.6356E+01	2.319E-03	2.453E+09	0.000
1s 5g $^3G_3$	1s 6f $^3F_4^0$	2.6475E+01	6.552E-05	6.928E+07				0.002
1s 5g $^3G_5$	1s 6f $^3F_4^0$	2.6601E+01	8.595E-02	9.002E+10	2.6486E+01	8.606E-02	9.015E+10	0.000
1s 5g $^1G_4$	1s 6f $^3F_4^0$	2.6606E+01	1.966E-03	2.059E+09	2.6491E+01	1.963E-03	2.056E+09	0.002
1s 6d $^3D_3$	1s 6f $^3F_4^0$	5.3175E+03	1.705E-01	4.469E+06	5.5117E+03	1.637E-01	3.962E+06	0.017
1s 4f $^3F_3^0$	1s 6g $^3G_4$	9.2736E+00	1.229E+00	1.060E+13	9.2341E+00	1.231E+00	1.061E+13	0.000
1s 4f $^3F_4^0$	1s 6g $^3G_4$	9.3264E+00	4.335E-02	3.694E+11	9.2866E+00	4.316E-02	3.678E+11	0.000
1s 4f $^1F_3^0$	1s 6g $^3G_4$	9.3281E+00	1.220E-03	1.039E+10	9.2883E+00	1.070E-03	9.114E+09	0.000
1s 5f $^3F_3^0$	1s 6g $^3G_4$	2.6251E+01	7.866E+00	8.460E+12	2.6139E+01	7.880E+00	8.475E+12	0.000
1s 5f $^3F_4^0$	1s 6g $^3G_4$	2.6469E+01	2.860E-01	3.026E+11	2.6355E+01	2.865E-01	3.031E+11	0.000
1s 5f $^1F_3^0$	1s 6g $^3G_4$	2.6476E+01	8.129E-03	8.594E+09	2.6362E+01	7.195E-03	7.608E+09	0.000
1s 6f $^3F_3^0$	1s 6g $^3G_4$	5.4970E+03	1.224E-01	3.001E+06	5.5303E+03	1.210E-01	2.909E+06	0.000
1s 6f $^3F_4^0$	1s 6g $^3G_4$	2.7996E+06	8.576E-06	8.111E-04				0.475
1s 2p $^3P_2^0$	1s 6g $^3G_3$	1.4397E+00	2.240E-10	1.030E+05				0.229
1s 3p $^3P_0^0$	1s 6g $^3G_3$	3.8210E+00	1.594E-12	1.041E+02				0.345
1s 4p $^3P_2^0$	1s 6g $^3G_3$	9.1429E+00	1.067E-07	1.217E+06				0.002
1s 4f $^3F_3^0$	1s 6g $^3G_3$	9.2732E+00	4.539E-02	5.029E+11	9.2341E+00	4.543E-02	5.033E+11	0.000
1s 4f $^3F_2^0$	1s 6g $^3G_3$	9.2754E+00	9.106E-01	1.009E+13	9.2363E+00	9.117E-01	1.009E+13	0.000
1s 4f $^3F_4^0$	1s 6g $^3G_3$	9.3261E+00	1.232E-03	1.362E+10	9.2866E+00	1.233E-03	1.351E+10	0.001
1s 4f $^1F_3^0$	1s 6g $^3G_3$	9.3277E+00	3.373E-02	3.694E+11	9.2883E+00	3.346E-02	3.664E+11	0.001

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Table 3 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	2.5717E+01	1.070E-06	1.542E+06				0.001
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6248E+01	2.902E-01	4.014E+11	2.6139E+01	2.908E-01	4.021E+11	0.000
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6257E+01	5.828E+00	8.055E+12	2.6148E+01	5.834E+00	8.062E+12	0.000
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6466E+01	8.195E-03	1.115E+10	2.6355E+01	8.187E-03	1.113E+10	0.001
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6473E+01	2.225E-01	3.025E+11	2.6362E+01	2.220E-01	3.018E+11	0.000
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	1.5598E+03	7.276E-08	2.849E+01				0.044
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	5.3682E+03	4.626E-03	1.530E+05	5.5303E+03	4.489E-03	1.386E+05	0.028
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	5.5968E+03	8.901E-02	2.708E+06	5.5277E+03	8.974E-02	2.774E+06	0.024
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	2.1175E+05	3.244E-06	6.894E-02				0.774
1s 3d <sup>3</sup> D <sub>2</sub>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	3.8309E+00	7.118E-06	4.622E+08				0.014
1s 3d <sup>3</sup> D <sub>3</sub>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	3.8743E+00	1.279E-02	8.119E+11	3.8580E+00	1.279E-02	8.125E+11	0.000
1s 3d <sup>1</sup> D <sub>2</sub>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	3.8760E+00	2.543E-01	1.613E+13	3.8597E+00	2.562E-01	1.625E+13	0.000
1s 4d <sup>3</sup> D <sub>2</sub>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	9.1664E+00	4.419E-05	5.012E+08				0.009
1s 4d <sup>3</sup> D <sub>3</sub>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	9.2714E+00	4.411E-02	4.890E+11	9.2331E+00	4.404E-02	4.880E+11	0.000
1s 4d <sup>1</sup> D <sub>2</sub>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	9.2758E+00	8.782E-01	9.726E+12	9.2375E+00	8.816E-01	9.761E+12	0.000
1s 5d <sup>3</sup> D <sub>2</sub>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.5812E+01	2.352E-04	3.364E+08				0.006
1s 5d <sup>3</sup> D <sub>3</sub>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.6240E+01	1.968E-01	2.723E+11	2.6136E+01	1.964E-01	2.716E+11	0.000
1s 5d <sup>1</sup> D <sub>2</sub>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.6259E+01	3.925E+00	5.424E+12	2.6155E+01	3.931E+00	5.429E+12	0.000
1s 5g <sup>3</sup> G <sub>4</sub>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.6466E+01	6.562E-05	8.927E+07				0.004
1s 5g <sup>3</sup> G <sub>3</sub>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.6471E+01	1.795E-03	2.440E+09	2.6361E+01	1.792E-03	2.437E+09	0.002
1s 5g <sup>1</sup> G <sub>4</sub>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.6601E+01	6.833E-02	9.201E+10	2.6490E+01	6.844E-02	9.214E+10	0.001
1s 6d <sup>3</sup> D <sub>2</sub>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.7871E+03	2.665E-05	7.950E+03	1.8323E+03	4.615E-05	1.298E+04	0.111
1s 6d <sup>3</sup> D <sub>3</sub>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	5.1604E+03	6.538E-03	2.340E+05	5.5079E+03	6.062E-03	1.888E+05	0.009
1s 6d <sup>1</sup> D <sub>2</sub>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	5.6121E+03	1.196E-01	3.619E+06	5.6823E+03	1.176E-01	3.443E+06	0.002
1s 6g <sup>3</sup> G <sub>4</sub>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.8628E+05	3.680E-06	1.011E-01				0.917
1s 6g <sup>3</sup> G <sub>3</sub>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	9.9701E+05	1.872E-05	1.795E-02				0.869
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>5</sub>	9.3170E+00	1.552E+00	1.084E+13	9.2773E+00	1.558E+00	1.088E+13	0.000
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>5</sub>	2.6394E+01	1.003E+01	8.734E+12	2.6281E+01	1.006E+01	8.758E+12	0.000
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>5</sub>	9.2152E+03	9.257E-02	6.610E+05	9.2775E+03	9.155E-02	6.395E+05	0.002
1s 5g <sup>3</sup> G <sub>4</sub>	1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	2.6394E+01	1.465E+01	1.275E+13	2.6281E+01	1.467E+01	1.277E+13	0.000
1s 5g <sup>3</sup> G <sub>5</sub>	1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	2.6525E+01	3.263E-01	2.812E+11	2.6411E+01	3.264E-01	2.813E+11	0.000
1s 5g <sup>1</sup> G <sub>4</sub>	1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	2.6529E+01	5.862E-03	5.051E+09	2.6415E+01	4.968E-03	4.281E+09	0.001
1s 6g <sup>3</sup> G <sub>4</sub>	1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	9.2359E+03	5.084E-02	3.614E+05	9.2564E+03	5.050E-02	3.544E+05	0.018
1s 6g <sup>3</sup> G <sub>5</sub>	1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	8.7873E+06	1.183E-06	9.290E-06				0.948
1s 3d <sup>3</sup> D <sub>3</sub>	1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	3.8727E+00	3.209E-12	1.586E+02				0.851
1s 4d <sup>3</sup> D <sub>3</sub>	1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	9.2624E+00	6.140E-11	5.305E+02				0.185
1s 5d <sup>3</sup> D <sub>3</sub>	1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	2.6168E+01	4.788E-09	5.183E+03				0.002
1s 5g <sup>3</sup> G <sub>4</sub>	1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	2.6392E+01	3.318E-01	3.530E+11	2.6281E+01	3.323E-01	3.536E+11	0.000
1s 5g <sup>3</sup> G <sub>3</sub>	1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	2.6397E+01	1.165E+01	1.239E+13	2.6286E+01	1.166E+01	1.241E+13	0.000
1s 5g <sup>3</sup> G <sub>5</sub>	1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	2.6523E+01	6.061E-03	6.385E+09	2.6411E+01	6.044E-03	6.367E+09	0.001
1s 5g <sup>1</sup> G <sub>4</sub>	1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	2.6527E+01	2.678E-01	2.820E+11	2.6415E+01	2.670E-01	2.812E+11	0.000
1s 6d <sup>3</sup> D <sub>3</sub>	1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	3.3388E+03	1.016E-10	6.754E-03				0.436
1s 6g <sup>3</sup> G <sub>4</sub>	1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	9.0013E+03	1.182E-03	1.081E+04	9.2564E+03	1.147E-03	9.845E+03	0.004
1s 6g <sup>3</sup> G <sub>3</sub>	1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	9.3695E+03	3.986E-02	3.365E+05	9.2564E+03	4.017E-02	3.445E+05	0.012
1s 6g <sup>3</sup> G <sub>5</sub>	1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	3.4069E+05	5.670E-07	3.620E-03				0.752
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	9.2640E+00	1.114E-07	9.625E+05				0.014
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	9.3167E+00	3.545E-02	3.027E+11	9.2773E+00	3.542E-02	3.024E+11	0.000
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	9.3184E+00	1.235E+00	1.054E+13	9.2790E+00	1.239E+00	1.057E+13	0.000
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6175E+01	1.994E-07	2.157E+05				0.031
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6391E+01	2.290E-01	2.437E+11	2.6281E+01	2.286E-01	2.432E+11	0.000
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6398E+01	7.983E+00	8.490E+12	2.6287E+01	8.001E+00	8.508E+12	0.000
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	3.4068E+03	1.222E-09	7.804E-02				0.960
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	8.9311E+03	2.180E-03	2.026E+04	9.2773E+03	2.080E-03	1.776E+04	0.042
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	9.4124E+03	7.208E-02	6.030E+05	9.2882E+03	7.274E-02	6.196E+05	0.031
1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	2.9962E+05	6.236E-07	5.149E-03				0.526
1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	1.9372E+06	4.406E-06	8.701E-04				0.711
1s 5g <sup>3</sup> G <sub>5</sub>	1s 6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	2.6474E+01	1.773E+01	1.298E+13	2.6361E+01	1.777E+01	1.301E+13	0.000
1s 6g <sup>3</sup> G <sub>5</sub>	1s 6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1.3897E+04	4.086E-02	1.085E+05	1.3933E+04	4.057E-02	1.063E+05	0.026
1s 5g <sup>3</sup> G <sub>4</sub>	1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	2.6342E+01	1.711E-06	1.496E+06				0.001
1s 5g <sup>3</sup> G <sub>5</sub>	1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	2.6473E+01	2.737E-01	2.369E+11	2.6361E+01	2.735E-01	2.366E+11	0.000
1s 5g <sup>1</sup> G <sub>4</sub>	1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	2.6477E+01	1.473E+01	1.274E+13	2.6365E+01	1.476E+01	1.277E+13	0.000
1s 6g <sup>3</sup> G <sub>4</sub>	1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	5.4809E+03	9.930E-09	2.004E-01				0.195
1s 6g <sup>3</sup> G <sub>5</sub>	1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1.3461E+04	6.513E-04	2.180E+03	1.3933E+04	6.242E-04	1.933E+03	0.002
1s 6g <sup>1</sup> G <sub>4</sub>	1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1.4116E+04	3.341E-02	1.017E+05	1.3934E+04	3.370E-02	1.043E+05	0.019
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	1.3378E+00	7.720E-04	9.590E+11	1.3323E+00	8.087E-04	1.004E+12	0.015
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	1.3387E+00	3.810E-04	4.727E+11	1.3331E+00	3.785E-04	4.696E+11	0.001
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	1.3964E+00	2.525E-03	2.879E+12	1.3905E+00	2.566E-03	2.926E+12	0.019
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	1.4019E+00	4.638E-04	5.247E+11	1.3961E+00	4.626E-04	5.232E+11	0.004
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	3.4180E+00	3.432E-03	6.531E+11	3.4039E+00	3.453E-03	6.570E+11	0.006
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	3.4195E+00	1.667E-03	3.171E+11	3.4054E+00	1.625E-03	3.089E+11	0.006
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	3.5305E+00	1.085E-02	1.935E+12	3.5159E+00	1.077E-02	1.922E+12	0.004

(continued on next page)

Table 3 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	3.5405E+00	1.974E-03	3.501E+11	3.5260E+00	1.955E-03	3.467E+11	0.005
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	7.4166E+00	1.104E-02	4.464E+11	7.3859E+00	1.108E-02	4.478E+11	0.004
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	7.4194E+00	5.355E-03	2.163E+11	7.3886E+00	5.225E-03	2.110E+11	0.004
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	7.6388E+00	3.445E-02	1.313E+12	7.6070E+00	3.431E-02	1.307E+12	0.004
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	7.6581E+00	6.277E-03	2.380E+11	7.6265E+00	6.235E-03	2.363E+11	0.004
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	7.7310E+00	1.468E-09	5.461E+04				0.174
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	1.6020E+01	3.789E-02	3.283E+11	1.5955E+01	3.806E-02	3.296E+11	0.001
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	1.6027E+01	1.835E-02	1.589E+11	1.5961E+01	1.794E-02	1.553E+11	0.001
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	1.6551E+01	1.189E-01	9.653E+11	1.6483E+01	1.187E-01	9.639E+11	0.001
1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	1.6597E+01	2.172E-02	1.753E+11	1.6529E+01	2.161E-02	1.744E+11	0.000
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	1.6773E+01	1.742E-08	1.377E+05				0.145
1s 6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	4.2860E+01	2.134E-01	2.582E+11	4.2690E+01	2.157E-01	2.610E+11	0.005
1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	4.2887E+01	1.033E-01	1.249E+11	4.2622E+01	1.000E-01	1.214E+11	0.006
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	4.5091E+01	7.068E-01	7.730E+11	4.4909E+01	7.019E-01	7.672E+11	0.005
1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	4.5287E+01	1.298E-01	1.408E+11	4.5084E+01	1.247E-01	1.352E+11	0.004
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7s <sup>3</sup> S <sub>1</sub>	4.6051E+01	2.376E-07	2.491E+05				0.119
1s <sup>2</sup> 1S <sub>0</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup> 8	3.1400E-01	2.473E-03	5.575E+13	3.1277E-01	2.233E-03	5.033E+13	0.014
1s 2s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.3266E+00	8.485E-03	1.072E+13	1.3210E+00	8.499E-03	1.073E+13	0.001
1s 2s <sup>1</sup> S <sub>0</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.3387E+00	3.675E-03	4.559E+12	1.3333E+00	3.455E-03	4.285E+12	0.005
1s 3s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	3.3968E+00	1.851E-02	3.568E+12	3.3827E+00	1.869E-02	3.601E+12	0.003
1s 3s <sup>1</sup> S <sub>0</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	3.4178E+00	8.150E-03	1.551E+12	3.4039E+00	7.676E-03	1.460E+12	0.004
1s 3d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	3.5373E+00	2.636E-03	4.685E+11	3.5225E+00	2.629E-03	4.672E+11	0.007
1s 3d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	3.5388E+00	5.820E-04	1.033E+11	3.5240E+00	5.690E-04	1.010E+11	0.014
1s 3d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	3.5757E+00	3.300E-06	5.739E+08	3.5607E+00	4.032E-06	7.011E+08	0.058
1s 4s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	7.3716E+00	4.040E-02	1.653E+12	7.3412E+00	4.095E-02	1.675E+12	0.005
1s 4s <sup>1</sup> S <sub>0</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	7.4116E+00	1.804E-02	7.300E+11	7.3814E+00	1.691E-02	6.845E+11	0.013
1s 4d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	7.6476E+00	1.361E-02	5.173E+11	7.6163E+00	1.350E-02	5.132E+11	0.004
1s 4d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	7.6504E+00	2.969E-03	1.128E+11	7.6191E+00	2.915E-03	1.106E+11	0.011
1s 4d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	7.7236E+00	1.514E-05	5.643E+08	7.6918E+00	1.914E-05	7.134E+08	0.050
1s 5s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.5898E+01	1.045E-01	9.197E+11	1.5833E+01	1.061E-01	9.332E+11	0.005
1s 5s <sup>1</sup> S <sub>0</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.5991E+01	4.695E-02	4.082E+11	1.5927E+01	4.406E-02	3.829E+11	0.014
1s 5d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.6554E+01	6.096E-02	4.946E+11	1.6489E+01	6.030E-02	4.890E+11	0.002
1s 5d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.6561E+01	1.320E-02	1.070E+11	1.6495E+01	1.298E-02	1.052E+11	0.007
1s 5d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.6737E+01	6.527E-05	5.181E+08	1.6670E+01	8.178E-05	6.487E+08	0.033
1s 6s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.2260E+01	4.475E-01	5.571E+11	4.2057E+01	4.571E-01	5.697E+11	0.006
1s 6s <sup>1</sup> S <sub>0</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.2638E+01	2.029E-01	2.482E+11	4.2377E+01	1.912E-01	2.347E+11	0.009
1s 6d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.4993E+01	4.312E-01	4.736E+11	4.4844E+01	4.266E-01	4.677E+11	0.002
1s 6d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.5021E+01	9.291E-02	1.019E+11	4.4837E+01	9.088E-02	9.966E+10	0.002
1s 6d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.5778E+01	4.619E-04	4.901E+08	4.5600E+01	3.977E-04	4.217E+08	0.019
1s 7s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	7.6504E+03	4.971E-02	1.888E+06	7.3461E+03	5.274E-02	2.154E+06	0.473
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	1.3376E+00	3.292E-04	1.227E+12	1.3321E+00	3.285E-04	1.224E+12	0.026
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	1.4017E+00	1.114E-03	3.782E+12	1.3959E+00	1.070E-03	3.634E+12	0.019
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	3.4164E+00	1.425E-03	8.144E+11	3.4026E+00	1.427E-03	8.155E+11	0.006
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	3.5388E+00	4.562E-03	2.430E+12	3.5246E+00	4.493E-03	2.392E+12	0.001
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	7.4094E+00	4.589E-03	5.575E+11	7.3798E+00	4.609E-03	5.597E+11	0.001
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	7.6504E+00	1.442E-02	1.643E+12	7.6200E+00	1.430E-02	1.629E+12	0.002
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	1.5987E+01	1.568E-02	4.091E+11	1.5926E+01	1.585E-02	4.135E+11	0.008
1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	1.6561E+01	4.949E-02	1.204E+12	1.6498E+01	4.952E-02	1.203E+12	0.007
1s 6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	4.2620E+01	8.694E-02	3.193E+11	4.2488E+01	8.468E-02	3.102E+11	0.004
1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	4.5020E+01	2.908E-01	9.571E+11	4.4858E+01	2.959E-01	9.728E+11	0.004
1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	1.5939E+06	1.021E-04	2.681E-01				0.803
1s 2s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.3265E+00	4.036E-03	1.530E+13	1.3210E+00	3.995E-03	1.514E+13	0.003
1s 3s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	3.3967E+00	8.794E-03	5.084E+12	3.3830E+00	8.817E-03	5.095E+12	0.006
1s 3d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	3.5387E+00	1.077E-03	5.739E+11	3.5243E+00	1.057E-03	5.628E+11	0.014
1s 4s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	7.3711E+00	1.921E-02	2.358E+12	7.3425E+00	1.936E-02	2.376E+12	0.007
1s 4d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	7.6499E+00	5.527E-03	6.300E+11	7.6205E+00	5.438E-03	6.193E+11	0.010
1s 5s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.5896E+01	4.976E-02	1.314E+12	1.5839E+01	5.030E-02	1.326E+12	0.007
1s 5d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.6558E+01	2.465E-02	5.997E+11	1.6502E+01	2.430E-02	5.902E+11	0.006
1s 6s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.2244E+01	2.130E-01	7.963E+11	4.2099E+01	2.165E-01	8.080E+11	0.007
1s 6d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.5003E+01	1.739E-01	5.729E+11	4.4885E+01	1.725E-01	5.665E+11	0.001
1s 7s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	7.1550E+03	2.549E-02	3.321E+06	8.8861E+03	2.046E-02	1.714E+06	0.480
1s 2s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3253E+00	1.891E-02	1.437E+13	1.3197E+00	1.925E-02	1.462E+13	0.001
1s 3s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.3884E+00	3.934E-02	4.571E+12	3.3744E+00	3.973E-02	4.615E+12	0.005
1s 3d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.5282E+00	3.283E-04	3.518E+10	3.5135E+00	3.304E-04	3.541E+10	0.010
1s 3d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.5297E+00	3.595E-05	3.849E+09	3.5150E+00	3.345E-05	3.581E+09	0.017
1s 3d <sup>3</sup> D <sub>3</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.5650E+00	3.513E-03	3.687E+11	3.5501E+00	3.455E-03	3.626E+11	0.013
1s 3d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.5665E+00	2.544E-04	2.668E+10	3.5515E+00	2.446E-04	2.565E+10	0.013
1s 4s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.3324E+00	8.272E-02	2.052E+12	7.3023E+00	8.341E-02	2.069E+12	0.007
1s 4d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.6054E+00	1.768E-03	4.077E+10	7.5744E+00	1.757E-03	4.050E+10	0.006
1s 4d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.6082E+00	1.921E-04	4.428E+09	7.5772E+00	1.813E-04	4.178E+09	0.008
1s 4d <sup>3</sup> D <sub>3</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.6776E+00	1.856E-02	4.201E+11	7.6461E+00	1.822E-02	4.122E+11	0.008

(continued on next page)

Table 3 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	A (s <sup>-1</sup> )	$\lambda$ (Å)	gf	A (s <sup>-1</sup> )	
1s 4d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.6806E+00	1.326E-03	2.999E+10	7.6491E+00	1.284E-03	2.903E+10	0.009
1s 5s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.5717E+01	2.047E-01	1.106E+12	1.5653E+01	2.060E-01	1.112E+12	0.007
1s 5d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6358E+01	8.043E-03	4.010E+10	1.6293E+01	7.930E-03	3.951E+10	0.003
1s 5d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6364E+01	8.712E-04	4.340E+09	1.6300E+01	8.288E-04	4.126E+09	0.004
1s 5d <sup>3</sup> D <sub>3</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6529E+01	8.380E-02	4.092E+11	1.6463E+01	8.203E-02	4.003E+11	0.004
1s 5d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6536E+01	5.940E-03	2.898E+10	1.6471E+01	5.769E-03	2.812E+10	0.005
1s 5g <sup>3</sup> G <sub>3</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6620E+01	2.424E-09	1.171E+04				0.041
1s 6s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.1005E+01	7.989E-01	6.339E+11	4.0810E+01	8.054E-01	6.397E+11	0.007
1s 6d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.3572E+01	5.481E-02	3.851E+10	4.3429E+01	5.418E-02	3.800E+10	0.003
1s 6d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.3599E+01	5.937E-03	4.167E+09	4.3422E+01	5.899E-03	4.138E+09	0.000
1s 6d <sup>3</sup> D <sub>3</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4278E+01	5.768E-01	3.925E+11	4.4127E+01	5.633E-01	3.826E+11	0.003
1s 6d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4308E+01	4.074E-02	2.768E+10	4.4138E+01	3.914E-02	2.657E+10	0.001
1s 6g <sup>3</sup> G <sub>3</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4659E+01	4.072E-08	2.724E+04				0.013
1s 7s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.1691E+03	7.901E-01	7.712E+08	1.1590E+03	7.980E-01	7.858E+08	0.072
1s 2p <sup>3</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	1.3362E+00	3.096E-02	2.313E+13	1.3307E+00	3.108E-02	2.321E+13	0.001
1s 2p <sup>3</sup> P <sub>2</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	1.3946E+00	5.230E-03	3.587E+12	1.3888E+00	5.160E-03	3.539E+12	0.008
1s 2p <sup>1</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	1.4001E+00	8.791E-04	5.983E+11	1.3943E+00	8.081E-04	5.498E+11	0.013
1s 3p <sup>3</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	3.4075E+00	6.964E-02	8.001E+12	3.3932E+00	6.971E-02	8.008E+12	0.001
1s 3p <sup>3</sup> P <sub>2</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	3.5193E+00	1.286E-02	1.385E+12	3.5045E+00	1.286E-02	1.385E+12	0.001
1s 3p <sup>1</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	3.5292E+00	2.078E-03	2.225E+11	3.5145E+00	1.921E-03	2.057E+11	0.003
1s 4p <sup>3</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	7.3673E+00	1.429E-01	3.511E+12	7.3356E+00	1.431E-01	3.519E+12	0.001
1s 4p <sup>3</sup> P <sub>2</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	7.5864E+00	2.803E-02	6.498E+11	7.5537E+00	2.826E-02	6.552E+11	0.001
1s 4p <sup>1</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	7.6055E+00	4.508E-03	1.040E+11	7.5729E+00	4.133E-03	9.533E+10	0.003
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>2</sub>	7.6759E+00	4.363E-03	9.879E+10	7.6429E+00	4.349E-03	9.848E+10	0.006
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>2</sub>	7.6774E+00	3.185E-04	7.208E+09	7.6444E+00	3.188E-04	7.218E+09	0.006
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>2</sub>	7.7133E+00	3.659E-07	8.205E+06				0.014
1s 5p <sup>3</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	1.5792E+01	3.371E-01	1.803E+12	1.5722E+01	3.385E-01	1.811E+12	0.001
1s 5p <sup>3</sup> P <sub>2</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	1.6307E+01	7.040E-02	3.532E+11	1.6234E+01	7.148E-02	3.587E+11	0.001
1s 5p <sup>1</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	1.6352E+01	1.134E-02	5.658E+10	1.6279E+01	1.027E-02	5.130E+10	0.004
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>2</sub>	1.6519E+01	3.339E-02	1.633E+11	1.6446E+01	3.340E-02	1.633E+11	0.001
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>2</sub>	1.6522E+01	2.432E-03	1.189E+10	1.6450E+01	2.444E-03	1.195E+10	0.001
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>2</sub>	1.6607E+01	2.729E-06	1.320E+07				0.014
1s 6p <sup>3</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	4.1263E+01	1.251E+00	9.802E+11	4.1063E+01	1.250E+00	9.806E+11	0.001
1s 6p <sup>3</sup> P <sub>2</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	4.3326E+01	2.912E-01	2.069E+11	4.3112E+01	2.974E-01	2.116E+11	0.001
1s 6p <sup>1</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	4.3508E+01	4.727E-02	3.331E+10	4.3273E+01	4.648E-02	3.283E+10	0.001
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>2</sub>	4.4197E+01	3.118E-01	2.129E+11	4.4000E+01	3.118E-01	2.130E+11	0.000
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>2</sub>	4.4212E+01	2.269E-02	1.548E+10	4.4000E+01	2.271E-02	1.552E+10	0.000
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>2</sub>	4.4566E+01	2.533E-05	1.702E+07				0.015
1s 7p <sup>3</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	1.2946E+03	6.694E-01	5.328E+08	1.2624E+03	6.847E-01	5.683E+08	0.085
1s 7p <sup>3</sup> P <sub>2</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	2.0924E+04	7.595E-03	2.314E+04	1.5290E+04	1.048E-02	5.933E+04	0.623
1s 2p <sup>3</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	1.3362E+00	6.637E-03	8.265E+12	1.3307E+00	6.631E-03	8.256E+12	0.004
1s 2p <sup>3</sup> P <sub>2</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	1.3371E+00	1.257E-02	1.564E+13	1.3315E+00	1.257E-02	1.563E+13	0.002
1s 2p <sup>1</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	1.3946E+00	5.723E-04	6.542E+11	1.3888E+00	5.618E-04	6.421E+11	0.010
1s 2p <sup>1</sup> P <sub>2</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	1.4001E+00	2.555E-03	2.898E+12	1.3943E+00	2.472E-03	2.803E+12	0.006
1s 3p <sup>3</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	3.4074E+00	1.488E-02	2.849E+12	3.3932E+00	1.485E-02	2.844E+12	0.000
1s 3p <sup>3</sup> P <sub>2</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	3.4088E+00	2.822E-02	5.400E+12	3.3947E+00	2.819E-02	5.393E+12	0.000
1s 3p <sup>1</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	3.5192E+00	1.406E-03	2.523E+11	3.5045E+00	1.401E-03	2.515E+11	0.000
1s 3p <sup>1</sup> P <sub>2</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	3.5291E+00	6.358E-03	1.135E+12	3.5145E+00	6.259E-03	1.117E+12	0.000
1s 4p <sup>3</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	7.3668E+00	3.045E-02	1.248E+12	7.3357E+00	3.052E-02	1.250E+12	0.000
1s 4p <sup>3</sup> P <sub>2</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	7.3695E+00	5.785E-02	2.368E+12	7.3384E+00	5.791E-02	2.370E+12	0.000
1s 4p <sup>1</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	7.5859E+00	3.056E-03	1.181E+11	7.5538E+00	3.082E-03	1.190E+11	0.000
1s 4p <sup>1</sup> P <sub>2</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	7.6050E+00	1.395E-02	5.361E+11	7.5730E+00	1.384E-02	5.323E+11	0.000
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>1</sub>	7.6769E+00	2.803E-03	1.058E+11	7.6445E+00	2.797E-03	1.055E+11	0.006
1s 5p <sup>3</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	1.5790E+01	7.173E-02	6.397E+11	1.5722E+01	7.230E-02	6.448E+11	0.002
1s 5p <sup>3</sup> P <sub>2</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	1.5796E+01	1.364E-01	1.215E+12	1.5728E+01	1.369E-01	1.220E+12	0.002
1s 5p <sup>1</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	1.6305E+01	7.659E-03	6.406E+10	1.6235E+01	7.804E-03	6.528E+10	0.001
1s 5p <sup>1</sup> P <sub>2</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	1.6349E+01	3.522E-02	2.929E+11	1.6280E+01	3.519E-02	2.927E+11	0.002
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>1</sub>	1.6520E+01	2.145E-02	1.748E+11	1.6451E+01	2.148E-02	1.750E+11	0.001
1s 6p <sup>3</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	4.1248E+01	2.657E-01	3.472E+11	4.1067E+01	2.734E-01	3.574E+11	0.000
1s 6p <sup>3</sup> P <sub>2</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	4.1273E+01	5.057E-01	6.601E+11	4.1003E+01	5.090E-01	6.675E+11	0.000
1s 6p <sup>1</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	4.3310E+01	3.160E-02	3.746E+10	4.3116E+01	3.243E-02	3.846E+10	0.000
1s 6p <sup>1</sup> P <sub>2</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	4.3491E+01	1.469E-01	1.726E+11	4.3277E+01	1.432E-01	1.686E+11	0.000
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>1</sub>	4.4195E+01	2.002E-01	2.279E+11	4.4004E+01	2.007E-01	2.285E+11	0.000
1s 7p <sup>3</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	1.2801E+03	1.445E-01	1.960E+08	1.2659E+03	1.475E-01	2.029E+08	0.069
1s 7p <sup>3</sup> P <sub>2</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	1.2951E+03	2.699E-01	3.578E+08	1.2292E+03	2.853E-01	4.163E+08	0.073
1s 7p <sup>1</sup> P <sub>0</sub>	1s 7d <sup>3</sup> D <sub>1</sub>	1.7684E+04	9.719E-04	6.910E+03				0.539
1s 2 <sup>1</sup> S <sub>0</sub>	1s 7p <sup>1</sup> P <sub>0</sub>	3.1400E-01	6.133E-03	1.383E+14	3.1269E-01	6.558E-03	1.478E+14	0.034
1s 2s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>1</sup> P <sub>0</sub>	1.3252E+00	3.384E-03	4.284E+12	1.3196E+00	3.343E-03	4.232E+12	0.001
1s 2s <sup>1</sup> S <sub>0</sub>	1s 7p <sup>1</sup> P <sub>0</sub>	1.3373E+00	8.044E-03	1.000E+13	1.3319E+00	8.135E-03	1.011E+13	0.002
1s 3s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>1</sup> P <sub>0</sub>	3.3877E+00	7.007E-03	1.358E+12	3.3738E+00	6.862E-03	1.329E+12	0.004
1s 3s <sup>1</sup> S <sub>0</sub>	1s 7p <sup>1</sup> P <sub>0</sub>	3.4087E+00	1.698E-02	3.249E+12	3.3948E+00	1.687E-02	3.228E+12	0.007

(continued on next page)



Table 3 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	gf	$A$ ( $s^{-1}$ )	
1s 3d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	3.5275E+00	5.455E-05	9.748E+09	3.5128E+00	6.841E-05	1.222E+10	0.020
1s 3d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	3.5290E+00	1.667E-04	2.975E+10	3.5143E+00	1.567E-04	2.797E+10	0.023
1s 3d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	3.5657E+00	2.254E-03	3.941E+11	3.5508E+00	2.218E-03	3.879E+11	0.018
1s 4s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	7.3292E+00	1.467E-02	6.074E+11	7.2994E+00	1.435E-02	5.938E+11	0.006
1s 4s <sup>1</sup> S <sub>0</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	7.3687E+00	3.615E-02	1.480E+12	7.3391E+00	3.552E-02	1.453E+12	0.018
1s 4d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	7.6019E+00	2.848E-04	1.096E+10	7.5713E+00	3.513E-04	1.351E+10	0.015
1s 4d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	7.6047E+00	8.821E-04	3.391E+10	7.5741E+00	8.289E-04	3.185E+10	0.015
1s 4d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	7.6770E+00	1.182E-02	4.460E+11	7.6459E+00	1.171E-02	4.416E+11	0.012
1s 5s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.5702E+01	3.615E-02	3.260E+11	1.5640E+01	3.530E-02	3.181E+11	0.006
1s 5s <sup>1</sup> S <sub>0</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.5793E+01	8.962E-02	7.989E+11	1.5731E+01	8.793E-02	7.833E+11	0.020
1s 5d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.6342E+01	1.272E-03	1.059E+10	1.6279E+01	1.567E-03	1.303E+10	0.010
1s 5d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.6348E+01	3.965E-03	3.299E+10	1.6286E+01	3.728E-03	3.099E+10	0.009
1s 5d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.6520E+01	5.302E-02	4.320E+11	1.6456E+01	5.276E-02	4.295E+11	0.008
1s 6s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.0902E+01	1.398E-01	1.858E+11	4.0720E+01	1.370E-01	1.821E+11	0.007
1s 6s <sup>1</sup> S <sub>0</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.1256E+01	3.498E-01	4.569E+11	4.1020E+01	3.451E-01	4.522E+11	0.014
1s 6d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.3457E+01	8.540E-03	1.005E+10	4.3327E+01	1.016E-02	1.193E+10	0.003
1s 6d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.3483E+01	2.672E-02	3.142E+10	4.3321E+01	2.490E-02	2.926E+10	0.003
1s 6d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.4189E+01	3.623E-01	4.126E+11	4.4032E+01	3.636E-01	4.134E+11	0.002
1s 7s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.0915E+03	1.520E-01	2.837E+08	1.0907E+03	1.478E-01	2.739E+08	0.066
1s 7s <sup>1</sup> S <sub>0</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.2741E+03	3.038E-01	4.162E+08	1.2422E+03	3.169E-01	4.528E+08	0.028
1s 7d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	7.6625E+04	3.302E-04	1.250E+02	7.6225E+04	3.302E-04	1.250E+02	0.321
1s 7d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	2.3287E+05	3.390E-04	1.390E+01	2.3287E+05	3.390E-04	1.390E+01	0.942
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	1.3942E+00	5.071E-02	2.486E+13	1.3883E+00	5.182E-02	2.540E+13	0.003
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	3.5164E+00	1.199E-01	9.238E+12	3.5016E+00	1.209E-01	9.318E+12	0.001
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	7.5732E+00	2.553E-01	4.241E+12	7.5406E+00	2.573E-01	4.276E+12	0.001
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	7.6624E+00	2.543E-04	4.128E+09	7.6295E+00	2.555E-04	4.148E+09	0.002
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	7.6639E+00	1.167E-05	1.894E+08	7.6639E+00	1.167E-05	1.894E+08	0.001
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	7.6985E+00	5.558E-03	8.936E+10	7.6654E+00	5.556E-03	8.934E+10	0.000
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	7.6996E+00	2.073E-04	3.331E+09	7.6665E+00	2.067E-04	3.323E+09	0.001
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	1.6246E+01	6.275E-01	2.266E+12	1.6174E+01	6.344E-01	2.291E+12	0.001
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	1.6456E+01	1.973E-03	6.943E+09	1.6385E+01	1.981E-03	6.974E+09	0.002
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	1.6460E+01	9.278E-05	3.263E+08	1.6388E+01	9.234E-05	3.248E+08	0.001
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	1.6542E+01	4.307E-02	1.500E+11	1.6469E+01	4.303E-02	1.498E+11	0.001
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	1.6544E+01	1.605E-03	5.589E+09	1.6472E+01	1.600E-03	5.573E+09	0.000
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	4.2898E+01	2.505E+00	1.297E+12	4.2690E+01	2.541E+00	1.317E+12	0.001
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	4.3752E+01	1.834E-02	9.130E+09	4.3561E+01	1.845E-02	9.187E+09	0.001
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	4.3767E+01	8.773E-04	4.364E+08	4.3561E+01	9.216E-04	4.589E+08	0.000
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	4.4102E+01	4.014E-01	1.966E+11	4.3907E+01	4.009E-01	1.965E+11	0.001
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	4.4114E+01	1.496E-02	7.327E+09	4.3908E+01	1.483E-02	7.268E+09	0.000
1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	4.4320E+01	3.747E-11	3.577E+01	4.4320E+01	3.747E-11	3.577E+01	0.055
1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	3.5985E+03	4.118E-01	3.031E+07	3.3938E+03	4.365E-01	3.581E+07	0.194
1s 3d <sup>3</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.5247E+00	1.202E-01	9.218E+12	3.5099E+00	1.203E-01	9.226E+12	0.001
1s 3d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.5615E+00	7.764E-03	5.832E+11	3.5464E+00	7.675E-03	5.766E+11	0.002
1s 3d <sup>1</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.5629E+00	4.626E-04	3.472E+10	3.5478E+00	4.247E-04	3.188E+10	0.001
1s 4d <sup>3</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	7.5891E+00	3.358E-01	5.555E+12	7.5575E+00	3.361E-01	5.561E+12	0.001
1s 4d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	7.6610E+00	2.246E-02	3.646E+11	7.6289E+00	2.240E-02	3.637E+11	0.002
1s 4d <sup>1</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	7.6640E+00	1.423E-03	2.309E+10	7.6319E+00	1.320E-03	2.142E+10	0.002
1s 5d <sup>3</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6283E+01	8.980E-01	3.228E+12	1.6216E+01	8.992E-01	3.231E+12	0.001
1s 5d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6452E+01	6.182E-02	2.176E+11	1.6384E+01	6.195E-02	2.180E+11	0.001
1s 5d <sup>1</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6459E+01	4.017E-03	1.413E+10	1.6391E+01	3.740E-03	1.315E+10	0.002
1s 5g <sup>3</sup> G <sub>4</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6541E+01	1.113E-02	3.876E+10	1.6470E+01	1.117E-02	3.890E+10	0.003
1s 5g <sup>3</sup> G <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6543E+01	4.140E-04	1.442E+09	1.6472E+01	4.143E-04	1.442E+09	0.005
1s 5g <sup>1</sup> G <sub>4</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6593E+01	1.212E-10	4.195E+02	1.6593E+01	1.212E-10	4.195E+02	0.342
1s 6d <sup>3</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.3043E+01	3.664E+00	1.885E+12	4.2880E+01	3.666E+00	1.884E+12	0.000
1s 6d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.3731E+01	2.630E-01	1.310E+11	4.3560E+01	2.642E-01	1.315E+11	0.001
1s 6d <sup>1</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.3761E+01	1.732E-02	8.618E+09	4.3571E+01	1.851E-02	9.214E+09	0.002
1s 6g <sup>3</sup> G <sub>4</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.4095E+01	1.866E-01	9.147E+10	4.3907E+01	1.868E-01	9.159E+10	0.001
1s 6g <sup>3</sup> G <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.4103E+01	6.915E-03	3.388E+09	4.3907E+01	6.929E-03	3.396E+09	0.002
1s 6g <sup>1</sup> G <sub>4</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.4313E+01	1.954E-11	9.481E+00	4.4313E+01	1.954E-11	9.481E+00	0.976
1s 7d <sup>3</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.2661E+03	3.105E-01	1.626E+07	4.3591E+03	3.024E-01	1.504E+07	0.021
1s 7d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.3237E+05	3.848E-04	6.791E+00	2.3237E+05	3.848E-04	6.791E+00	0.802
1s 2s <sup>3</sup> S <sub>1</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.3248E+00	4.328E-14	3.290E+01	1.3248E+00	4.328E-14	3.290E+01	1.000
1s 3s <sup>3</sup> S <sub>1</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.3851E+00	6.587E-08	7.668E+06	3.3851E+00	6.587E-08	7.668E+06	0.230
1s 3d <sup>3</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.5247E+00	8.645E-03	9.283E+11	3.5099E+00	8.646E-03	9.283E+11	0.001
1s 3d <sup>3</sup> D <sub>1</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.5262E+00	7.731E-02	8.295E+12	3.5113E+00	7.733E-02	8.296E+12	0.000
1s 3d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.5614E+00	3.920E-04	4.123E+10	3.5464E+00	3.833E-04	4.031E+10	0.009
1s 3d <sup>1</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.5628E+00	5.413E-03	5.689E+11	3.5478E+00	5.315E-03	5.586E+11	0.001
1s 4s <sup>3</sup> S <sub>1</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	7.3170E+00	2.637E-07	6.571E+06	7.3170E+00	2.637E-07	6.571E+06	0.196
1s 4d <sup>3</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	7.5889E+00	2.421E-02	5.609E+11	7.5575E+00	2.425E-02	5.616E+11	0.001
1s 4d <sup>3</sup> D <sub>1</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	7.5917E+00	2.162E-01	5.004E+12	7.5603E+00	2.161E-01	5.003E+12	0.000
1s 4d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	7.6607E+00	1.123E-03	2.554E+10	7.6289E+00	1.119E-03	2.543E+10	0.001

(continued on next page)

Table 3 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	
1s 4d <sup>1</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	7.6637E+00	1.559E-02	3.541E+11	7.6319E+00	1.544E-02	3.507E+11	0.000
1s 5s <sup>3</sup> S <sub>1</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.5646E+01	7.887E-07	4.298E+06				0.141
1s 5d <sup>3</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.6281E+01	6.482E-02	3.262E+11	1.6216E+01	6.497E-02	3.268E+11	0.001
1s 5d <sup>3</sup> D <sub>1</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.6288E+01	5.783E-01	2.908E+12	1.6222E+01	5.783E-01	2.906E+12	0.000
1s 5d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.6451E+01	3.084E-03	1.520E+10	1.6384E+01	3.094E-03	1.524E+10	0.001
1s 5d <sup>1</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.6458E+01	4.283E-02	2.110E+11	1.6391E+01	4.261E-02	2.098E+11	0.000
1s 5g <sup>3</sup> G <sub>3</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.6541E+01	8.275E-03	4.035E+10	1.6472E+01	8.273E-03	4.033E+10	0.005
1s 6s <sup>3</sup> S <sub>1</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.0528E+01	3.074E-06	2.497E+06				0.094
1s 6d <sup>3</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.3034E+01	2.645E-01	1.905E+11	4.2880E+01	2.675E-01	1.924E+11	0.000
1s 6d <sup>3</sup> D <sub>1</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.3060E+01	2.361E+00	1.698E+12	4.2874E+01	2.361E+00	1.699E+12	0.000
1s 6d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.3722E+01	1.309E-02	9.135E+09	4.3560E+01	1.319E-02	9.200E+09	0.000
1s 6d <sup>1</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.3752E+01	1.821E-01	1.269E+11	4.3571E+01	1.795E-01	1.251E+11	0.000
1s 6g <sup>3</sup> G <sub>3</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.4094E+01	1.383E-01	9.486E+10	4.3907E+01	1.384E-01	9.499E+10	0.002
1s 7s <sup>3</sup> S <sub>1</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	8.7540E+02	1.283E-06	2.234E+03				0.488
1s 7d <sup>3</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.1806E+03	2.294E-02	1.751E+06	4.3602E+03	2.205E-02	1.534E+06	0.022
1s 7d <sup>3</sup> D <sub>1</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.3395E+03	1.964E-01	1.391E+07	4.3189E+03	1.965E-01	1.393E+07	0.003
1s 7d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.0992E+05	4.006E-05	4.423E+00				0.425
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	1.3358E+00	3.593E-05	2.686E+10	1.3303E+00	2.913E-05	2.177E+10	0.084
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	1.3942E+00	3.581E-03	2.458E+12	1.3883E+00	3.597E-03	2.468E+12	0.003
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	1.3997E+00	3.271E-02	2.227E+13	1.3939E+00	3.326E-02	2.264E+13	0.003
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	3.4047E+00	7.199E-05	8.285E+09	3.3905E+00	5.619E-05	6.465E+09	0.008
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	3.5163E+00	8.443E-03	9.110E+11	3.5016E+00	8.386E-03	9.046E+11	0.000
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	3.5262E+00	7.729E-02	8.293E+12	3.5116E+00	7.772E-02	8.336E+12	0.000
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	7.3543E+00	1.374E-04	3.390E+09	7.3231E+00	1.131E-04	2.791E+09	0.017
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	7.5726E+00	1.795E-02	4.176E+11	7.5404E+00	1.783E-02	4.149E+11	0.000
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	7.5916E+00	1.652E-01	3.823E+12	7.5595E+00	1.654E-01	3.829E+12	0.001
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	7.6618E+00	1.695E-05	3.852E+08	7.6293E+00	2.044E-05	4.644E+08	0.001
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	7.6633E+00	1.769E-04	4.018E+09	7.6308E+00	1.751E-04	3.978E+09	0.001
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	7.6990E+00	4.105E-03	9.239E+10	7.6663E+00	4.113E-03	9.258E+10	0.001
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	1.5732E+01	3.089E-04	1.665E+09	1.5665E+01	2.767E-04	1.492E+09	0.013
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	1.6243E+01	4.406E-02	2.228E+11	1.6173E+01	4.394E-02	2.222E+11	0.002
1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	1.6288E+01	4.077E-01	2.050E+12	1.6218E+01	4.078E-01	2.051E+12	0.002
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	1.6454E+01	1.308E-04	6.446E+08	1.6384E+01	1.575E-04	7.764E+08	0.001
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	1.6457E+01	1.369E-03	6.741E+09	1.6387E+01	1.355E-03	6.674E+09	0.001
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	1.6542E+01	3.181E-02	1.551E+11	1.6471E+01	3.185E-02	1.553E+11	0.000
1s 6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	4.0858E+01	1.084E-03	8.665E+08	4.0674E+01	2.276E-03	1.819E+09	0.010
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	4.2880E+01	1.755E-01	1.273E+11	4.2684E+01	1.759E-01	1.277E+11	0.000
1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	4.3058E+01	1.639E+00	1.180E+12	4.2841E+01	1.631E+00	1.175E+12	0.000
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	4.3733E+01	1.210E-03	8.439E+08	4.3554E+01	1.357E-03	9.465E+08	0.002
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	4.3748E+01	1.269E-02	8.846E+09	4.3554E+01	1.249E-02	8.711E+09	0.000
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	4.4094E+01	2.963E-01	2.033E+11	4.3901E+01	2.970E-01	2.038E+11	0.000
1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	9.8772E+02	8.471E-04	1.158E+06	9.7564E+02	1.201E-03	1.670E+06	0.072
1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	3.4747E+03	2.994E-02	3.308E+06	3.3529E+03	3.063E-02	3.604E+06	0.158
1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	4.4062E+03	2.162E-01	1.486E+07	4.0947E+03	2.330E-01	1.838E+07	0.194
1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	1.7858E+05	3.308E-05	1.384E+00				0.998
1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7d <sup>1</sup> D <sub>2</sub>	1.2412E+06	4.984E-05	4.316E-02				0.703
1s 3d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	3.5600E+00	1.630E-01	9.533E+12	3.5449E+00	1.642E-01	9.604E+12	0.001
1s 4d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	7.6543E+00	4.614E-01	5.836E+12	7.6222E+00	4.634E-01	5.861E+12	0.001
1s 5d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.6421E+01	1.249E+00	3.434E+12	1.6353E+01	1.253E+00	3.444E+12	0.001
1s 5g <sup>3</sup> G <sub>4</sub>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.6509E+01	3.674E-04	9.991E+08	1.6439E+01	3.709E-04	1.008E+09	0.002
1s 5g <sup>3</sup> G <sub>3</sub>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.6511E+01	1.046E-05	2.843E+07				0.007
1s 5g <sup>3</sup> G <sub>5</sub>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.6560E+01	1.366E-02	3.691E+10	1.6489E+01	1.369E-02	3.700E+10	0.003
1s 5g <sup>1</sup> G <sub>4</sub>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.6562E+01	3.137E-04	8.476E+08	1.6491E+01	3.124E-04	8.442E+08	0.005
1s 6d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.3514E+01	5.201E+00	2.036E+12	4.3345E+01	5.214E+00	2.039E+12	0.001
1s 6g <sup>3</sup> G <sub>4</sub>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.3874E+01	6.176E-03	2.378E+09	4.3688E+01	6.221E-03	2.395E+09	0.001
1s 6g <sup>3</sup> G <sub>3</sub>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.3882E+01	1.758E-04	6.767E+07				0.003
1s 6g <sup>3</sup> G <sub>5</sub>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.4083E+01	2.292E-01	8.743E+10	4.3895E+01	2.295E-01	8.752E+10	0.001
1s 6g <sup>1</sup> G <sub>4</sub>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.4090E+01	5.247E-03	2.001E+09	4.3895E+01	5.215E-03	1.989E+09	0.002
1s 7d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	8.4332E+03	2.169E-01	2.260E+06	8.7593E+03	2.079E-01	1.991E+06	0.031
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7g <sup>3</sup> G <sub>4</sub>	7.6554E+00	3.948E-01	4.993E+12	7.6229E+00	3.951E-01	4.997E+12	0.000
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7g <sup>3</sup> G <sub>4</sub>	7.6914E+00	1.379E-02	1.728E+11	7.6587E+00	1.370E-02	1.716E+11	0.001
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7g <sup>3</sup> G <sub>4</sub>	7.6926E+00	3.877E-04	4.856E+09	7.6598E+00	3.390E-04	4.246E+09	0.000
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7g <sup>3</sup> G <sub>4</sub>	1.6424E+01	1.538E+00	4.224E+12	1.6354E+01	1.539E+00	4.229E+12	0.000
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7g <sup>3</sup> G <sub>4</sub>	1.6509E+01	5.485E-02	1.492E+11	1.6439E+01	5.482E-02	1.490E+11	0.000
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7g <sup>3</sup> G <sub>4</sub>	1.6512E+01	1.557E-03	4.233E+09	1.6441E+01	1.373E-03	3.733E+09	0.000
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7g <sup>3</sup> G <sub>4</sub>	4.3526E+01	7.332E+00	2.868E+12	4.3346E+01	7.341E+00	2.871E+12	0.000
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7g <sup>3</sup> G <sub>4</sub>	4.3873E+01	2.683E-01	1.033E+11	4.3689E+01	2.690E-01	1.035E+11	0.000
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7g <sup>3</sup> G <sub>4</sub>	4.3884E+01	7.664E-03	2.949E+09	4.3689E+01	7.956E-03	3.063E+09	0.000
1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7g <sup>3</sup> G <sub>4</sub>	4.4083E+01	7.172E-02	2.735E+10	4.3896E+01	7.180E-02	2.738E+10	0.001
1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 7g <sup>3</sup> G <sub>4</sub>	4.4088E+01	1.627E-03	6.203E+08	4.3896E+01	1.632E-03	6.224E+08	0.000
1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s 7g <sup>3</sup> G <sub>4</sub>	4.4227E+01	8.330E-09	3.156E+03				0.017

(continued on next page)

Table 3 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	
1s7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>4</sub>	8.7347E+03	1.730E-01	1.681E+06	8.7974E+03	1.710E-01	1.623E+06	0.020
1s7f <sup>3</sup> F <sub>5</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>4</sub>	4.7642E+06	1.133E-05	3.699E-04				0.957
1s2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	1.3940E+00	7.262E-10	3.561E+05				0.771
1s3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	3.5149E+00	7.323E-13	5.648E+01				0.981
1s4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	7.5662E+00	3.484E-08	5.800E+05				0.013
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	7.6553E+00	1.458E-02	2.371E+11	7.6229E+00	1.457E-02	2.370E+11	0.000
1s4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	7.6568E+00	2.925E-01	4.754E+12	7.6244E+00	2.926E-01	4.755E+12	0.000
1s4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	7.6913E+00	3.956E-04	6.373E+09	7.6587E+00	3.914E-04	6.305E+09	0.001
1s4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	7.6924E+00	1.073E-02	1.728E+11	7.6598E+00	1.062E-02	1.710E+11	0.001
1s5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	1.6214E+01	1.621E-07	7.833E+05				0.004
1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	1.6423E+01	5.677E-02	2.005E+11	1.6354E+01	5.681E-02	2.006E+11	0.000
1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	1.6427E+01	1.139E+00	4.023E+12	1.6358E+01	1.139E+00	4.025E+12	0.000
1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	1.6508E+01	1.573E-03	5.499E+09	1.6439E+01	1.566E-03	5.476E+09	0.001
1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	1.6511E+01	4.267E-02	1.491E+11	1.6441E+01	4.248E-02	1.484E+11	0.001
1s6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	4.2676E+01	1.217E-06	6.370E+05				0.001
1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	4.3521E+01	2.705E-01	1.361E+11	4.3346E+01	2.721E-01	1.368E+11	0.000
1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	4.3535E+01	5.434E+00	2.732E+12	4.3346E+01	5.438E+00	2.734E+12	0.000
1s6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	4.3867E+01	7.685E-03	3.806E+09	4.3689E+01	7.686E-03	3.804E+09	0.000
1s6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	4.3878E+01	2.087E-01	1.033E+11	4.3689E+01	2.072E-01	1.025E+11	0.000
1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	4.4083E+01	5.701E-02	2.796E+10	4.3896E+01	5.711E-02	2.800E+10	0.000
1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	2.5035E+03	1.166E-07	1.772E+01				0.002
1s7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	8.5297E+03	6.540E-03	8.565E+04	8.7975E+03	6.341E-03	7.740E+04	0.028
1s7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	8.8934E+03	1.258E-01	1.516E+06	8.7928E+03	1.267E-01	1.548E+06	0.024
1s7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>3</sub>	3.3768E+05	4.572E-06	3.820E-02				0.857
1s3d <sup>3</sup> D <sub>2</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	3.5233E+00	3.298E-06	2.531E+08				0.031
1s3d <sup>3</sup> D <sub>3</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	3.5600E+00	6.068E-03	4.563E+11	3.5449E+00	6.074E-03	4.567E+11	0.001
1s3d <sup>1</sup> D <sub>2</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	3.5614E+00	1.207E-01	9.071E+12	3.5463E+00	1.216E-01	9.136E+12	0.000
1s4d <sup>3</sup> D <sub>2</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	7.5823E+00	1.691E-05	2.802E+08				0.029
1s4d <sup>3</sup> D <sub>3</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	7.6541E+00	1.717E-02	2.792E+11	7.6222E+00	1.713E-02	2.787E+11	0.001
1s4d <sup>1</sup> D <sub>2</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	7.6570E+00	3.420E-01	5.558E+12	7.6252E+00	3.431E-01	5.576E+12	0.001
1s5d <sup>3</sup> D <sub>2</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.6251E+01	5.598E-05	2.020E+08				0.022
1s5d <sup>3</sup> D <sub>3</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.6420E+01	4.647E-02	1.642E+11	1.6353E+01	4.635E-02	1.637E+11	0.000
1s5d <sup>1</sup> D <sub>2</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.6427E+01	9.263E-01	3.271E+12	1.6360E+01	9.280E-01	3.275E+12	0.000
1s5g <sup>3</sup> G <sub>4</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.6508E+01	1.041E-05	3.639E+07				0.015
1s5g <sup>3</sup> G <sub>3</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.6510E+01	2.872E-04	1.004E+09	1.6441E+01	2.866E-04	1.002E+09	0.006
1s5g <sup>1</sup> G <sub>4</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.6561E+01	1.090E-02	3.787E+10	1.6491E+01	1.088E-02	3.782E+10	0.004
1s6d <sup>3</sup> D <sub>2</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.2826E+01	2.508E-04	1.303E+08	4.2671E+01	4.916E-04	2.551E+08	0.014
1s6d <sup>3</sup> D <sub>3</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.3507E+01	1.933E-01	9.731E+10	4.3345E+01	1.928E-01	9.698E+10	0.000
1s6d <sup>1</sup> D <sub>2</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.3537E+01	3.859E+00	1.940E+12	4.3355E+01	3.861E+00	1.941E+12	0.000
1s6g <sup>3</sup> G <sub>4</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.3867E+01	1.761E-04	8.718E+07				0.006
1s6g <sup>3</sup> G <sub>3</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.3875E+01	4.808E-03	2.380E+09	4.3688E+01	4.791E-03	2.372E+09	0.003
1s6g <sup>1</sup> G <sub>4</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.4083E+01	1.824E-01	8.943E+10	4.3895E+01	1.825E-01	8.952E+10	0.002
1s7d <sup>3</sup> D <sub>2</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.8385E+03	3.561E-05	4.211E+03	2.9112E+03	6.098E-05	6.798E+03	0.242
1s7d <sup>3</sup> D <sub>3</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	8.1837E+03	8.316E-03	1.183E+05	8.7525E+03	7.695E-03	9.491E+04	0.023
1s7d <sup>1</sup> D <sub>2</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	8.9054E+03	1.521E-01	1.827E+06	9.0373E+03	1.492E-01	1.726E+06	0.011
1s7g <sup>3</sup> G <sub>4</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.9370E+05	5.267E-06	5.818E-02				0.814
1s7g <sup>3</sup> G <sub>3</sub>	1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.5307E+06	2.742E-05	1.115E-02				0.915
1s4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>5</sub>	7.6874E+00	4.969E-01	5.098E+12	7.6547E+00	4.989E-01	5.120E+12	0.000
1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>5</sub>	1.6491E+01	1.948E+00	4.343E+12	1.6420E+01	1.952E+00	4.354E+12	0.000
1s6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>5</sub>	4.3742E+01	9.373E+00	2.970E+12	4.3559E+01	9.390E+00	2.975E+12	0.000
1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>5</sub>	4.3951E+01	1.512E-03	4.745E+08	4.3765E+01	1.522E-03	4.777E+08	0.001
1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>5</sub>	4.3956E+01	2.810E-05	8.818E+06				0.001
1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>5</sub>	4.4090E+01	8.517E-02	2.657E+10	4.3903E+01	8.525E-02	2.659E+10	0.000
1s6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>5</sub>	4.4094E+01	1.316E-03	4.106E+08	4.3903E+01	1.311E-03	4.091E+08	0.000
1s7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>5</sub>	1.4632E+04	1.310E-01	3.709E+05	1.4765E+04	1.292E-01	3.564E+05	0.023
1s5g <sup>3</sup> G <sub>4</sub>	1s7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1.6491E+01	1.774E+00	3.956E+12	1.6420E+01	1.776E+00	3.960E+12	0.000
1s5g <sup>3</sup> G <sub>5</sub>	1s7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1.6542E+01	3.898E-02	8.638E+10	1.6471E+01	3.887E-02	8.615E+10	0.001
1s5g <sup>1</sup> G <sub>4</sub>	1s7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1.6543E+01	6.999E-04	1.551E+09	1.6473E+01	5.907E-04	1.308E+09	0.001
1s6g <sup>3</sup> G <sub>4</sub>	1s7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	4.3742E+01	1.301E+01	4.123E+12	4.3559E+01	1.302E+01	4.126E+12	0.000
1s6g <sup>3</sup> G <sub>5</sub>	1s7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	4.3950E+01	2.913E-01	9.143E+10	4.3765E+01	2.917E-01	9.156E+10	0.000
1s6g <sup>1</sup> G <sub>4</sub>	1s7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	4.3957E+01	5.234E-03	1.643E+09	4.3765E+01	5.401E-03	1.695E+09	0.001
1s7g <sup>3</sup> G <sub>4</sub>	1s7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1.4659E+04	9.514E-02	2.685E+05	1.4689E+04	9.453E-02	2.634E+05	0.021
1s7g <sup>3</sup> G <sub>5</sub>	1s7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1.1751E+07	2.630E-06	1.154E-05				0.964
1s3d <sup>3</sup> D <sub>3</sub>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	3.5591E+00	1.547E-12	9.050E+01				0.940
1s4d <sup>3</sup> D <sub>3</sub>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	7.6502E+00	3.959E-11	5.014E+02				0.538
1s5d <sup>3</sup> D <sub>3</sub>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.6402E+01	7.418E-10	2.043E+03				0.061
1s5g <sup>3</sup> G <sub>4</sub>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.6490E+01	4.020E-02	1.096E+11	1.6420E+01	4.022E-02	1.096E+11	0.000
1s5g <sup>3</sup> G <sub>3</sub>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.6492E+01	1.411E+00	3.845E+12	1.6423E+01	1.412E+00	3.848E+12	0.000
1s5g <sup>3</sup> G <sub>5</sub>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.6541E+01	7.259E-04	1.966E+09	1.6471E+01	7.199E-04	1.950E+09	0.004
1s5g <sup>1</sup> G <sub>4</sub>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.6543E+01	3.199E-02	8.663E+10	1.6473E+01	3.181E-02	8.614E+10	0.000
1s6d <sup>3</sup> D <sub>3</sub>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.3381E+01	8.687E-09	3.421E+03				0.040

(continued on next page)

Table 3 (continued)

Lower	Upper	GRASP2K			FAC			<i>dT</i>
		$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )	$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )	
1s 6g <sup>3</sup> G <sub>4</sub>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.3739E+01	2.946E-01	1.141E+11	4.3559E+01	2.959E-01	1.146E+11	0.000
1s 6g <sup>3</sup> G <sub>3</sub>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.3747E+01	1.035E+01	4.007E+12	4.3559E+01	1.035E+01	4.012E+12	0.000
1s 6g <sup>3</sup> G <sub>5</sub>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.3947E+01	5.409E-03	2.076E+09	4.3765E+01	5.401E-03	2.072E+09	0.001
1s 6g <sup>1</sup> G <sub>4</sub>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.3954E+01	2.390E-01	9.169E+10	4.3765E+01	2.376E-01	9.119E+10	0.000
1s 7d <sup>3</sup> D <sub>3</sub>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	5.2970E+03	2.748E-10	7.259E-03				0.966
1s 7g <sup>3</sup> G <sub>4</sub>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.4287E+04	2.211E-03	8.030E+03	1.4689E+04	2.148E-03	7.317E+03	0.009
1s 7g <sup>3</sup> G <sub>3</sub>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.4871E+04	7.459E-02	2.500E+05	1.4689E+04	7.520E-02	2.561E+05	0.009
1s 7g <sup>3</sup> G <sub>5</sub>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	5.3648E+05	1.070E-06	2.756E-03				0.163
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7g <sup>1</sup> G <sub>4</sub>	7.6513E+00	3.467E-08	4.389E+05				0.018
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7g <sup>1</sup> G <sub>4</sub>	7.6873E+00	1.135E-02	1.424E+11	7.6547E+00	1.134E-02	1.422E+11	0.000
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7g <sup>1</sup> G <sub>4</sub>	7.6884E+00	3.952E-01	4.955E+12	7.6558E+00	3.968E-01	4.975E+12	0.000
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7g <sup>1</sup> G <sub>4</sub>	1.6405E+01	3.735E-08	1.029E+05				0.050
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7g <sup>1</sup> G <sub>4</sub>	1.6490E+01	4.447E-02	1.212E+11	1.6420E+01	4.438E-02	1.209E+11	0.000
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7g <sup>1</sup> G <sub>4</sub>	1.6493E+01	1.549E+00	4.222E+12	1.6423E+01	1.553E+00	4.231E+12	0.000
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7g <sup>1</sup> G <sub>4</sub>	4.3393E+01	4.042E-08	1.591E+04				0.133
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7g <sup>1</sup> G <sub>4</sub>	4.3738E+01	2.139E-01	8.286E+10	4.3559E+01	2.134E-01	8.265E+10	0.000
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7g <sup>1</sup> G <sub>4</sub>	4.3749E+01	7.458E+00	2.888E+12	4.3560E+01	7.469E+00	2.892E+12	0.000
1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7g <sup>1</sup> G <sub>4</sub>	4.3947E+01	2.711E-05	1.041E+07				0.001
1s 6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7g <sup>1</sup> G <sub>4</sub>	4.3952E+01	1.240E-03	4.758E+08	4.3765E+01	1.240E-03	4.757E+08	0.000
1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s 7g <sup>1</sup> G <sub>4</sub>	4.4090E+01	7.073E-02	2.696E+10	4.3903E+01	7.082E-02	2.700E+10	0.000
1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7g <sup>1</sup> G <sub>4</sub>	5.4114E+03	2.878E-10	7.284E-03				0.998
1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7g <sup>1</sup> G <sub>4</sub>	1.4181E+04	3.084E-03	1.137E+04	1.4765E+04	2.937E-03	9.900E+03	0.048
1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7g <sup>1</sup> G <sub>4</sub>	1.4947E+04	1.020E-01	3.382E+05	1.4784E+04	1.026E-01	3.451E+05	0.037
1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7g <sup>1</sup> G <sub>4</sub>	4.7824E+05	1.162E-06	3.764E-03				0.645
1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7g <sup>1</sup> G <sub>4</sub>	3.2051E+06	7.916E-06	5.712E-04				0.700
1s 5g <sup>3</sup> G <sub>5</sub>	1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1.6529E+01	2.139E+00	4.017E+12	1.6459E+01	2.144E+00	4.027E+12	0.000
1s 6g <sup>3</sup> G <sub>5</sub>	1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	4.3863E+01	1.577E+01	4.205E+12	4.3678E+01	1.579E+01	4.211E+12	0.000
1s 7g <sup>3</sup> G <sub>5</sub>	1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	2.2048E+04	7.648E-02	8.073E+04	2.2104E+04	7.596E-02	7.910E+04	0.025
1s 6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>6</sub>	4.3863E+01	2.165E+01	5.775E+12	4.3678E+01	2.167E+01	5.780E+12	0.000
1s 6h <sup>1</sup> H <sub>6</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>6</sub>	4.4002E+01	3.281E-01	8.695E+10	4.3816E+01	3.283E-01	8.699E+10	0.000
1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>6</sub>	4.4006E+01	4.130E-03	1.094E+09	4.3816E+01	4.263E-03	1.129E+09	0.000
1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>6</sub>	2.2088E+04	4.138E-02	4.352E+04	2.2113E+04	4.114E-02	4.281E+04	0.010
1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>6</sub>	2.7778E+08	4.919E-08	3.208E-10				1.000
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>5</sub>	7.6846E+00	6.513E-12	6.688E+01				0.024
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>5</sub>	1.6478E+01	2.181E-11	4.870E+01				0.047
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>5</sub>	4.3653E+01	1.093E-14	3.479E-03				0.317
1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>5</sub>	4.3861E+01	3.322E-01	1.047E+11	4.3678E+01	3.335E-01	1.051E+11	0.000
1s 6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>5</sub>	4.3866E+01	1.799E+01	5.669E+12	4.3678E+01	1.800E+01	5.675E+12	0.000
1s 6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>5</sub>	4.4000E+01	4.274E-03	1.339E+09	4.3816E+01	4.263E-03	1.335E+09	0.001
1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>5</sub>	4.4004E+01	2.786E-01	8.725E+10	4.3816E+01	2.771E-01	8.679E+10	0.000
1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>5</sub>	8.6997E+03	2.746E-16	2.200E-09				1.000
1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>5</sub>	2.1496E+04	6.522E-04	8.558E+02	2.2113E+04	6.330E-04	7.784E+02	0.060
1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>5</sub>	2.2351E+04	3.396E-02	4.123E+04	2.2113E+04	3.418E-02	4.203E+04	0.048
1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>5</sub>	8.0038E+05	2.245E-07	2.125E-04				0.972
1s 5g <sup>3</sup> G <sub>4</sub>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1.6478E+01	2.072E-07	4.628E+05				0.011
1s 5g <sup>3</sup> G <sub>5</sub>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1.6529E+01	3.303E-02	7.332E+10	1.6459E+01	3.299E-02	7.323E+10	0.000
1s 5g <sup>1</sup> G <sub>4</sub>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1.6530E+01	1.777E+00	3.943E+12	1.6460E+01	1.781E+00	3.953E+12	0.000
1s 6g <sup>3</sup> G <sub>4</sub>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3653E+01	1.484E-06	4.723E+05				0.007
1s 6g <sup>3</sup> G <sub>5</sub>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3860E+01	2.434E-01	7.671E+10	4.3678E+01	2.429E-01	7.657E+10	0.000
1s 6g <sup>1</sup> G <sub>4</sub>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3867E+01	1.310E+01	4.128E+12	4.3678E+01	1.312E+01	4.135E+12	0.000
1s 7g <sup>3</sup> G <sub>4</sub>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	8.6987E+03	1.842E-08	1.476E-01				0.636
1s 7g <sup>3</sup> G <sub>5</sub>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	2.1355E+04	1.219E-03	1.621E+03	2.2104E+04	1.168E-03	1.438E+03	0.005
1s 7g <sup>1</sup> G <sub>4</sub>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	2.2395E+04	6.255E-02	7.562E+04	2.2104E+04	6.310E-02	7.765E+04	0.011
1s 7i <sup>3</sup> I <sub>6</sub>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	6.8074E+05	2.552E-07	3.340E-04				0.629
1s 7i <sup>3</sup> I <sub>5</sub>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.4823E+06	2.614E-06	7.893E-05				0.959
1s 6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>7</sub>	4.3940E+01	2.539E+01	5.847E+12	4.3754E+01	2.543E+01	5.857E+12	0.000
1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7i <sup>3</sup> I <sub>7</sub>	3.1010E+04	3.454E-02	1.597E+04	3.1022E+04	3.437E-02	1.574E+04	0.010
1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	4.3799E+01	1.223E-06	3.271E+05				0.004
1s 6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	4.3938E+01	2.829E-01	7.519E+10	4.3754E+01	2.825E-01	7.509E+10	0.000
1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	4.3942E+01	2.172E+01	5.772E+12	4.3754E+01	2.175E+01	5.782E+12	0.000
1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	1.2726E+04	4.183E-09	1.325E-02				0.903
1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	3.0020E+04	3.975E-04	2.263E+02	3.1022E+04	3.819E-04	2.019E+02	0.083
1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	3.1409E+04	2.917E-02	1.517E+04	3.1022E+04	2.940E-02	1.554E+04	0.060

**Table 4**  
Electric quadrupole transitions E2 calculated with GRASP2K and FAC for all  $n = 1-7$  configurations. For the GRASP2K calculation, the active set is expanded to  $n = 10$  (GRASP3) and only the length form is considered. A comparison between the wavelengths, weighted oscillator strengths and transition probabilities is given. The relative difference between transition probabilities in the velocity and length gauge is given in the last column by  $dT$ .

Lower	Upper	GRASP2K			FAC			$dT$
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	
1s2p $^3P_1^0$	1s2p $^3P_2^0$	3.1908E+01	3.112E-07	4.078E+05	3.1815E+01	3.135E-07	4.098E+05	0.006
1s2p $^3P_0^0$	1s2p $^3P_2^0$	3.2407E+01	1.878E-07	2.386E+05	3.2290E+01	1.887E-07	2.394E+05	0.019
1s2p $^3P_1^0$	1s2p $^1P_1^0$	2.9274E+01	3.608E-07	9.361E+05	2.9150E+01	3.594E-07	9.325E+05	0.011
1s2p $^3P_2^0$	1s2p $^1P_1^0$	3.5465E+02	1.078E-10	1.905E+00				0.174
1s2s $^3S_1$	1s3s $^3S_1$	2.1766E+00	4.067E-09	1.909E+06	2.1673E+00	4.604E-09	2.161E+06	0.026
1s2p $^3P_0^0$	1s3p $^3P_0^0$	2.1983E+00	3.696E-06	1.700E+09	2.1892E+00	4.175E-06	1.920E+09	0.009
1s2p $^3P_2^0$	1s3p $^3P_0^0$	2.3610E+00	7.133E-04	2.845E+11	2.3509E+00	7.174E-04	2.861E+11	0.002
1s2p $^1P_1^0$	1s3p $^3P_1^0$	2.3768E+00	6.407E-04	2.522E+11	2.3669E+00	6.330E-04	2.491E+11	0.001
1s2p $^3P_2^0$	1s3p $^3P_0^0$	2.3603E+00	4.510E-04	5.400E+11	2.3503E+00	4.561E-04	5.461E+11	0.000
1s2p $^3P_0^0$	1s3p $^3P_2^0$	2.1541E+00	6.263E-04	1.800E+11	2.1452E+00	6.425E-04	1.846E+11	0.002
1s2p $^3P_2^0$	1s3p $^3P_2^0$	2.1564E+00	3.953E-04	1.134E+11	2.1474E+00	4.009E-04	1.150E+11	0.001
1s2p $^3P_2^0$	1s3p $^3P_2^0$	2.3101E+00	7.422E-04	1.855E+11	2.3003E+00	7.550E-04	1.887E+11	0.000
1s2p $^1P_1^0$	1s3p $^3P_2^0$	2.3252E+00	2.840E-04	7.006E+10	2.3156E+00	2.859E-04	7.054E+10	0.002
1s3p $^3P_0^0$	1s3p $^3P_2^0$	1.0725E+02	3.088E-07	3.581E+04	1.0689E+02	3.098E-07	3.587E+04	0.001
1s3p $^3P_0^0$	1s3p $^3P_2^0$	1.0873E+02	1.880E-07	2.121E+04	1.0831E+02	1.883E-07	2.123E+04	0.002
1s $^2$ 1S $_0$	1s3d $^3D_2$	3.4460E-01	8.826E-04	9.910E+12	3.4325E-01	9.055E-04	1.016E+13	0.003
1s2s $^3S_1$	1s3d $^3D_2$	2.1226E+00	2.875E-03	8.513E+11	2.1136E+00	2.919E-03	8.644E+11	0.003
1s2s $^1S_0$	1s3d $^3D_2$	2.1539E+00	1.869E-03	5.374E+11	2.1452E+00	1.833E-03	5.270E+11	0.003
1s3s $^3S_1$	1s3d $^3D_2$	8.5509E+01	3.819E-07	6.968E+04	8.5230E+01	3.815E-07	6.947E+04	0.030
1s3s $^1S_0$	1s3d $^3D_2$	1.0120E+02	1.521E-07	1.982E+04	1.0108E+02	1.504E-07	1.947E+04	0.037
1s2s $^3S_1$	1s3d $^3D_1$	2.1220E+00	2.860E-03	1.412E+12	2.1130E+00	2.904E-03	1.434E+12	0.002
1s3s $^3S_1$	1s3d $^3D_1$	8.4639E+01	3.934E-07	1.221E+05	8.4368E+01	3.922E-07	1.214E+05	0.027
1s3d $^3D_2$	1s3d $^3D_1$	8.3264E+03	1.645E-13	5.276E-06				0.531
1s2p $^3P_0^0$	1s3p $^1P_1^0$	2.1504E+00	5.523E-04	2.655E+11	2.1415E+00	5.632E-04	2.707E+11	0.000
1s2p $^3P_2^0$	1s3p $^1P_1^0$	2.3058E+00	2.829E-04	1.183E+11	2.2961E+00	2.891E-04	1.209E+11	0.002
1s2p $^1P_1^0$	1s3p $^1P_1^0$	2.3209E+00	3.899E-04	1.610E+11	2.3113E+00	3.893E-04	1.606E+11	0.000
1s3p $^3P_0^0$	1s3p $^1P_1^0$	9.8786E+01	3.556E-07	8.103E+04	9.8358E+01	3.546E-07	8.082E+04	0.005
1s3p $^3P_2^0$	1s3p $^1P_1^0$	1.2519E+03	8.846E-11	1.255E-01				0.052
1s2s $^3S_1$	1s3d $^3D_3$	2.1095E+00	6.734E-03	1.442E+12	2.1005E+00	6.967E-03	1.492E+12	0.003
1s3s $^3S_1$	1s3d $^3D_3$	6.8392E+01	1.793E-06	3.652E+05	6.8186E+01	1.790E-06	3.637E+05	0.024
1s3d $^3D_2$	1s3d $^3D_3$	3.4166E+02	2.752E-09	2.246E+01				0.004
1s3d $^3D_1$	1s3d $^3D_3$	3.5628E+02	3.967E-10	2.978E+00				0.044
1s $^2$ 1S $_0$	1s3d $^1D_2$	3.4430E-01	1.235E-03	1.389E+13	3.4289E-01	1.431E-03	1.610E+13	0.003
1s2s $^3S_1$	1s3d $^1D_2$	2.1090E+00	1.910E-03	5.729E+11	2.1000E+00	1.974E-03	5.922E+11	0.002
1s2s $^1S_0$	1s3d $^1D_2$	2.1399E+00	2.871E-03	8.364E+11	2.1313E+00	2.875E-03	8.373E+11	0.002
1s3s $^3S_1$	1s3d $^1D_2$	6.7876E+01	5.194E-07	1.504E+05	6.7664E+01	5.176E-07	1.495E+05	0.021
1s3s $^1S_0$	1s3d $^1D_2$	7.7401E+01	5.347E-07	1.191E+05	7.7288E+01	5.296E-07	1.172E+05	0.025
1s3d $^3D_2$	1s3d $^1D_2$	3.2917E+02	7.638E-10	9.405E+00				0.034
1s3d $^3D_1$	1s3d $^1D_2$	3.4272E+02	1.578E-09	1.792E+01				0.011
1s3d $^3D_3$	1s3d $^1D_2$	8.9990E+03	1.023E-13	1.685E-06				0.644
1s2s $^3S_1$	1s4s $^3S_1$	1.6177E+00	1.741E-10	1.480E+05	1.6108E+00	4.748E-10	4.034E+05	0.331
1s3s $^3S_1$	1s4s $^3S_1$	6.2995E+00	5.359E-09	3.003E+05				0.020
1s3d $^3D_2$	1s4s $^3S_1$	6.8005E+00	1.094E-04	5.261E+09	6.7717E+00	1.086E-04	5.221E+09	0.001
1s3d $^3D_1$	1s4s $^3S_1$	6.8061E+00	1.100E-04	5.277E+09	6.7772E+00	1.084E-04	5.207E+09	0.002
1s3d $^3D_3$	1s4s $^3S_1$	6.9386E+00	2.664E-04	1.230E+10	6.9089E+00	2.627E-04	1.213E+10	0.001
1s3d $^1D_2$	1s4s $^3S_1$	6.9440E+00	7.527E-05	3.471E+09	6.9143E+00	7.389E-05	3.407E+09	0.001
1s2p $^3P_0^0$	1s4p $^3P_0^0$	1.6323E+00	8.176E-07	6.823E+08	1.6255E+00	9.043E-07	7.545E+08	0.004
1s2p $^3P_2^0$	1s4p $^3P_0^0$	1.7203E+00	1.481E-04	1.113E+11	1.7131E+00	1.462E-04	1.099E+11	0.004
1s2p $^1P_1^0$	1s4p $^3P_0^0$	1.7287E+00	1.320E-04	9.819E+10	1.7215E+00	1.289E-04	9.594E+10	0.002
1s3p $^3P_1^0$	1s4p $^3P_0^0$	6.3396E+00	2.991E-06	1.655E+08	6.3138E+00	3.265E-06	1.806E+08	0.000
1s3p $^3P_2^0$	1s4p $^3P_0^0$	6.7379E+00	6.333E-04	3.101E+10	6.7101E+00	6.376E-04	3.122E+10	0.000
1s3p $^1P_1^0$	1s4p $^3P_0^0$	6.7743E+00	5.713E-04	2.768E+10	6.7469E+00	5.671E-04	2.746E+10	0.000
1s3d $^3D_2$	1s4s $^1S_0$	6.7668E+00	7.055E-05	1.028E+10	6.7378E+00	7.263E-05	1.058E+10	0.001
1s3d $^1D_2$	1s4s $^1S_0$	6.9088E+00	1.123E-04	1.569E+10	6.8790E+00	1.145E-04	1.601E+10	0.001
1s2p $^3P_2^0$	1s4p $^3P_0^0$	1.7201E+00	9.380E-05	2.115E+11	1.7129E+00	9.268E-05	2.089E+11	0.000
1s3p $^3P_2^0$	1s4p $^3P_0^0$	6.7356E+00	4.014E-04	5.902E+10	6.7079E+00	4.061E-04	5.970E+10	0.000
1s2p $^3P_0^0$	1s4p $^3P_2^0$	1.6219E+00	1.580E-04	8.014E+10	1.6152E+00	1.612E-04	8.177E+10	0.002
1s2p $^3P_0^0$	1s4p $^3P_2^0$	1.6232E+00	9.919E-05	5.022E+10	1.6164E+00	1.007E-04	5.101E+10	0.001
1s2p $^3P_2^0$	1s4p $^3P_2^0$	1.7088E+00	1.710E-04	7.811E+10	1.7016E+00	1.722E-04	7.870E+10	0.001
1s2p $^1P_1^0$	1s4p $^3P_2^0$	1.7170E+00	6.489E-05	2.936E+10	1.7100E+00	6.523E-05	2.950E+10	0.004
1s3p $^3P_1^0$	1s4p $^3P_2^0$	6.1858E+00	5.474E-04	1.909E+10	6.1607E+00	5.538E-04	1.930E+10	0.000
1s3p $^3P_0^0$	1s4p $^3P_2^0$	6.1907E+00	3.483E-04	1.212E+10	6.1653E+00	3.485E-04	1.212E+10	0.000
1s3p $^3P_2^0$	1s4p $^3P_2^0$	6.5644E+00	6.573E-04	2.035E+10	6.5375E+00	6.633E-04	2.052E+10	0.000
1s3p $^1P_1^0$	1s4p $^3P_2^0$	6.5991E+00	2.535E-04	7.766E+09	6.5723E+00	2.534E-04	7.759E+09	0.000
1s4p $^3P_1^0$	1s4p $^3P_2^0$	2.5504E+02	2.619E-07	5.371E+03	2.5410E+02	2.626E-07	5.380E+03	0.002
1s4p $^3P_0^0$	1s4p $^3P_2^0$	2.5839E+02	1.600E-07	3.197E+03	2.5732E+02	1.603E-07	3.202E+03	0.001
1s $^2$ 1S $_0$	1s4d $^3D_2$	3.2750E-01	4.379E-04	5.445E+12	3.2616E-01	4.466E-04	5.553E+12	0.003
1s2s $^3S_1$	1s4d $^3D_2$	1.6050E+00	2.179E-04	1.128E+11	1.5981E+00	2.096E-04	1.085E+11	0.002

(continued on next page)

Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	A (s <sup>-1</sup> )	$\lambda$ (Å)	gf	A (s <sup>-1</sup> )	
1s 2s <sup>1</sup> S <sub>0</sub>	1s 4d <sup>3</sup> D <sub>2</sub>	1.6228E+00	1.321E-04	6.689E+10	1.6162E+00	1.318E-04	6.677E+10	0.003
1s 3s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>3</sup> D <sub>2</sub>	6.1111E+00	1.685E-03	6.018E+10	6.0854E+00	1.711E-03	6.113E+10	0.002
1s 3s <sup>1</sup> S <sub>0</sub>	1s 4d <sup>3</sup> D <sub>2</sub>	6.1795E+00	1.100E-03	3.842E+10	6.1544E+00	1.079E-03	3.768E+10	0.002
1s 3d <sup>3</sup> D <sub>2</sub>	1s 4d <sup>3</sup> D <sub>2</sub>	6.5814E+00	4.239E-04	1.306E+10	6.5534E+00	4.253E-04	1.310E+10	0.000
1s 3d <sup>3</sup> D <sub>1</sub>	1s 4d <sup>3</sup> D <sub>2</sub>	6.5866E+00	1.859E-04	5.715E+09	6.5585E+00	1.860E-04	5.720E+09	0.000
1s 3d <sup>3</sup> D <sub>3</sub>	1s 4d <sup>3</sup> D <sub>2</sub>	6.7107E+00	2.138E-04	6.333E+09	6.6818E+00	2.135E-04	6.326E+09	0.000
1s 3d <sup>1</sup> D <sub>2</sub>	1s 4d <sup>3</sup> D <sub>2</sub>	6.7157E+00	5.225E-05	1.545E+09	6.6868E+00	5.192E-05	1.536E+09	0.000
1s 4s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>3</sup> D <sub>2</sub>	2.0428E+02	4.053E-07	1.296E+04	2.0324E+02	4.072E-07	1.304E+04	0.029
1s 4s <sup>1</sup> S <sub>0</sub>	1s 4d <sup>3</sup> D <sub>2</sub>	2.4021E+02	1.633E-07	3.776E+03	2.3934E+02	1.627E-07	3.756E+03	0.039
1s 2s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	1.6048E+00	2.169E-04	1.872E+11	1.5980E+00	2.076E-04	1.792E+11	0.002
1s 3s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	6.1092E+00	1.673E-03	9.967E+10	6.0836E+00	1.700E-03	1.013E+11	0.002
1s 3d <sup>3</sup> D <sub>2</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	6.5793E+00	1.840E-04	9.451E+09	6.5513E+00	1.852E-04	9.515E+09	0.000
1s 3d <sup>3</sup> D <sub>1</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	6.5845E+00	1.810E-04	9.280E+09	6.5564E+00	1.814E-04	9.306E+09	0.000
1s 3d <sup>3</sup> D <sub>3</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	6.7085E+00	3.503E-05	1.731E+09	6.6796E+00	3.499E-05	1.729E+09	0.001
1s 3d <sup>1</sup> D <sub>2</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	6.7135E+00	1.229E-04	6.065E+09	6.6847E+00	1.225E-04	6.044E+09	0.000
1s 4s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	2.0227E+02	4.160E-07	2.261E+04	2.0125E+02	4.171E-07	2.270E+04	0.026
1s 4d <sup>3</sup> D <sub>2</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	2.0536E+04	1.788E-13	9.425E-07				0.337
1s 2p <sup>3</sup> P <sub>0</sub>	1s 4p <sup>1</sup> P <sub>0</sub>	1.6210E+00	1.402E-04	1.186E+11	1.6143E+00	1.421E-04	1.202E+11	0.001
1s 2p <sup>3</sup> P <sub>2</sub>	1s 4p <sup>1</sup> P <sub>0</sub>	1.7078E+00	6.574E-05	5.012E+10	1.7006E+00	6.655E-05	5.072E+10	0.006
1s 2p <sup>1</sup> P <sub>0</sub>	1s 4p <sup>1</sup> P <sub>0</sub>	1.7161E+00	8.979E-05	6.779E+10	1.7090E+00	8.874E-05	6.699E+10	0.000
1s 3p <sup>3</sup> P <sub>0</sub>	1s 4p <sup>1</sup> P <sub>0</sub>	6.1732E+00	4.872E-04	2.843E+10	6.1480E+00	4.916E-04	2.867E+10	0.000
1s 3p <sup>3</sup> P <sub>2</sub>	1s 4p <sup>1</sup> P <sub>0</sub>	6.5502E+00	2.512E-04	1.302E+10	6.5232E+00	2.544E-04	1.318E+10	0.001
1s 3p <sup>1</sup> P <sub>0</sub>	1s 4p <sup>1</sup> P <sub>0</sub>	6.5847E+00	3.422E-04	1.755E+10	6.5579E+00	3.415E-04	1.750E+10	0.000
1s 4p <sup>3</sup> P <sub>0</sub>	1s 4p <sup>1</sup> P <sub>0</sub>	2.3520E+02	3.010E-07	1.210E+04	2.3412E+02	3.005E-07	1.208E+04	0.004
1s 4p <sup>3</sup> P <sub>2</sub>	1s 4p <sup>1</sup> P <sub>0</sub>	3.0236E+03	7.051E-11	1.715E-02				0.024
1s 2s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>3</sup> D <sub>3</sub>	1.6018E+00	5.612E-04	2.084E+11	1.5950E+00	5.556E-04	2.063E+11	0.002
1s 3s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>3</sup> D <sub>3</sub>	6.0652E+00	3.882E-03	1.005E+11	6.0400E+00	3.968E-03	1.027E+11	0.002
1s 3d <sup>3</sup> D <sub>2</sub>	1s 4d <sup>3</sup> D <sub>3</sub>	6.5283E+00	2.062E-04	4.610E+09	6.5006E+00	2.084E-04	4.660E+09	0.000
1s 3d <sup>3</sup> D <sub>1</sub>	1s 4d <sup>3</sup> D <sub>3</sub>	6.5334E+00	3.327E-05	7.427E+08	6.5057E+00	3.358E-05	7.497E+08	0.001
1s 3d <sup>3</sup> D <sub>3</sub>	1s 4d <sup>3</sup> D <sub>3</sub>	6.6555E+00	8.341E-04	1.794E+10	6.6270E+00	8.375E-04	1.801E+10	0.000
1s 3d <sup>1</sup> D <sub>2</sub>	1s 4d <sup>3</sup> D <sub>3</sub>	6.6604E+00	1.380E-04	2.964E+09	6.6320E+00	1.380E-04	2.966E+09	0.000
1s 4s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>3</sup> D <sub>3</sub>	1.6310E+02	1.890E-06	6.771E+04	1.6240E+02	1.893E-06	6.783E+04	0.022
1s 4d <sup>3</sup> D <sub>2</sub>	1s 4d <sup>3</sup> D <sub>3</sub>	8.0890E+02	3.369E-09	4.906E+00				0.003
1s 4d <sup>3</sup> D <sub>1</sub>	1s 4d <sup>3</sup> D <sub>3</sub>	8.4207E+02	4.858E-10	6.529E-01				0.015
1s 2p <sup>3</sup> P <sub>0</sub>	1s 4f <sup>3</sup> F <sub>3</sub>	1.6179E+00	2.847E-03	1.036E+12	1.6112E+00	2.908E-03	1.058E+12	0.001
1s 2p <sup>3</sup> P <sub>2</sub>	1s 4f <sup>3</sup> F <sub>3</sub>	1.7043E+00	7.811E-04	2.562E+11	1.6971E+00	7.937E-04	2.603E+11	0.001
1s 2p <sup>1</sup> P <sub>0</sub>	1s 4f <sup>3</sup> F <sub>3</sub>	1.7125E+00	1.912E-04	6.213E+10	1.7055E+00	1.844E-04	5.990E+10	0.003
1s 3p <sup>3</sup> P <sub>0</sub>	1s 4f <sup>3</sup> F <sub>3</sub>	6.1276E+00	4.973E-03	1.262E+11	6.1026E+00	4.989E-03	1.265E+11	0.000
1s 3p <sup>3</sup> P <sub>2</sub>	1s 4f <sup>3</sup> F <sub>3</sub>	6.4989E+00	1.148E-03	2.591E+10	6.4721E+00	1.153E-03	2.601E+10	0.000
1s 3p <sup>1</sup> P <sub>0</sub>	1s 4f <sup>3</sup> F <sub>3</sub>	6.5328E+00	2.725E-04	6.084E+09	6.5062E+00	2.680E-04	5.982E+09	0.000
1s 4p <sup>3</sup> P <sub>0</sub>	1s 4f <sup>3</sup> F <sub>3</sub>	1.8322E+02	6.325E-07	1.795E+04	1.8244E+02	6.324E-07	1.795E+04	0.003
1s 4p <sup>3</sup> P <sub>2</sub>	1s 4f <sup>3</sup> F <sub>3</sub>	6.5059E+02	3.452E-09	7.771E+00	6.4694E+02	3.463E-09	7.818E+00	0.016
1s 4p <sup>1</sup> P <sub>0</sub>	1s 4f <sup>3</sup> F <sub>3</sub>	8.2895E+02	3.954E-10	5.482E-01				0.020
1s 2p <sup>3</sup> P <sub>0</sub>	1s 4f <sup>3</sup> F <sub>2</sub>	1.6178E+00	8.729E-04	4.449E+11	1.6111E+00	9.021E-04	4.597E+11	0.001
1s 2p <sup>3</sup> P <sub>2</sub>	1s 4f <sup>3</sup> F <sub>2</sub>	1.6191E+00	1.244E-03	6.329E+11	1.6123E+00	1.269E-03	6.460E+11	0.000
1s 2p <sup>1</sup> P <sub>0</sub>	1s 4f <sup>3</sup> F <sub>2</sub>	1.7042E+00	1.959E-04	8.998E+10	1.6971E+00	1.993E-04	9.155E+10	0.000
1s 3p <sup>3</sup> P <sub>0</sub>	1s 4f <sup>3</sup> F <sub>2</sub>	6.124E+00	4.103E-04	1.867E+11	1.7054E+00	4.121E-04	1.874E+11	0.002
1s 3p <sup>3</sup> P <sub>2</sub>	1s 4f <sup>3</sup> F <sub>2</sub>	6.1266E+00	1.521E-03	5.406E+10	6.1016E+00	1.533E-03	5.447E+10	0.000
1s 3p <sup>1</sup> P <sub>0</sub>	1s 4f <sup>3</sup> F <sub>2</sub>	6.1314E+00	2.165E-03	7.684E+10	6.1062E+00	2.172E-03	7.706E+10	0.000
1s 3p <sup>3</sup> P <sub>0</sub>	1s 4f <sup>3</sup> F <sub>2</sub>	6.4978E+00	2.880E-04	9.101E+09	6.4710E+00	2.892E-04	9.137E+09	0.000
1s 3p <sup>1</sup> P <sub>0</sub>	1s 4f <sup>3</sup> F <sub>2</sub>	6.5317E+00	5.991E-04	1.874E+10	6.5052E+00	5.988E-04	1.871E+10	0.000
1s 4p <sup>3</sup> P <sub>0</sub>	1s 4f <sup>3</sup> F <sub>2</sub>	1.8236E+02	1.962E-07	7.869E+03	1.8158E+02	1.960E-07	7.865E+03	0.002
1s 4p <sup>3</sup> P <sub>2</sub>	1s 4f <sup>3</sup> F <sub>2</sub>	1.8406E+02	2.716E-07	1.070E+04	1.8322E+02	2.717E-07	1.070E+04	0.003
1s 4p <sup>3</sup> P <sub>0</sub>	1s 4f <sup>3</sup> F <sub>2</sub>	6.3989E+02	9.105E-10	2.967E+00	6.3631E+02	9.130E-10	2.982E+00	0.014
1s 4p <sup>1</sup> P <sub>0</sub>	1s 4f <sup>3</sup> F <sub>2</sub>	8.1166E+02	9.363E-10	1.896E+00	8.0920E+02	9.307E-10	1.880E+00	0.020
1s 4f <sup>3</sup> F <sub>3</sub>	1s 4f <sup>3</sup> F <sub>2</sub>	3.8916E+04	1.030E-14	9.073E-09				0.558
1s <sup>2</sup> S <sub>0</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	3.2740E-01	6.231E-04	7.755E+12	3.2603E-01	7.226E-04	8.992E+12	0.002
1s 2s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	1.6017E+00	1.591E-04	8.273E+10	1.5948E+00	1.567E-04	8.150E+10	0.001
1s 2s <sup>1</sup> S <sub>0</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	1.6194E+00	2.277E-04	1.158E+11	1.6128E+00	2.323E-04	1.181E+11	0.002
1s 3s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	6.0634E+00	1.094E-03	3.969E+10	6.0381E+00	1.117E-03	4.054E+10	0.002
1s 3s <sup>1</sup> S <sub>0</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	6.1308E+00	1.677E-03	5.953E+10	6.1059E+00	1.661E-03	5.893E+10	0.002
1s 3d <sup>3</sup> D <sub>2</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	6.5262E+00	5.168E-05	1.619E+09	6.4985E+00	5.227E-05	1.637E+09	0.000
1s 3d <sup>3</sup> D <sub>1</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	6.5313E+00	1.191E-04	3.724E+09	6.5035E+00	1.198E-04	3.747E+09	0.000
1s 3d <sup>3</sup> D <sub>3</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	6.6532E+00	1.372E-04	4.134E+09	6.6247E+00	1.377E-04	4.152E+09	0.000
1s 3d <sup>1</sup> D <sub>2</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	6.6582E+00	5.591E-04	1.683E+10	6.6297E+00	5.608E-04	1.687E+10	0.000
1s 4s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	1.6177E+02	5.455E-07	2.781E+04	1.6105E+02	5.455E-07	2.782E+04	0.020
1s 4s <sup>1</sup> S <sub>0</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	1.8350E+02	5.750E-07	2.278E+04	1.8292E+02	5.727E-07	2.264E+04	0.027
1s 4d <sup>3</sup> D <sub>2</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	7.7722E+02	9.379E-10	2.071E+00				0.018
1s 4d <sup>3</sup> D <sub>1</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	8.0779E+02	1.943E-09	3.972E+00				0.005
1s 4d <sup>3</sup> D <sub>3</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	1.9845E+04	1.515E-13	5.133E-07				0.342
1s 2p <sup>3</sup> P <sub>2</sub>	1s 4f <sup>3</sup> F <sub>4</sub>	1.7025E+00	5.177E-03	1.324E+12	1.6954E+00	5.446E-03	1.392E+12	0.000

(continued on next page)

Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	6.4732E+00	7.864E-03	1.391E+11	6.4465E+00	7.967E-03	1.408E+11	0.000
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.6544E+02	6.500E-08	2.224E+02	4.6333E+02	6.501E-08	2.225E+02	0.009
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.6355E+03	1.450E-10	4.017E-02	1.6325E+03	1.439E-10	3.970E-02	0.016
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.7073E+03	1.015E-11	2.582E-03				0.053
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.6162E+00	5.484E-06	2.001E+09	1.6095E+00	7.555E-06	2.755E+09	0.014
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.7025E+00	5.783E-04	1.901E+11	1.6953E+00	6.082E-04	1.999E+11	0.000
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.7107E+00	3.470E-03	1.130E+12	1.7036E+00	3.569E-03	1.161E+12	0.001
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	6.1040E+00	8.647E-06	2.211E+08	6.0791E+00	9.972E-06	2.549E+08	0.003
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.4472E+00	8.785E-04	1.998E+10	6.4457E+00	8.900E-04	2.023E+10	0.000
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	6.5060E+00	5.198E-03	1.170E+11	6.4796E+00	5.218E-03	1.174E+11	0.000
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.6424E+02	1.482E-09	5.234E+01	1.6359E+02	1.492E-09	5.269E+01	0.001
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.6135E+02	7.452E-09	3.336E+01	4.5925E+02	7.450E-09	3.337E+01	0.006
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	5.4442E+02	2.699E-08	8.676E+01	5.4298E+02	2.686E-08	8.609E+01	0.009
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.5861E+03	1.917E-11	7.263E-03				0.019
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.6535E+03	1.021E-10	3.557E-02	1.6504E+03	1.013E-10	3.513E-02	0.007
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	5.2510E+04	3.365E-15	1.163E-09				0.824
1s 2s <sup>3</sup> S <sub>1</sub>	1s 5s <sup>3</sup> S <sub>1</sub>	1.4473E+00	4.378E-12	4.647E+03	1.4412E+00	1.023E-10	1.086E+05	0.891
1s 3s <sup>3</sup> S <sub>1</sub>	1s 5s <sup>3</sup> S <sub>1</sub>	4.3197E+00	7.655E-10	9.121E+04				0.164
1s 3d <sup>3</sup> D <sub>2</sub>	1s 5s <sup>3</sup> S <sub>1</sub>	4.5495E+00	2.933E-05	3.150E+09	4.5304E+00	2.931E-05	3.148E+09	0.001
1s 3d <sup>3</sup> D <sub>1</sub>	1s 5s <sup>3</sup> S <sub>1</sub>	4.5520E+00	2.949E-05	3.165E+09	4.5328E+00	2.930E-05	3.144E+09	0.003
1s 3d <sup>3</sup> D <sub>3</sub>	1s 5s <sup>3</sup> S <sub>1</sub>	4.6109E+00	7.001E-05	7.322E+09	4.5914E+00	6.937E-05	7.254E+09	0.001
1s 3d <sup>1</sup> D <sub>2</sub>	1s 5s <sup>3</sup> S <sub>1</sub>	4.6133E+00	1.982E-05	2.071E+09	4.5938E+00	1.952E-05	2.039E+09	0.003
1s 4s <sup>3</sup> S <sub>1</sub>	1s 5s <sup>3</sup> S <sub>1</sub>	1.3745E+01	5.045E-09	5.937E+04				0.022
1s 4d <sup>3</sup> D <sub>2</sub>	1s 5s <sup>3</sup> S <sub>1</sub>	1.4736E+01	1.591E-04	1.629E+09	1.4676E+01	1.575E-04	1.612E+09	0.001
1s 4d <sup>3</sup> D <sub>1</sub>	1s 5s <sup>3</sup> S <sub>1</sub>	1.4747E+01	1.592E-04	1.628E+09	1.4686E+01	1.567E-04	1.602E+09	0.002
1s 4d <sup>3</sup> D <sub>3</sub>	1s 5s <sup>3</sup> S <sub>1</sub>	1.5010E+01	3.835E-04	3.785E+09	1.4947E+01	3.784E-04	3.734E+09	0.001
1s 4d <sup>1</sup> D <sub>2</sub>	1s 5s <sup>3</sup> S <sub>1</sub>	1.5021E+01	1.079E-04	1.063E+09	1.4959E+01	1.059E-04	1.044E+09	0.002
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.4598E+00	3.294E-07	3.437E+08	1.4537E+00	3.558E-07	3.711E+08	0.007
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.5297E+00	5.743E-05	5.456E+10	1.5233E+00	5.632E-05	5.350E+10	0.003
1s 2p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.5364E+00	5.106E-05	4.809E+10	1.5300E+00	4.964E-05	4.674E+10	0.002
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.3450E+00	7.585E-07	8.933E+07	4.3271E+00	8.116E-07	9.556E+07	0.006
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.5285E+00	1.479E-04	1.603E+10	4.5097E+00	1.475E-04	1.598E+10	0.000
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.5449E+00	1.323E-04	1.424E+10	4.5263E+00	1.309E-04	1.408E+10	0.000
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.3810E+01	2.420E-06	2.821E+07	1.3752E+01	2.598E-06	3.028E+07	0.001
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.4601E+01	5.296E-04	5.524E+09	1.4539E+01	5.330E-04	5.559E+09	0.000
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.4672E+01	4.785E-04	4.943E+09	1.4610E+01	4.758E-04	4.914E+09	0.000
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.4936E+01	9.431E-05	9.400E+08	1.4873E+01	9.437E-05	9.404E+08	0.000
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.4942E+01	2.888E-05	2.876E+08	1.4879E+01	2.862E-05	2.850E+08	0.001
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.5078E+01	1.573E-07	1.538E+06	1.5014E+01	1.253E-07	1.225E+06	0.002
1s 3d <sup>3</sup> D <sub>2</sub>	1s 5s <sup>1</sup> S <sub>0</sub>	4.5420E+00	1.917E-05	6.199E+09	4.5228E+00	1.941E-05	6.277E+09	0.001
1s 3d <sup>1</sup> D <sub>2</sub>	1s 5s <sup>1</sup> S <sub>0</sub>	4.6055E+00	2.999E-05	9.431E+09	4.5859E+00	2.997E-05	9.427E+09	0.002
1s 4d <sup>3</sup> D <sub>2</sub>	1s 5s <sup>1</sup> S <sub>0</sub>	1.4657E+01	1.021E-04	3.171E+09	1.4596E+01	1.045E-04	3.246E+09	0.000
1s 4d <sup>1</sup> D <sub>2</sub>	1s 5s <sup>1</sup> S <sub>0</sub>	1.4939E+01	1.627E-04	4.864E+09	1.4876E+01	1.658E-04	4.956E+09	0.001
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.5297E+00	3.640E-05	1.038E+11	1.5233E+00	3.564E-05	1.015E+11	0.000
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.5279E+00	9.388E-05	3.054E+10	4.5092E+00	9.356E-05	3.043E+10	0.000
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.4595E+01	3.360E-04	1.052E+10	1.4534E+01	3.399E-04	1.064E+10	0.000
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.4936E+01	4.095E-05	1.225E+09	1.4874E+01	4.095E-05	1.224E+09	0.001
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.4555E+00	6.570E-05	4.138E+10	1.4495E+00	6.694E-05	4.214E+10	0.002
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.4565E+00	4.114E-05	2.587E+10	1.4505E+00	4.181E-05	2.628E+10	0.001
1s 2p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.5251E+00	6.889E-05	3.951E+10	1.5187E+00	6.910E-05	3.963E+10	0.001
1s 2p <sup>1</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.5317E+00	2.611E-05	1.485E+10	1.5253E+00	2.616E-05	1.487E+10	0.004
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.3076E+00	1.546E-04	1.112E+10	4.2899E+00	1.560E-04	1.121E+10	0.000
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.3099E+00	9.802E-05	7.040E+09	4.2921E+00	9.847E-05	7.070E+09	0.000
1s 3p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4878E+00	1.697E-04	1.124E+10	4.4692E+00	1.704E-04	1.128E+10	0.000
1s 3p <sup>1</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.5039E+00	6.500E-05	4.275E+09	4.4855E+00	6.502E-05	4.274E+09	0.001
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3439E+01	4.552E-04	3.363E+09	1.3383E+01	4.582E-04	3.384E+09	0.000
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.3448E+01	2.902E-04	2.140E+09	1.3392E+01	2.890E-04	2.131E+09	0.000
1s 4p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.4186E+01	5.493E-04	3.641E+09	1.4127E+01	5.527E-04	3.663E+09	0.000
1s 4p <sup>1</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.4253E+01	2.123E-04	1.394E+09	1.4194E+01	2.117E-04	1.390E+09	0.000
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.4503E+01	1.980E-05	1.256E+08	1.4442E+01	1.963E-05	1.245E+08	0.001
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.4508E+01	4.987E-06	3.161E+07	1.4447E+01	4.933E-06	3.126E+07	0.000
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.4632E+01	1.385E-04	8.628E+08	1.4571E+01	1.367E-04	8.519E+08	0.000
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.4636E+01	1.545E-05	9.618E+07	1.4575E+01	1.522E-05	9.479E+07	0.000
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.9993E+02	2.211E-07	1.180E+03	4.9817E+02	2.213E-07	1.179E+03	0.003
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	5.0634E+02	1.353E-07	7.042E+02	5.0434E+02	1.354E-07	7.042E+02	0.002
1s <sup>2</sup> <sup>1</sup> S <sub>0</sub>	1s 5d <sup>3</sup> D <sub>2</sub>	3.2010E-01	2.358E-04	3.069E+12	3.1882E-01	2.397E-04	3.120E+12	0.002
1s 2s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>3</sup> D <sub>2</sub>	1.4421E+00	4.328E-05	2.776E+10	1.4360E+00	3.977E-05	2.551E+10	0.000
1s 2s <sup>1</sup> S <sub>0</sub>	1s 5d <sup>3</sup> D <sub>2</sub>	1.4565E+00	2.475E-05	1.556E+10	1.4506E+00	2.497E-05	1.569E+10	0.003
1s 3s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>3</sup> D <sub>2</sub>	4.2737E+00	2.788E-04	2.036E+10	4.2558E+00	2.762E-04	2.017E+10	0.002
1s 3s <sup>1</sup> S <sub>0</sub>	1s 5d <sup>3</sup> D <sub>2</sub>	4.3071E+00	1.759E-04	1.265E+10	4.2893E+00	1.752E-04	1.259E+10	0.001
1s 3d <sup>3</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>2</sub>	4.4985E+00	9.377E-05	6.182E+09	4.4794E+00	9.361E-05	6.171E+09	0.001

(continued on next page)

Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	gf	$A$ ( $s^{-1}$ )	
1s 3d <sup>3</sup> D <sub>1</sub>	1s 5d <sup>3</sup> D <sub>2</sub>	4.5010E+00	4.110E–05	2.707E+09	4.4818E+00	4.103E–05	2.702E+09	0.002
1s 3d <sup>3</sup> D <sub>3</sub>	1s 5d <sup>3</sup> D <sub>2</sub>	4.5585E+00	4.574E–05	2.936E+09	4.5391E+00	4.533E–05	2.910E+09	0.001
1s 3d <sup>1</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>2</sub>	4.5609E+00	1.111E–05	7.124E+08	4.5414E+00	1.094E–05	7.020E+08	0.002
1s 4s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>3</sup> D <sub>2</sub>	1.3290E+01	1.104E–03	8.339E+09	1.3233E+01	1.121E–03	8.472E+09	0.002
1s 4s <sup>1</sup> S <sub>0</sub>	1s 5d <sup>3</sup> D <sub>2</sub>	1.3420E+01	7.221E–04	5.349E+09	1.3364E+01	7.080E–04	5.244E+09	0.001
1s 4d <sup>3</sup> D <sub>2</sub>	1s 5d <sup>1</sup> P <sub>2</sub>	1.4214E+01	4.446E–04	2.936E+09	1.4154E+01	4.454E–04	2.940E+09	0.000
1s 4d <sup>3</sup> D <sub>1</sub>	1s 5d <sup>3</sup> D <sub>2</sub>	1.4224E+01	1.955E–04	1.289E+09	1.4164E+01	1.954E–04	1.288E+09	0.000
1s 4d <sup>3</sup> D <sub>3</sub>	1s 5d <sup>3</sup> D <sub>2</sub>	1.4468E+01	2.257E–04	1.438E+09	1.4407E+01	2.258E–04	1.439E+09	0.000
1s 4d <sup>1</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>2</sub>	1.4479E+01	5.540E–05	3.525E+08	1.4417E+01	5.517E–05	3.511E+08	0.000
1s 5s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>3</sup> D <sub>2</sub>	4.0118E+02	3.701E–07	3.067E+03	3.9828E+02	3.741E–07	3.119E+03	0.027
1s 5s <sup>1</sup> S <sub>0</sub>	1s 5d <sup>3</sup> D <sub>2</sub>	4.7039E+02	1.499E–07	9.037E+02	4.6740E+02	1.505E–07	9.114E+02	0.045
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.4551E+00	5.848E–05	6.140E+10	1.4491E+00	5.907E–05	6.201E+10	0.000
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.5247E+00	2.653E–05	2.538E+10	1.5183E+00	2.678E–05	2.561E+10	0.008
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.5313E+00	3.621E–05	3.434E+10	1.5249E+00	3.560E–05	3.375E+10	0.002
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	4.3044E+00	1.385E–04	1.662E+10	4.2867E+00	1.391E–04	1.669E+10	0.000
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	4.4844E+00	6.547E–05	7.239E+09	4.4658E+00	6.579E–05	7.272E+09	0.001
1s 3p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	4.5006E+00	8.834E–05	9.697E+09	4.4821E+00	8.767E–05	9.621E+09	0.000
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.3409E+01	4.062E–04	5.023E+09	1.3352E+01	4.085E–04	5.051E+09	0.000
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.4153E+01	2.101E–04	2.332E+09	1.4093E+01	2.121E–04	2.355E+09	0.000
1s 4p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.4219E+01	2.851E–04	3.135E+09	1.4160E+01	2.846E–04	3.130E+09	0.000
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.4467E+01	4.625E–06	4.913E+07	1.4407E+01	4.908E–06	5.213E+07	0.000
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.4473E+01	1.034E–05	1.097E+08	1.4412E+01	1.028E–05	1.091E+08	0.001
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.4601E+01	9.082E–05	9.472E+08	1.4539E+01	9.153E–05	9.546E+08	0.000
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	4.6126E+02	2.539E–07	2.653E+03	4.5925E+02	2.534E–07	2.649E+03	0.004
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	5.9640E+03	5.793E–11	3.621E–03				0.013
1s 2s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	1.4421E+00	4.306E–05	4.604E+10	1.4359E+00	3.931E–05	4.203E+10	0.002
1s 3s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	4.2732E+00	2.771E–04	3.375E+10	4.2553E+00	2.739E–04	3.335E+10	0.002
1s 3d <sup>3</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	4.4980E+00	4.080E–05	4.484E+09	4.4789E+00	4.078E–05	4.481E+09	0.001
1s 3d <sup>3</sup> D <sub>1</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	4.5005E+00	4.016E–05	4.408E+09	4.4813E+00	3.999E–05	4.390E+09	0.001
1s 3d <sup>3</sup> D <sub>3</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	4.5580E+00	7.478E–06	8.003E+08	4.5386E+00	7.403E–06	7.923E+08	0.003
1s 3d <sup>1</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	4.5603E+00	2.632E–05	2.814E+09	4.5409E+00	2.597E–05	2.777E+09	0.001
1s 4s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	1.3285E+01	1.095E–03	1.380E+10	1.3229E+01	1.114E–03	1.403E+10	0.002
1s 4d <sup>3</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	1.4209E+01	1.940E–04	2.137E+09	1.4150E+01	1.951E–04	2.149E+09	0.000
1s 4d <sup>3</sup> D <sub>1</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	1.4219E+01	1.902E–04	2.091E+09	1.4159E+01	1.904E–04	2.094E+09	0.000
1s 4d <sup>3</sup> D <sub>3</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	1.4463E+01	3.687E–05	3.919E+08	1.4402E+01	3.689E–05	3.921E+08	0.001
1s 4d <sup>1</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	1.4474E+01	1.291E–04	1.370E+09	1.4412E+01	1.289E–04	1.368E+09	0.000
1s 5s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	3.9728E+02	3.792E–07	5.342E+03	3.9446E+02	3.826E–07	5.421E+03	0.023
1s 5d <sup>3</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	4.0886E+04	1.644E–13	2.186E–07				0.336
1s 2s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	1.4408E+00	1.204E–04	5.525E+10	1.4347E+00	1.149E–04	5.277E+10	0.002
1s 3s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	4.2622E+00	6.786E–04	3.560E+10	4.2443E+00	6.795E–04	3.563E+10	0.002
1s 3d <sup>3</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	4.4858E+00	4.726E–05	2.238E+09	4.4668E+00	4.769E–05	2.258E+09	0.001
1s 3d <sup>3</sup> D <sub>1</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	4.4882E+00	7.661E–06	3.624E+08	4.4692E+00	7.705E–06	3.644E+08	0.002
1s 3d <sup>3</sup> D <sub>3</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	4.5454E+00	1.848E–04	8.523E+09	4.5261E+00	1.847E–04	8.521E+09	0.001
1s 3d <sup>1</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	4.5477E+00	3.058E–05	1.409E+09	4.5284E+00	3.047E–05	1.404E+09	0.001
1s 4s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	1.3179E+01	2.524E–03	1.385E+10	1.3123E+01	2.570E–03	1.410E+10	0.002
1s 4d <sup>3</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	1.4088E+01	2.165E–04	1.040E+09	1.4029E+01	2.178E–04	1.046E+09	0.000
1s 4d <sup>3</sup> D <sub>1</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	1.4097E+01	3.491E–05	1.674E+08	1.4038E+01	3.507E–05	1.681E+08	0.000
1s 4d <sup>3</sup> D <sub>3</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	1.4337E+01	8.763E–04	4.062E+09	1.4277E+01	8.786E–04	4.072E+09	0.000
1s 4d <sup>1</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	1.4348E+01	1.443E–04	6.680E+08	1.4287E+01	1.441E–04	6.672E+08	0.000
1s 5s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	3.1997E+02	1.720E–06	1.600E+04	3.1810E+02	1.730E–06	1.615E+04	0.020
1s 5d <sup>3</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	1.5807E+03	3.267E–09	1.246E+00				0.003
1s 5d <sup>3</sup> D <sub>1</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	1.6443E+03	4.714E–10	1.661E–01				0.008
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>0</sub> <sup>o</sup>	1.4538E+00	1.563E–03	7.049E+11	1.4478E+00	1.594E–03	7.186E+11	0.001
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>0</sub> <sup>o</sup>	1.5232E+00	4.174E–04	1.714E+11	1.5168E+00	4.215E–04	1.730E+11	0.001
1s 2p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>0</sub> <sup>o</sup>	1.5298E+00	1.017E–04	4.140E+10	1.5235E+00	9.866E–05	4.016E+10	0.003
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>0</sub> <sup>o</sup>	4.2930E+00	6.727E–05	3.478E+09	4.2753E+00	6.478E–05	3.348E+09	0.001
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>0</sub> <sup>o</sup>	4.4720E+00	4.140E–06	1.972E+08	4.4534E+00	3.472E–06	1.654E+08	0.002
1s 3p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>0</sub> <sup>o</sup>	4.4880E+00	8.259E–07	3.907E+07	4.4696E+00	1.108E–06	5.240E+07	0.012
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>0</sub> <sup>o</sup>	1.3298E+01	3.606E–03	1.943E+10	1.3242E+01	3.616E–03	1.948E+10	0.000
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>0</sub> <sup>o</sup>	1.4030E+01	8.664E–04	4.194E+09	1.3970E+01	8.723E–04	4.223E+09	0.000
1s 4p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>0</sub> <sup>o</sup>	1.4095E+01	2.047E–04	9.816E+08	1.4036E+01	2.005E–04	9.620E+08	0.000
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>0</sub> <sup>o</sup>	1.4339E+01	5.397E–04	2.501E+09	1.4278E+01	5.406E–04	2.505E+09	0.000
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>0</sub> <sup>o</sup>	1.4344E+01	8.972E–05	4.155E+08	1.4283E+01	8.978E–05	4.157E+08	0.000
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>0</sub> <sup>o</sup>	1.4466E+01	9.385E–05	4.274E+08	1.4404E+01	9.364E–05	4.264E+08	0.000
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>0</sub> <sup>o</sup>	1.4470E+01	1.130E–05	5.141E+07	1.4408E+01	1.125E–05	5.124E+07	0.000
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>0</sub> <sup>o</sup>	3.5882E+02	8.216E–07	6.081E+03	3.5685E+02	8.246E–07	6.118E+03	0.001
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>0</sub> <sup>o</sup>	1.2712E+03	4.533E–09	2.673E+00	1.2579E+03	4.615E–09	2.756E+00	0.010
1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>0</sub> <sup>o</sup>	1.6156E+03	5.213E–10	1.903E–01				0.012
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4538E+00	4.796E–04	3.027E+11	1.4478E+00	4.936E–04	3.115E+11	0.001
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4548E+00	6.831E–04	4.305E+11	1.4488E+00	6.959E–04	4.385E+11	0.000
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.5232E+00	1.045E–04	6.006E+10	1.5168E+00	1.058E–04	6.085E+10	0.001

(continued on next page)



Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	
1s2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.5298E+00	2.187E-04	1.247E+11	1.5234E+00	2.185E-04	1.245E+11	0.002
1s3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.2928E+00	2.075E-05	1.502E+09	4.2750E+00	1.920E-05	1.389E+09	0.002
1s3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.2951E+00	2.908E-05	2.103E+09	4.2773E+00	2.793E-05	2.019E+09	0.001
1s3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.4718E+00	1.047E-06	6.984E+07	4.4531E+00	8.606E-07	5.740E+07	0.005
1s3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.4878E+00	1.836E-06	1.216E+08	4.4693E+00	1.609E-06	1.065E+08	0.004
1s4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.3296E+01	1.101E-03	8.310E+09	1.3240E+01	1.110E-03	8.382E+09	0.000
1s4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.3305E+01	1.570E-03	1.183E+10	1.3248E+01	1.574E-03	1.186E+10	0.000
1s4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4027E+01	2.174E-04	1.474E+09	1.3967E+01	2.189E-04	1.484E+09	0.000
1s4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4093E+01	4.547E-04	3.054E+09	1.4033E+01	4.555E-04	3.059E+09	0.000
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4336E+01	8.950E-05	5.809E+08	1.4275E+01	8.974E-05	5.825E+08	0.000
1s4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4342E+01	3.591E-04	2.329E+09	1.4281E+01	3.595E-04	2.332E+09	0.000
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4463E+01	7.505E-06	4.786E+07	1.4401E+01	7.492E-06	4.778E+07	0.000
1s4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4467E+01	6.818E-05	4.346E+08	1.4405E+01	6.800E-05	4.334E+08	0.000
1s5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.5713E+02	2.546E-07	2.663E+03	3.5518E+02	2.555E-07	2.679E+03	0.001
1s5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.6039E+02	3.530E-07	3.626E+03	3.5830E+02	3.545E-07	3.652E+03	0.001
1s5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.2503E+03	1.196E-09	1.021E+00	1.2374E+03	1.217E-09	1.051E+00	0.009
1s5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.5820E+03	1.240E-09	6.612E-01	1.5673E+03	1.256E-09	6.767E-01	0.013
1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	7.6009E+04	1.358E-14	3.135E-09				0.251
1s <sup>2</sup> <sup>1</sup> S <sub>0</sub>	1s5d <sup>1</sup> D <sub>2</sub>	3.2000E-01	3.384E-04	4.406E+12	3.1875E-01	3.920E-04	5.103E+12	0.001
1s2s <sup>3</sup> S <sub>1</sub>	1s5d <sup>1</sup> D <sub>2</sub>	1.4408E+00	3.421E-05	2.199E+10	1.4346E+00	3.238E-05	2.081E+10	0.001
1s2s <sup>1</sup> S <sub>0</sub>	1s5d <sup>1</sup> D <sub>2</sub>	1.4551E+00	4.690E-05	2.955E+10	1.4492E+00	4.826E-05	3.040E+10	0.002
1s3s <sup>3</sup> S <sub>1</sub>	1s5d <sup>1</sup> D <sub>2</sub>	4.2617E+00	1.913E-04	1.405E+10	4.2438E+00	1.909E-04	1.402E+10	0.002
1s3s <sup>1</sup> S <sub>0</sub>	1s5d <sup>1</sup> D <sub>2</sub>	4.2949E+00	2.860E-04	2.068E+10	4.2772E+00	2.874E-04	2.078E+10	0.001
1s3d <sup>3</sup> D <sub>2</sub>	1s5d <sup>1</sup> D <sub>2</sub>	4.4852E+00	1.193E-05	7.912E+08	4.4662E+00	1.201E-05	7.964E+08	0.000
1s3d <sup>3</sup> D <sub>1</sub>	1s5d <sup>1</sup> D <sub>2</sub>	4.4876E+00	2.723E-05	1.804E+09	4.4686E+00	2.736E-05	1.812E+09	0.001
1s3d <sup>3</sup> D <sub>3</sub>	1s5d <sup>1</sup> D <sub>2</sub>	4.5449E+00	3.039E-05	1.963E+09	4.5255E+00	3.031E-05	1.958E+09	0.001
1s3d <sup>1</sup> D <sub>2</sub>	1s5d <sup>1</sup> D <sub>2</sub>	4.5472E+00	1.242E-04	8.013E+09	4.5278E+00	1.237E-04	7.986E+09	0.001
1s4s <sup>3</sup> S <sub>1</sub>	1s5d <sup>1</sup> D <sub>2</sub>	1.3174E+01	7.090E-04	5.450E+09	1.3118E+01	7.220E-04	5.550E+09	0.002
1s4s <sup>1</sup> S <sub>0</sub>	1s5d <sup>1</sup> D <sub>2</sub>	1.3302E+01	1.097E-03	8.271E+09	1.3247E+01	1.082E-03	8.157E+09	0.001
1s4d <sup>3</sup> D <sub>2</sub>	1s5d <sup>1</sup> D <sub>2</sub>	1.4082E+01	5.367E-05	3.610E+08	1.4023E+01	5.400E-05	3.632E+08	0.000
1s4d <sup>3</sup> D <sub>1</sub>	1s5d <sup>1</sup> D <sub>2</sub>	1.4092E+01	1.243E-04	8.352E+08	1.4033E+01	1.245E-04	8.366E+08	0.000
1s4d <sup>3</sup> D <sub>3</sub>	1s5d <sup>1</sup> D <sub>2</sub>	1.4332E+01	1.438E-04	9.338E+08	1.4271E+01	1.442E-04	9.366E+08	0.000
1s4d <sup>1</sup> D <sub>2</sub>	1s5d <sup>1</sup> D <sub>2</sub>	1.4342E+01	5.883E-04	3.816E+09	1.4282E+01	5.895E-04	3.823E+09	0.000
1s5s <sup>3</sup> S <sub>1</sub>	1s5d <sup>1</sup> D <sub>2</sub>	3.1728E+02	4.955E-07	6.566E+03	3.1538E+02	4.978E-07	6.620E+03	0.018
1s5s <sup>1</sup> S <sub>0</sub>	1s5d <sup>1</sup> D <sub>2</sub>	3.5905E+02	5.277E-07	5.460E+03	3.5720E+02	5.289E-07	5.482E+03	0.031
1s5d <sup>3</sup> D <sub>2</sub>	1s5d <sup>1</sup> D <sub>2</sub>	1.5170E+03	9.109E-10	5.280E-01				0.016
1s5d <sup>3</sup> D <sub>1</sub>	1s5d <sup>1</sup> D <sub>2</sub>	1.5755E+03	1.889E-09	1.015E+00				0.003
1s5d <sup>3</sup> D <sub>3</sub>	1s5d <sup>1</sup> D <sub>2</sub>	3.7649E+04	1.593E-13	1.499E-07				0.285
1s2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.5225E+00	2.780E-03	8.890E+11	1.5161E+00	2.919E-03	9.332E+11	0.000
1s3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.4658E+00	3.882E-05	1.443E+09	4.4472E+00	3.385E-05	1.257E+09	0.001
1s4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.3968E+01	5.895E-03	2.239E+10	1.3909E+01	5.959E-03	2.263E+10	0.000
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.4275E+01	9.254E-05	3.366E+08	1.4214E+01	9.308E-05	3.385E+08	0.000
1s4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.4280E+01	7.287E-06	2.648E+07	1.4220E+01	7.321E-06	2.660E+07	0.000
1s4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.4401E+01	7.716E-04	2.758E+09	1.4339E+01	7.730E-04	2.762E+09	0.000
1s4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.4404E+01	7.051E-05	2.519E+08	1.4343E+01	7.056E-05	2.520E+08	0.000
1s5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	9.0890E+02	8.517E-08	7.641E+01	9.0168E+02	8.608E-08	7.780E+01	0.007
1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	3.1889E+03	1.921E-10	1.400E-02	3.1838E+03	1.906E-10	1.382E-02	0.001
1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	3.3285E+03	1.343E-11	8.982E-04				0.017
1s3d <sup>3</sup> D <sub>2</sub>	1s5g <sup>3</sup> G <sub>4</sub>	4.4792E+00	6.254E-03	2.310E+11	4.4604E+00	6.315E-03	2.332E+11	0.000
1s3d <sup>3</sup> D <sub>3</sub>	1s5g <sup>3</sup> G <sub>4</sub>	4.5387E+00	6.548E-04	2.356E+10	4.5195E+00	6.553E-04	2.357E+10	0.000
1s3d <sup>1</sup> D <sub>2</sub>	1s5g <sup>3</sup> G <sub>4</sub>	4.5410E+00	5.882E-05	2.114E+09	4.5219E+00	5.907E-05	2.122E+09	0.000
1s4d <sup>3</sup> D <sub>2</sub>	1s5g <sup>3</sup> G <sub>4</sub>	1.4023E+01	5.755E-03	2.169E+10	1.3966E+01	5.765E-03	2.172E+10	0.000
1s4d <sup>3</sup> D <sub>3</sub>	1s5g <sup>3</sup> G <sub>4</sub>	1.4271E+01	5.740E-04	2.089E+09	1.4212E+01	5.735E-04	2.086E+09	0.000
1s4d <sup>1</sup> D <sub>2</sub>	1s5g <sup>3</sup> G <sub>4</sub>	1.4281E+01	5.352E-05	1.945E+08	1.4222E+01	5.388E-05	1.957E+08	0.000
1s5d <sup>3</sup> D <sub>2</sub>	1s5g <sup>3</sup> G <sub>4</sub>	1.0444E+03	2.420E-08	1.645E+01	1.0513E+03	2.342E-08	1.557E+01	0.002
1s5d <sup>3</sup> D <sub>3</sub>	1s5g <sup>3</sup> G <sub>4</sub>	3.0779E+03	9.602E-11	7.512E-03	3.1417E+03	8.912E-11	6.635E-03	0.001
1s5d <sup>1</sup> D <sub>2</sub>	1s5g <sup>3</sup> G <sub>4</sub>	3.3519E+03	7.054E-12	4.653E-04				0.014
1s2s <sup>3</sup> S <sub>1</sub>	1s5g <sup>3</sup> G <sub>3</sub>	1.4401E+00	2.205E-11	1.013E+04	1.4340E+00	5.275E-14	2.423E+01	0.632
1s3s <sup>3</sup> S <sub>1</sub>	1s5g <sup>3</sup> G <sub>3</sub>	4.2561E+00	6.131E-09	3.225E+05				0.019
1s3d <sup>3</sup> D <sub>2</sub>	1s5g <sup>3</sup> G <sub>3</sub>	4.4791E+00	6.989E-04	3.319E+10	4.4603E+00	7.065E-04	3.355E+10	0.000
1s3d <sup>3</sup> D <sub>1</sub>	1s5g <sup>3</sup> G <sub>3</sub>	4.4815E+00	4.174E-03	1.980E+11	4.4627E+00	4.206E-03	1.995E+11	0.000
1s3d <sup>3</sup> D <sub>3</sub>	1s5g <sup>3</sup> G <sub>3</sub>	4.5386E+00	7.882E-05	3.646E+09	4.5194E+00	7.892E-05	3.651E+09	0.000
1s3d <sup>1</sup> D <sub>2</sub>	1s5g <sup>3</sup> G <sub>3</sub>	4.5409E+00	4.695E-04	2.170E+10	4.5217E+00	4.687E-04	2.165E+10	0.000
1s4s <sup>3</sup> S <sub>1</sub>	1s5g <sup>3</sup> G <sub>3</sub>	1.3121E+01	9.510E-09	5.263E+04				0.006
1s4d <sup>3</sup> D <sub>2</sub>	1s5g <sup>3</sup> G <sub>3</sub>	1.4022E+01	6.457E-04	3.129E+09	1.3965E+01	6.475E-04	3.137E+09	0.000
1s4d <sup>3</sup> D <sub>1</sub>	1s5g <sup>3</sup> G <sub>3</sub>	1.4031E+01	3.837E-03	1.857E+10	1.3974E+01	3.841E-03	1.858E+10	0.000
1s4d <sup>3</sup> D <sub>3</sub>	1s5g <sup>3</sup> G <sub>3</sub>	1.4269E+01	6.912E-05	3.235E+08	1.4210E+01	6.907E-05	3.231E+08	0.000
1s4d <sup>1</sup> D <sub>2</sub>	1s5g <sup>3</sup> G <sub>3</sub>	1.4280E+01	4.090E-04	1.912E+09	1.4221E+01	4.079E-04	1.905E+09	0.000
1s5s <sup>3</sup> S <sub>1</sub>	1s5g <sup>3</sup> G <sub>3</sub>	2.8921E+02	1.975E-12	2.250E-02	2.8822E+02	1.905E-12	2.167E-02	0.069
1s5d <sup>3</sup> D <sub>2</sub>	1s5g <sup>3</sup> G <sub>3</sub>	1.0362E+03	2.785E-09	2.471E+00	1.0430E+03	2.697E-09	2.342E+00	0.001
1s5d <sup>3</sup> D <sub>1</sub>	1s5g <sup>3</sup> G <sub>3</sub>	1.0632E+03	1.531E-08	1.291E+01	1.0701E+03	1.482E-08	1.222E+01	0.002

(continued on next page)

Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	A (s <sup>-1</sup> )	$\lambda$ (Å)	gf	A (s <sup>-1</sup> )	
1s 5d <sup>3</sup> D <sub>3</sub>	1s 5g <sup>3</sup> G <sub>3</sub>	3.0082E+03	1.239E-11	1.304E-03				0.004
1s 5d <sup>1</sup> D <sub>2</sub>	1s 5g <sup>3</sup> G <sub>3</sub>	3.2694E+03	5.703E-11	5.084E-03	3.3474E+03	5.238E-11	4.417E-03	0.014
1s 5g <sup>3</sup> G <sub>4</sub>	1s 5g <sup>3</sup> G <sub>3</sub>	1.3281E+05	1.079E-15	5.826E-11				0.731
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.4532E+00	3.021E-06	1.363E+09	1.4471E+00	3.966E-06	1.789E+09	0.017
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.5225E+00	3.106E-04	1.277E+11	1.5161E+00	3.258E-04	1.339E+11	0.001
1s 2p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.5291E+00	1.859E-03	7.576E+11	1.5227E+00	1.916E-03	7.807E+11	0.001
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.2871E+00	1.345E-07	6.974E+06	4.2694E+00	4.281E-08	2.219E+06	0.026
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.4656E+00	4.376E-06	2.091E+08	4.4470E+00	3.777E-06	1.804E+08	0.001
1s 3p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.4815E+00	2.232E-05	1.059E+09	4.4631E+00	2.227E-05	1.056E+09	0.002
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.3241E+01	5.944E-06	3.231E+07	1.3185E+01	6.974E-06	3.790E+07	0.001
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.3966E+01	6.580E-04	3.215E+09	1.3907E+01	6.653E-04	3.250E+09	0.000
1s 4p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.4031E+01	3.910E-03	1.892E+10	1.3972E+01	3.910E-03	1.892E+10	0.000
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.4278E+01	1.118E-05	5.231E+07	1.4212E+01	1.125E-05	5.265E+07	0.000
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.4278E+01	6.735E-05	3.148E+08	1.4218E+01	6.769E-05	3.163E+08	0.000
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.4398E+01	7.046E-05	3.239E+08	1.4337E+01	7.063E-05	3.246E+08	0.000
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.4402E+01	5.838E-04	2.682E+09	1.4341E+01	5.847E-04	2.686E+09	0.000
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	3.2151E+02	1.870E-09	1.724E+01	3.1987E+02	1.897E-09	1.752E+01	0.002
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	9.0084E+02	9.762E-09	1.146E+01	8.9370E+02	9.861E-09	1.166E+01	0.005
1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.0611E+03	3.558E-08	3.011E+01	1.0539E+03	3.585E-08	3.049E+01	0.007
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	3.0918E+03	2.542E-11	2.534E-03				0.013
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	3.2229E+03	1.353E-10	1.241E-02	3.2177E+03	1.342E-10	1.224E-02	0.002
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.0160E+05	4.530E-15	4.182E-10				0.407
1s 3d <sup>3</sup> D <sub>3</sub>	1s 5g <sup>3</sup> G <sub>5</sub>	4.5349E+00	8.603E-03	2.537E+11	4.5157E+00	8.751E-03	2.580E+11	0.000
1s 4d <sup>3</sup> D <sub>3</sub>	1s 5g <sup>3</sup> G <sub>5</sub>	1.4233E+01	7.663E-03	2.294E+10	1.4174E+01	7.697E-03	2.303E+10	0.000
1s 5d <sup>3</sup> D <sub>3</sub>	1s 5g <sup>3</sup> G <sub>5</sub>	1.9545E+03	5.017E-09	7.964E-01	1.9786E+03	4.774E-09	7.332E-01	0.001
1s 5g <sup>3</sup> G <sub>4</sub>	1s 5g <sup>3</sup> G <sub>5</sub>	5.3554E+03	1.676E-11	3.544E-04	5.3442E+03	1.665E-11	3.506E-04	0.005
1s 5g <sup>3</sup> G <sub>3</sub>	1s 5g <sup>3</sup> G <sub>5</sub>	5.5804E+03	7.076E-13	1.378E-05				0.118
1s 3d <sup>3</sup> D <sub>2</sub>	1s 5g <sup>1</sup> G <sub>4</sub>	4.4754E+00	1.669E-07	6.178E+06				0.002
1s 3d <sup>3</sup> D <sub>3</sub>	1s 5g <sup>1</sup> G <sub>4</sub>	4.5348E+00	5.236E-04	1.887E+10	4.5156E+00	5.326E-04	1.919E+10	0.000
1s 3d <sup>1</sup> D <sub>2</sub>	1s 5g <sup>1</sup> G <sub>4</sub>	4.5371E+00	6.519E-03	2.347E+11	4.5179E+00	6.617E-03	2.382E+11	0.000
1s 4d <sup>3</sup> D <sub>2</sub>	1s 5g <sup>1</sup> G <sub>4</sub>	1.3986E+01	2.967E-07	1.124E+06				0.001
1s 4d <sup>3</sup> D <sub>3</sub>	1s 5g <sup>1</sup> G <sub>4</sub>	1.4232E+01	4.665E-04	1.707E+09	1.4173E+01	4.686E-04	1.714E+09	0.000
1s 4d <sup>1</sup> D <sub>2</sub>	1s 5g <sup>1</sup> G <sub>4</sub>	1.4242E+01	5.798E-03	2.119E+10	1.4183E+01	5.817E-03	2.125E+10	0.000
1s 5d <sup>3</sup> D <sub>2</sub>	1s 5g <sup>1</sup> G <sub>4</sub>	8.6941E+02	2.714E-12	2.661E-03	8.7388E+02	2.967E-12	2.855E-03	0.022
1s 5d <sup>3</sup> D <sub>3</sub>	1s 5g <sup>1</sup> G <sub>4</sub>	1.9321E+03	3.162E-10	6.278E-02	1.9554E+03	3.010E-10	5.784E-02	0.001
1s 5d <sup>1</sup> D <sub>2</sub>	1s 5g <sup>1</sup> G <sub>4</sub>	2.0366E+03	3.358E-09	6.000E-01	2.0649E+03	3.180E-09	5.481E-01	0.007
1s 5g <sup>3</sup> G <sub>4</sub>	1s 5g <sup>1</sup> G <sub>4</sub>	5.1900E+03	1.321E-12	3.636E-05				0.045
1s 5g <sup>3</sup> G <sub>3</sub>	1s 5g <sup>1</sup> G <sub>4</sub>	5.4011E+03	1.294E-11	3.288E-04	5.3899E+03	1.285E-11	3.251E-04	0.008
1s 5g <sup>3</sup> G <sub>5</sub>	1s 5g <sup>1</sup> G <sub>4</sub>	1.6804E+05	4.412E-16	1.158E-11				0.888
1s 2s <sup>3</sup> S <sub>1</sub>	1s 6s <sup>3</sup> S <sub>1</sub>	1.3696E+00	2.953E-10	3.501E+05				0.955
1s 3s <sup>3</sup> S <sub>1</sub>	1s 6s <sup>3</sup> S <sub>1</sub>	3.6936E+00	9.398E-11	1.532E+04				0.701
1s 3d <sup>3</sup> D <sub>2</sub>	1s 6s <sup>3</sup> S <sub>1</sub>	3.8604E+00	1.286E-05	1.919E+09	3.8445E+00	1.300E-05	1.939E+09	0.008
1s 3d <sup>3</sup> D <sub>1</sub>	1s 6s <sup>3</sup> S <sub>1</sub>	3.8622E+00	1.310E-05	1.952E+09	3.8463E+00	1.290E-05	1.923E+09	0.012
1s 3d <sup>3</sup> D <sub>3</sub>	1s 6s <sup>3</sup> S <sub>1</sub>	3.9045E+00	3.054E-05	4.453E+09	3.8883E+00	3.041E-05	4.435E+09	0.008
1s 3d <sup>1</sup> D <sub>2</sub>	1s 6s <sup>3</sup> S <sub>1</sub>	3.9062E+00	8.750E-06	1.275E+09	3.8900E+00	8.603E-06	1.253E+09	0.010
1s 4s <sup>3</sup> S <sub>1</sub>	1s 6s <sup>3</sup> S <sub>1</sub>	8.9291E+00	9.105E-10	2.539E+04				0.189
1s 4d <sup>3</sup> D <sub>2</sub>	1s 6s <sup>3</sup> S <sub>1</sub>	9.3373E+00	4.394E-05	1.121E+09	9.3006E+00	4.402E-05	1.122E+09	0.001
1s 4d <sup>3</sup> D <sub>1</sub>	1s 6s <sup>3</sup> S <sub>1</sub>	9.3415E+00	4.405E-05	1.122E+09	9.3048E+00	4.355E-05	1.109E+09	0.004
1s 4d <sup>3</sup> D <sub>3</sub>	1s 6s <sup>3</sup> S <sub>1</sub>	9.4463E+00	1.037E-04	2.583E+09	9.4089E+00	1.029E-04	2.563E+09	0.002
1s 4d <sup>1</sup> D <sub>2</sub>	1s 6s <sup>3</sup> S <sub>1</sub>	9.4508E+00	2.923E-05	7.276E+08	9.4135E+00	2.897E-05	7.208E+08	0.003
1s 5s <sup>3</sup> S <sub>1</sub>	1s 6s <sup>3</sup> S <sub>1</sub>	2.5485E+01	4.451E-09	1.524E+04				0.034
1s 5d <sup>3</sup> D <sub>2</sub>	1s 6s <sup>3</sup> S <sub>1</sub>	2.7214E+01	1.771E-04	5.316E+08	2.7122E+01	1.754E-04	5.256E+08	0.001
1s 5d <sup>3</sup> D <sub>1</sub>	1s 6s <sup>3</sup> S <sub>1</sub>	2.7232E+01	1.769E-04	5.303E+08	2.7140E+01	1.731E-04	5.181E+08	0.002
1s 5d <sup>3</sup> D <sub>3</sub>	1s 6s <sup>3</sup> S <sub>1</sub>	2.7691E+01	4.244E-04	1.231E+09	2.7596E+01	4.178E-04	1.209E+09	0.001
1s 5d <sup>1</sup> D <sub>2</sub>	1s 6s <sup>3</sup> S <sub>1</sub>	2.7711E+01	1.192E-04	3.450E+08	2.7617E+01	1.172E-04	3.389E+08	0.002
1s 5g <sup>3</sup> G <sub>3</sub>	1s 6s <sup>3</sup> S <sub>1</sub>	2.7948E+01	1.280E-10	3.644E+02				0.022
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.3810E+00	1.717E-07	2.002E+08	1.3752E+00	2.325E-07	2.710E+08	0.030
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.4434E+00	2.896E-05	3.090E+10	1.4374E+00	2.858E-05	3.050E+10	0.007
1s 2p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.4493E+00	2.557E-05	2.706E+10	1.4433E+00	2.438E-05	2.580E+10	0.000
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	3.7142E+00	3.248E-07	5.236E+07	3.6989E+00	4.474E-07	7.210E+07	0.004
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	3.8474E+00	6.170E-05	9.267E+09	3.8314E+00	6.176E-05	9.275E+09	0.006
1s 3p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	3.8593E+00	5.498E-05	8.208E+09	3.8434E+00	5.307E-05	7.920E+09	0.005
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	8.9685E+00	6.588E-07	1.821E+07	8.9310E+00	8.937E-07	2.470E+07	0.001
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	9.2954E+00	1.314E-04	3.381E+09	9.2564E+00	1.331E-04	3.424E+09	0.001
1s 4p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	9.3241E+00	1.177E-04	3.010E+09	9.2853E+00	1.149E-04	2.939E+09	0.000
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	9.4302E+00	2.483E-05	6.209E+08	9.3908E+00	2.464E-05	6.161E+08	0.001
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	9.4324E+00	7.599E-06	1.899E+08	9.3930E+00	7.633E-06	1.907E+08	0.001
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	9.4866E+00	4.042E-08	9.986E+05	9.4468E+00	5.810E-08	1.435E+06	0.005
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	2.5582E+01	2.016E-06	6.850E+06	2.5476E+01	2.721E-06	9.243E+06	0.000
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	2.6962E+01	4.480E-04	1.370E+09	2.6849E+01	4.561E-04	1.395E+09	0.000
1s 5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	2.7084E+01	4.051E-04	1.228E+09	2.6972E+01	3.966E-04	1.202E+09	0.000

(continued on next page)

Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	2.7546E+01	1.673E-04	4.903E+08	2.7434E+01	1.664E-04	4.875E+08	0.000
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	2.7556E+01	5.120E-05	1.499E+08	2.7444E+01	5.132E-05	1.502E+08	0.000
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	2.7794E+01	2.736E-07	7.876E+05	2.7680E+01	3.570E-07	1.027E+06	0.000
1s 3d <sup>3</sup> D <sub>2</sub>	1s 6s <sup>1</sup> S <sub>0</sub>	3.8573E+00	8.512E-06	3.816E+09	3.8418E+00	8.554E-06	3.833E+09	0.004
1s 3d <sup>1</sup> D <sub>2</sub>	1s 6s <sup>1</sup> S <sub>0</sub>	3.9030E+00	1.339E-05	5.863E+09	3.8873E+00	1.312E-05	5.742E+09	0.012
1s 4d <sup>3</sup> D <sub>2</sub>	1s 6s <sup>1</sup> S <sub>0</sub>	9.3190E+00	2.867E-05	2.202E+09	9.2851E+00	2.880E-05	2.209E+09	0.002
1s 4d <sup>1</sup> D <sub>2</sub>	1s 6s <sup>1</sup> S <sub>0</sub>	9.4321E+00	4.483E-05	3.361E+09	9.3976E+00	4.468E-05	3.346E+09	0.002
1s 5d <sup>3</sup> D <sub>2</sub>	1s 6s <sup>1</sup> S <sub>0</sub>	2.7060E+01	1.136E-04	1.034E+09	2.6991E+01	1.153E-04	1.047E+09	0.001
1s 5d <sup>1</sup> D <sub>2</sub>	1s 6s <sup>1</sup> S <sub>0</sub>	2.7551E+01	1.808E-04	1.589E+09	2.7480E+01	1.831E-04	1.604E+09	0.000
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.4434E+00	1.839E-05	5.887E+10	1.4374E+00	1.782E-05	5.703E+10	0.005
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	3.8472E+00	3.921E-05	1.767E+10	3.8320E+00	3.856E-05	1.736E+10	0.006
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	9.2942E+00	8.350E-05	6.448E+09	9.2596E+00	8.326E-05	6.422E+09	0.001
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	9.4312E+00	1.079E-05	8.090E+08	9.3964E+00	1.073E-05	8.042E+08	0.001
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	2.6952E+01	2.844E-04	2.612E+09	2.6876E+01	2.863E-04	2.621E+09	0.000
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	2.7545E+01	7.268E-05	6.390E+08	2.7473E+01	7.228E-05	6.334E+08	0.000
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3788E+00	3.430E-05	2.407E+10	1.3731E+00	3.466E-05	2.432E+10	0.006
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3797E+00	2.139E-05	1.499E+10	1.3739E+00	2.180E-05	1.528E+10	0.002
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.4410E+00	3.551E-05	2.281E+10	1.4350E+00	3.534E-05	2.270E+10	0.006
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.4469E+00	1.342E-05	8.551E+09	1.4409E+00	1.332E-05	8.486E+09	0.000
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.6983E+00	6.924E-05	6.753E+09	3.6831E+00	6.933E-05	6.760E+09	0.007
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.7000E+00	4.378E-05	4.266E+09	3.6848E+00	4.378E-05	4.265E+09	0.006
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.8304E+00	7.355E-05	6.688E+09	3.8145E+00	7.319E-05	6.653E+09	0.007
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.8422E+00	2.807E-05	2.536E+09	3.8264E+00	2.789E-05	2.520E+09	0.005
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	8.8767E+00	1.362E-04	2.306E+09	8.8397E+00	1.369E-04	2.318E+09	0.001
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	8.8807E+00	8.688E-05	1.465E+09	8.8435E+00	8.652E-05	1.463E+09	0.001
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	9.1968E+00	1.504E-04	2.372E+09	9.1583E+00	1.507E-04	2.376E+09	0.001
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	9.2248E+00	5.772E-05	9.049E+08	9.1865E+00	5.772E-05	9.047E+08	0.000
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	9.3286E+00	5.477E-06	8.396E+07	9.2898E+00	5.452E-06	8.357E+07	0.001
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	9.3309E+00	1.379E-06	2.113E+07	9.2920E+00	1.357E-06	2.079E+07	0.002
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	9.3822E+00	3.795E-05	5.752E+08	9.3430E+00	3.754E-05	5.688E+08	0.000
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	9.3838E+00	4.233E-06	6.413E+07	9.3446E+00	4.189E-06	6.346E+07	0.000
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	2.4849E+01	8.840E-04	8.296E+08	2.4746E+01	8.860E-04	8.339E+08	0.000
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	2.4864E+01	2.449E-04	5.284E+08	2.4761E+01	2.428E-04	5.240E+08	0.000
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	2.6148E+01	4.645E-04	9.063E+08	2.6040E+01	4.663E-04	9.096E+08	0.000
1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	2.6264E+01	1.798E-04	3.477E+08	2.6156E+01	1.793E-04	3.466E+08	0.000
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	2.6698E+01	3.580E-05	6.700E+07	2.6590E+01	3.549E-05	6.640E+07	0.000
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	2.6707E+01	9.011E-06	1.685E+07	2.6599E+01	8.838E-06	1.652E+07	0.000
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	2.6923E+01	2.493E-04	4.588E+08	2.6814E+01	2.461E-04	4.528E+08	0.000
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	2.6930E+01	2.780E-05	5.113E+07	2.6821E+01	2.745E-05	5.048E+07	0.000
1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	8.6654E+02	1.895E-07	3.367E+02	8.6410E+02	1.920E-07	3.402E+02	0.003
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	8.7749E+02	1.161E-07	2.012E+02	8.3677E+02	1.322E-07	2.498E+02	0.003
1s 2 <sup>1</sup> S <sub>0</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	3.1620E-01	1.394E-04	1.859E+12	3.1497E-01	1.398E-04	1.864E+12	0.002
1s 2s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	1.3669E+00	1.366E-05	9.753E+09	1.3610E+00	1.209E-05	8.637E+09	0.007
1s 2s <sup>1</sup> S <sub>0</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	1.3798E+00	7.380E-06	5.171E+09	1.3741E+00	7.407E-06	5.189E+09	0.004
1s 3s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	3.6741E+00	8.920E-05	8.815E+09	3.6587E+00	8.805E-05	8.701E+09	0.004
1s 3s <sup>1</sup> S <sub>0</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	3.6988E+00	5.586E-05	5.447E+09	3.6835E+00	5.475E-05	5.337E+09	0.013
1s 3d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	3.8391E+00	3.737E-05	3.822E+09	3.713E-05	3.822E+09	3.713E+09	0.003
1s 3d <sup>3</sup> D <sub>1</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	3.8409E+00	1.647E-05	1.489E+09	3.8245E+00	1.647E-05	1.490E+09	0.007
1s 3d <sup>3</sup> D <sub>3</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	3.8827E+00	1.797E-05	1.590E+09	3.8661E+00	1.793E-05	1.587E+09	0.004
1s 3d <sup>1</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	3.8844E+00	4.392E-06	3.883E+08	3.8678E+00	4.140E-06	3.661E+08	0.010
1s 4s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	8.8160E+00	2.394E-04	4.109E+09	8.7783E+00	2.410E-04	4.138E+09	0.003
1s 4s <sup>1</sup> S <sub>0</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	8.8733E+00	1.533E-04	2.598E+09	8.8358E+00	1.502E-04	2.545E+09	0.007
1s 4d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	9.2136E+00	1.112E-04	1.748E+09	9.1745E+00	1.107E-04	1.740E+09	0.001
1s 4d <sup>3</sup> D <sub>1</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	9.2178E+00	4.892E-05	7.682E+08	9.1786E+00	4.923E-05	7.730E+08	0.002
1s 4d <sup>3</sup> D <sub>3</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	9.3198E+00	5.465E-05	8.393E+08	9.2799E+00	5.491E-05	8.435E+08	0.001
1s 4d <sup>1</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	9.3242E+00	1.339E-05	2.054E+08	9.2843E+00	1.284E-05	1.970E+08	0.003
1s 5s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	2.4585E+01	7.948E-04	1.754E+09	2.4475E+01	8.142E-04	1.798E+09	0.002
1s 5s <sup>1</sup> S <sub>0</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	2.4809E+01	5.211E-04	1.130E+09	2.4699E+01	5.045E-04	1.094E+09	0.001
1s 5d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	2.6190E+01	4.075E-04	7.925E+08	2.6077E+01	4.066E-04	7.910E+08	0.000
1s 5d <sup>3</sup> D <sub>1</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	2.6207E+01	1.795E-04	3.486E+08	2.6094E+01	1.806E-04	3.509E+08	0.001
1s 5d <sup>3</sup> D <sub>3</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	2.6631E+01	2.076E-04	3.904E+08	2.6515E+01	2.095E-04	3.941E+08	0.000
1s 5d <sup>1</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	2.6650E+01	5.102E-05	9.582E+07	2.6534E+01	4.929E-05	9.260E+07	0.001
1s 5g <sup>3</sup> G <sub>4</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	2.6864E+01	6.067E-05	1.121E+08	2.6740E+01	6.071E-05	1.123E+08	0.000
1s 5g <sup>3</sup> G <sub>3</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	2.6869E+01	6.827E-06	1.262E+07	2.6746E+01	6.882E-06	1.272E+07	0.000
1s 5g <sup>1</sup> G <sub>4</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	2.7003E+01	4.401E-09	8.052E+03				0.005
1s 6s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	6.9582E+02	3.295E-07	9.080E+02	6.7673E+02	3.578E-07	1.033E+03	0.023
1s 6s <sup>1</sup> S <sub>0</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	8.1469E+02	1.337E-07	2.688E+02	7.7023E+02	1.541E-07	3.436E+02	0.058
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.3786E+00	3.042E-05	3.559E+10	1.3729E+00	3.065E-05	3.585E+10	0.000
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.4408E+00	1.370E-05	1.468E+10	1.4348E+00	1.329E-05	1.423E+10	0.002
1s 2p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.4467E+00	1.838E-05	1.952E+10	1.4407E+00	1.863E-05	1.979E+10	0.007
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	3.6970E+00	6.212E-05	1.010E+10	3.6819E+00	6.180E-05	1.005E+10	0.006

(continued on next page)

Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	gf	$A$ ( $s^{-1}$ )	
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	3.8290E+00	2.847E-05	4.318E+09	3.8133E+00	2.744E-05	4.160E+09	0.005
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	3.8407E+00	3.813E-05	5.747E+09	3.8251E+00	3.860E-05	5.816E+09	0.003
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	8.8691E+00	1.223E-04	3.458E+09	8.8329E+00	1.223E-04	3.455E+09	0.001
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	9.1886E+00	5.804E-05	1.529E+09	9.1511E+00	5.631E-05	1.482E+09	0.001
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	9.2166E+00	7.802E-05	2.042E+09	9.1793E+00	7.959E-05	2.082E+09	0.000
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	9.3203E+00	1.284E-06	3.286E+07	9.2824E+00	1.452E-06	3.715E+07	0.003
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	9.3225E+00	2.872E-06	7.347E+07	9.2846E+00	2.760E-06	7.058E+07	0.001
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	9.3754E+00	2.499E-05	6.322E+08	9.3371E+00	2.499E-05	6.319E+08	0.001
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	2.4789E+01	3.429E-04	1.241E+09	2.4694E+01	3.435E-04	1.241E+09	0.000
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	2.6083E+01	1.778E-04	5.810E+08	2.5981E+01	1.727E-04	5.643E+08	0.000
1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	2.6197E+01	2.407E-04	7.798E+08	2.6097E+01	2.471E-04	8.000E+08	0.000
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	2.6629E+01	8.342E-06	2.616E+07	2.6529E+01	9.671E-06	3.029E+07	0.000
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	2.6638E+01	1.871E-05	5.863E+07	2.6539E+01	1.789E-05	5.600E+07	0.000
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	2.6860E+01	1.637E-04	5.046E+08	2.6759E+01	1.646E-04	5.067E+08	0.000
1s 6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	7.9973E+02	2.175E-07	7.560E+02	8.0416E+02	2.068E-07	7.051E+02	0.003
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.0374E+04	4.887E-11	1.010E-03				0.005
1s 2s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	1.3668E+00	1.350E-05	1.607E+10	1.3611E+00	1.183E-05	1.408E+10	0.004
1s 3s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	3.6740E+00	8.868E-05	1.461E+10	3.6587E+00	8.652E-05	1.424E+10	0.006
1s 3d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	3.8389E+00	1.627E-05	2.454E+09	3.8228E+00	1.618E-05	2.441E+09	0.005
1s 3d <sup>3</sup> D <sub>1</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	3.8407E+00	1.611E-05	2.429E+09	3.8246E+00	1.597E-05	2.408E+09	0.005
1s 3d <sup>3</sup> D <sub>3</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	3.8825E+00	2.940E-06	4.336E+08	3.8625E+00	2.932E-06	4.324E+08	0.006
1s 3d <sup>1</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	3.8842E+00	1.041E-05	1.534E+09	3.8678E+00	1.015E-05	1.496E+09	0.005
1s 4s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	8.8149E+00	2.379E-04	6.807E+09	8.7785E+00	2.371E-04	6.783E+09	0.004
1s 4d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	9.2124E+00	4.864E-05	1.274E+09	9.1748E+00	4.850E-05	1.270E+09	0.002
1s 4d <sup>3</sup> D <sub>1</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	9.2166E+00	4.770E-05	1.249E+09	9.1789E+00	4.769E-05	1.247E+09	0.002
1s 4d <sup>3</sup> D <sub>3</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	9.3186E+00	8.922E-06	2.284E+08	9.2802E+00	8.978E-06	2.298E+08	0.002
1s 4d <sup>1</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	9.3230E+00	3.131E-05	8.010E+08	9.2846E+00	3.094E-05	7.914E+08	0.001
1s 5s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	2.4577E+01	7.884E-04	2.902E+09	2.4477E+01	8.016E-04	2.949E+09	0.003
1s 5d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	2.6180E+01	1.783E-04	5.784E+08	2.6079E+01	1.784E-04	5.784E+08	0.001
1s 5d <sup>3</sup> D <sub>1</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	2.6197E+01	1.744E-04	5.652E+08	2.6096E+01	1.750E-04	5.667E+08	0.000
1s 5d <sup>3</sup> D <sub>3</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	2.6621E+01	3.384E-05	1.062E+08	2.6517E+01	3.426E-05	1.074E+08	0.001
1s 5d <sup>1</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	2.6640E+01	1.185E-04	3.712E+08	2.6536E+01	1.178E-04	3.688E+08	0.000
1s 5g <sup>3</sup> G <sub>3</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	2.6859E+01	4.044E-05	1.246E+08	2.6748E+01	4.053E-05	1.248E+08	0.000
1s 6s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	6.8911E+02	3.374E-07	1.580E+03	6.7829E+02	3.486E-07	1.670E+03	0.016
1s 6d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>1</sub>	7.1428E+04	1.468E-13	6.396E-08				0.467
1s 2s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	1.3662E+00	4.040E-05	2.062E+10	1.3604E+00	3.740E-05	1.909E+10	0.001
1s 3s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	3.6692E+00	2.239E-04	1.585E+10	3.6538E+00	2.222E-04	1.572E+10	0.005
1s 3d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	3.8337E+00	1.908E-05	1.237E+09	3.8174E+00	1.928E-05	1.250E+09	0.004
1s 3d <sup>3</sup> D <sub>1</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	3.8355E+00	3.117E-06	2.019E+08	3.8192E+00	3.126E-06	2.025E+08	0.005
1s 3d <sup>3</sup> D <sub>3</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	3.8772E+00	7.363E-05	4.667E+09	3.8607E+00	7.364E-05	4.668E+09	0.004
1s 3d <sup>1</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	3.8789E+00	1.225E-05	7.761E+08	3.8624E+00	1.214E-05	7.694E+08	0.005
1s 4s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	8.7877E+00	5.723E-04	7.062E+09	8.7503E+00	5.746E-04	7.090E+09	0.004
1s 4d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	9.1827E+00	5.597E-05	6.325E+08	9.1440E+00	5.630E-05	6.362E+08	0.001
1s 4d <sup>3</sup> D <sub>1</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	9.1868E+00	9.054E-06	1.022E+08	9.1480E+00	9.077E-06	1.024E+08	0.001
1s 4d <sup>3</sup> D <sub>3</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	9.2881E+00	2.193E-04	2.423E+09	9.2486E+00	2.195E-04	2.424E+09	0.001
1s 4d <sup>1</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	9.2925E+00	3.614E-05	3.988E+08	9.2530E+00	3.603E-05	3.976E+08	0.002
1s 5s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	2.4366E+01	1.808E-03	2.903E+09	2.4258E+01	1.840E-03	2.955E+09	0.002
1s 5d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	2.5941E+01	1.985E-04	2.811E+08	2.5832E+01	1.994E-04	2.823E+08	0.000
1s 5d <sup>3</sup> D <sub>1</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	2.5958E+01	3.202E-05	4.528E+07	2.5848E+01	3.209E-05	4.538E+07	0.000
1s 5d <sup>3</sup> D <sub>3</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	2.6374E+01	8.038E-04	1.101E+09	2.6261E+01	8.056E-04	1.103E+09	0.000
1s 5d <sup>1</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	2.6393E+01	1.321E-04	1.808E+08	2.6280E+01	1.319E-04	1.804E+08	0.000
1s 5g <sup>3</sup> G <sub>4</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	2.6602E+01	5.844E-06	7.869E+06	2.6482E+01	5.860E-06	7.894E+06	0.000
1s 5g <sup>3</sup> G <sub>3</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	2.6608E+01	7.044E-07	9.481E+05	2.6488E+01	7.042E-07	9.483E+05	0.000
1s 5g <sup>3</sup> G <sub>5</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	2.6735E+01	7.898E-05	1.053E+08	2.6614E+01	7.896E-05	1.053E+08	0.000
1s 5g <sup>1</sup> G <sub>4</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	2.6739E+01	4.809E-06	6.409E+06	2.6619E+01	4.803E-06	6.404E+06	0.000
1s 6s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	5.5466E+02	1.528E-06	4.732E+03	5.4291E+02	1.608E-06	5.157E+03	0.017
1s 6d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	2.7340E+03	3.001E-09	3.826E-01				0.003
1s 6d <sup>3</sup> D <sub>1</sub>	1s 6d <sup>3</sup> D <sub>3</sub>	2.8428E+03	4.330E-10	5.106E-02				0.008
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.3779E+00	9.054E-04	4.544E+11	1.3722E+00	9.227E-04	4.630E+11	0.001
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4401E+00	2.384E-04	1.095E+11	1.4340E+00	2.412E-04	1.108E+11	0.001
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4460E+00	5.807E-05	2.646E+10	1.4400E+00	5.515E-05	2.513E+10	0.001
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.6921E+00	3.684E-06	2.575E+08	3.6768E+00	4.342E-06	3.035E+08	0.024
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.8237E+00	6.010E-06	3.917E+08	3.8077E+00	6.772E-06	4.413E+08	0.007
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.8355E+00	1.590E-06	1.030E+08	3.8195E+00	1.275E-06	8.258E+07	0.008
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	8.8410E+00	3.538E-04	4.314E+09	8.8032E+00	3.5117E-04	4.288E+09	0.000
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.1585E+00	6.227E-05	7.074E+08	9.1192E+00	6.110E-05	6.942E+08	0.000
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.1863E+00	1.425E-05	1.609E+08	9.1472E+00	1.460E-05	1.649E+08	0.000
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.2892E+00	1.116E-04	1.233E+09	9.2496E+00	1.113E-04	1.229E+09	0.001
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.2914E+00	1.854E-05	2.047E+08	9.2518E+00	1.857E-05	2.050E+08	0.001
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.3423E+00	1.905E-05	2.080E+08	9.3023E+00	1.898E-05	2.072E+08	0.001
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.3440E+00	2.289E-06	2.499E+07	9.3039E+00	2.187E-06	2.387E+07	0.001

(continued on next page)

Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	
1s5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.4571E+01	2.580E-03	4.072E+09	2.4463E+01	2.587E-03	4.085E+09	0.000
1s5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.5841E+01	6.351E-04	9.063E+08	2.5726E+01	6.431E-04	9.181E+08	0.000
1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.5954E+01	1.498E-04	2.119E+08	2.5839E+01	1.432E-04	2.027E+08	0.000
1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.6377E+01	6.346E-04	8.692E+08	2.6263E+01	6.351E-04	8.700E+08	0.000
1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.6386E+01	1.056E-04	1.445E+08	2.6272E+01	1.060E-04	1.451E+08	0.000
1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.6597E+01	1.106E-04	1.490E+08	2.6482E+01	1.110E-04	1.495E+08	0.000
1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.6604E+01	1.332E-05	1.793E+07	2.6488E+01	1.282E-05	1.727E+07	0.000
1s6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	6.2157E+02	8.428E-07	2.079E+03	6.1517E+02	8.540E-07	2.132E+03	0.002
1s6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.1987E+03	4.683E-09	9.231E-01	2.1353E+03	5.072E-09	1.051E+00	0.014
1s6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.7901E+03	5.400E-10	6.610E-02				0.014
1s2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.3779E+00	2.777E-04	1.951E+11	1.3722E+00	2.854E-04	2.005E+11	0.001
1s2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.3788E+00	3.955E-04	2.775E+11	1.3730E+00	4.024E-04	2.823E+11	0.000
1s2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4401E+00	5.965E-05	3.838E+10	1.4340E+00	6.023E-05	3.874E+10	0.002
1s2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4459E+00	1.248E-04	7.961E+10	1.4400E+00	1.244E-04	7.940E+10	0.002
1s3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.6920E+00	1.087E-06	1.064E+08	3.6768E+00	1.477E-06	1.445E+08	0.029
1s3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.6937E+00	1.645E-06	1.609E+08	3.6784E+00	1.937E-06	1.893E+08	0.023
1s3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.8236E+00	1.498E-06	1.367E+08	3.8077E+00	1.691E-06	1.543E+08	0.012
1s3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.8353E+00	3.469E-06	3.146E+08	3.8195E+00	3.746E-06	3.396E+08	0.003
1s4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	8.8404E+00	1.083E-04	1.849E+09	8.8032E+00	1.065E-04	1.819E+09	0.001
1s4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	8.8444E+00	1.537E-04	2.622E+09	8.8071E+00	1.527E-04	2.605E+09	0.000
1s4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	9.1578E+00	1.565E-05	2.489E+08	9.1192E+00	1.529E-05	2.432E+08	0.001
1s4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	9.1856E+00	3.180E-05	5.028E+08	9.1472E+00	3.119E-05	4.931E+08	0.000
1s4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	9.2886E+00	1.855E-05	2.868E+08	9.2496E+00	1.847E-05	2.856E+08	0.001
1s4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	9.2908E+00	7.429E-05	1.148E+09	9.2518E+00	7.409E-05	1.145E+09	0.000
1s4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	9.3416E+00	1.524E-06	2.329E+07	9.3023E+00	1.517E-06	2.318E+07	0.001
1s4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	9.3433E+00	1.384E-05	2.116E+08	9.3039E+00	1.371E-05	2.095E+08	0.001
1s5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	2.4566E+01	7.873E-04	1.740E+09	2.4463E+01	7.936E-04	1.754E+09	0.000
1s5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	2.4582E+01	1.123E-03	2.479E+09	2.4477E+01	1.126E-03	2.486E+09	0.000
1s5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	2.5836E+01	1.593E-04	3.185E+08	2.5726E+01	1.609E-04	3.216E+08	0.000
1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	2.5948E+01	3.343E-04	6.624E+08	2.5839E+01	3.349E-04	6.635E+08	0.000
1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	2.6372E+01	1.053E-04	2.020E+08	2.6263E+01	1.054E-04	2.022E+08	0.000
1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	2.6381E+01	4.223E-04	8.094E+08	2.6272E+01	4.226E-04	8.098E+08	0.000
1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	2.6592E+01	8.828E-06	1.665E+07	2.6482E+01	8.872E-06	1.673E+07	0.000
1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	2.6599E+01	8.031E-05	1.514E+08	2.6489E+01	8.015E-05	1.511E+08	0.000
1s6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	6.1864E+02	2.611E-07	9.100E+02	6.1520E+02	2.653E-07	9.272E+02	0.001
1s6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	6.2421E+02	3.621E-07	1.240E+03	6.0122E+02	4.004E-07	1.465E+03	0.001
1s6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	2.1625E+03	1.236E-09	3.526E-01	2.1357E+03	1.266E-09	3.671E-01	0.013
1s6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	2.7321E+03	1.288E-09	2.302E-01	2.6181E+03	1.394E-09	2.690E-01	0.017
1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.3144E+05	1.419E-14	1.096E-09				0.139
1s <sup>2</sup> <sup>1</sup> S <sub>0</sub>	1s6d <sup>1</sup> D <sub>2</sub>	3.1620E-01	2.010E-04	2.681E+12	3.1493E-01	2.346E-04	3.129E+12	0.002
1s2s <sup>3</sup> S <sub>1</sub>	1s6d <sup>1</sup> D <sub>2</sub>	1.3661E+00	1.156E-05	8.265E+09	1.3604E+00	1.042E-05	7.448E+09	0.008
1s2s <sup>1</sup> S <sub>0</sub>	1s6d <sup>1</sup> D <sub>2</sub>	1.3791E+00	1.520E-05	1.066E+10	1.3734E+00	1.583E-05	1.110E+10	0.002
1s3s <sup>3</sup> S <sub>1</sub>	1s6d <sup>1</sup> D <sub>2</sub>	3.6690E+00	6.320E-05	6.263E+09	3.6537E+00	6.164E-05	6.108E+09	0.004
1s3s <sup>1</sup> S <sub>0</sub>	1s6d <sup>1</sup> D <sub>2</sub>	3.6936E+00	9.420E-05	9.212E+09	3.6785E+00	9.501E-05	9.288E+09	0.013
1s3d <sup>3</sup> D <sub>2</sub>	1s6d <sup>1</sup> D <sub>2</sub>	3.8335E+00	4.853E-06	4.406E+08	3.8174E+00	4.999E-06	4.537E+08	0.001
1s3d <sup>3</sup> D <sub>1</sub>	1s6d <sup>1</sup> D <sub>2</sub>	3.8353E+00	1.105E-05	1.002E+09	3.8191E+00	1.091E-05	9.901E+08	0.006
1s3d <sup>3</sup> D <sub>3</sub>	1s6d <sup>1</sup> D <sub>2</sub>	3.8770E+00	1.211E-05	1.075E+09	3.8606E+00	1.192E-05	1.058E+09	0.005
1s3d <sup>1</sup> D <sub>2</sub>	1s6d <sup>1</sup> D <sub>2</sub>	3.8787E+00	4.990E-05	4.425E+09	3.8623E+00	4.949E-05	4.388E+09	0.006
1s4s <sup>3</sup> S <sub>1</sub>	1s6d <sup>1</sup> D <sub>2</sub>	8.7865E+00	1.610E-04	2.782E+09	8.7499E+00	1.592E-04	2.751E+09	0.003
1s4s <sup>1</sup> S <sub>0</sub>	1s6d <sup>1</sup> D <sub>2</sub>	8.8434E+00	2.451E-04	4.180E+09	8.8071E+00	2.460E-04	4.195E+09	0.007
1s4d <sup>3</sup> D <sub>2</sub>	1s6d <sup>1</sup> D <sub>2</sub>	9.1814E+00	1.395E-05	2.208E+08	9.1435E+00	1.436E-05	2.272E+08	0.000
1s4d <sup>3</sup> D <sub>1</sub>	1s6d <sup>1</sup> D <sub>2</sub>	9.1855E+00	3.215E-05	5.084E+08	9.1476E+00	3.177E-05	5.021E+08	0.002
1s4d <sup>3</sup> D <sub>3</sub>	1s6d <sup>1</sup> D <sub>2</sub>	9.2868E+00	3.602E-05	5.571E+08	9.2482E+00	3.553E-05	5.496E+08	0.002
1s4d <sup>1</sup> D <sub>2</sub>	1s6d <sup>1</sup> D <sub>2</sub>	9.2911E+00	1.477E-04	2.282E+09	9.2526E+00	1.477E-04	2.282E+09	0.002
1s5s <sup>3</sup> S <sub>1</sub>	1s6d <sup>1</sup> D <sub>2</sub>	2.4357E+01	5.073E-04	1.141E+09	2.4255E+01	5.096E-04	1.145E+09	0.003
1s5s <sup>1</sup> S <sub>0</sub>	1s6d <sup>1</sup> D <sub>2</sub>	2.4576E+01	7.897E-04	1.744E+09	2.4475E+01	7.829E-04	1.728E+09	0.001
1s5d <sup>3</sup> D <sub>2</sub>	1s6d <sup>1</sup> D <sub>2</sub>	2.5931E+01	4.900E-05	9.721E+07	2.5828E+01	5.056E-05	1.002E+08	0.000
1s5d <sup>3</sup> D <sub>1</sub>	1s6d <sup>1</sup> D <sub>2</sub>	2.5947E+01	1.137E-04	2.253E+08	2.5844E+01	1.121E-04	2.221E+08	0.000
1s5d <sup>3</sup> D <sub>3</sub>	1s6d <sup>1</sup> D <sub>2</sub>	2.6363E+01	1.317E-04	2.529E+08	2.6257E+01	1.303E-04	2.519E+08	0.000
1s5d <sup>1</sup> D <sub>2</sub>	1s6d <sup>1</sup> D <sub>2</sub>	2.6382E+01	5.402E-04	1.035E+09	2.6276E+01	5.422E-04	1.038E+09	0.000
1s5g <sup>3</sup> G <sub>4</sub>	1s6d <sup>1</sup> D <sub>2</sub>	2.6591E+01	5.584E-07	1.054E+06	2.6478E+01	6.309E-07	1.190E+06	0.000
1s5g <sup>3</sup> G <sub>3</sub>	1s6d <sup>1</sup> D <sub>2</sub>	2.6597E+01	4.150E-06	7.826E+06	2.6484E+01	4.105E-06	7.742E+06	0.000
1s5g <sup>1</sup> G <sub>4</sub>	1s6d <sup>1</sup> D <sub>2</sub>	2.6728E+01	5.969E-05	1.115E+08	2.6615E+01	5.978E-05	1.116E+08	0.000
1s6s <sup>3</sup> S <sub>1</sub>	1s6d <sup>1</sup> D <sub>2</sub>	5.4990E+02	4.398E-07	1.940E+03	5.4127E+02	4.505E-07	2.034E+03	0.014
1s6s <sup>1</sup> S <sub>0</sub>	1s6d <sup>1</sup> D <sub>2</sub>	6.2157E+02	4.706E-07	1.625E+03	5.9948E+02	5.219E-07	1.921E+03	0.040
1s6d <sup>3</sup> D <sub>2</sub>	1s6d <sup>1</sup> D <sub>2</sub>	2.6222E+03	8.371E-10	1.624E-01				0.019
1s6d <sup>3</sup> D <sub>1</sub>	1s6d <sup>1</sup> D <sub>2</sub>	2.7221E+03	1.737E-09	3.127E-01				0.001
1s6d <sup>3</sup> D <sub>3</sub>	1s6d <sup>1</sup> D <sub>2</sub>	6.4120E+04	1.525E-13	4.950E-08				0.345
1s2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.4397E+00	1.592E-03	5.693E+11	1.4336E+00	1.671E-03	5.974E+11	0.001
1s3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	3.8211E+00	3.236E-05	1.643E+09	3.8051E+00	3.745E-05	1.901E+09	0.010
1s4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	9.1433E+00	4.491E-04	3.981E+09	9.1041E+00	4.417E-04	3.916E+09	0.000

(continued on next page)

Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	A (s <sup>-1</sup> )	$\lambda$ (Å)	gf	A (s <sup>-1</sup> )	
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	9.2736E+00	1.951E-05	1.681E+08	9.2341E+00	1.958E-05	1.688E+08	0.001
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	9.2758E+00	1.549E-06	1.335E+07	9.2363E+00	1.553E-06	1.338E+07	0.001
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	9.3265E+00	1.596E-04	1.360E+09	9.2866E+00	1.593E-04	1.358E+09	0.000
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	9.3281E+00	1.458E-05	1.242E+08	9.2883E+00	1.455E-05	1.239E+08	0.000
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	2.5720E+01	4.305E-03	4.823E+09	2.5607E+01	4.350E-03	4.875E+09	0.000
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	2.6252E+01	1.086E-04	1.168E+08	2.6139E+01	1.090E-04	1.172E+08	0.000
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	2.6261E+01	8.548E-06	9.187E+06	2.6148E+01	8.573E-06	9.214E+06	0.000
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	2.6469E+01	9.072E-04	9.597E+08	2.6355E+01	9.087E-04	9.613E+08	0.000
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	2.6476E+01	8.289E-05	8.763E+07	2.6362E+01	8.292E-05	8.768E+07	0.000
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.5714E+03	8.788E-08	2.638E+01	1.5399E+03	9.216E-08	2.856E+01	0.009
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	5.5078E+03	2.014E-10	4.921E-03	5.5226E+03	1.981E-10	4.774E-03	0.002
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	5.7487E+03	1.406E-11	3.153E-04				0.005
1s 3d <sup>3</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	3.8309E+00	3.357E-03	1.695E+11	3.8148E+00	3.386E-03	1.709E+11	0.000
1s 3d <sup>3</sup> D <sub>3</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	3.8744E+00	3.474E-04	1.715E+10	3.8580E+00	3.479E-04	1.717E+10	0.000
1s 3d <sup>1</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	3.8761E+00	3.116E-05	1.537E+09	3.8597E+00	3.004E-05	1.481E+09	0.001
1s 4d <sup>3</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	9.1668E+00	7.908E-05	6.975E+08	9.1289E+00	8.154E-05	7.190E+08	0.001
1s 4d <sup>3</sup> D <sub>3</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	9.2719E+00	1.137E-05	9.800E+07	9.2332E+00	1.167E-05	1.006E+08	0.001
1s 4d <sup>1</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	9.2762E+00	1.073E-06	9.238E+06	9.2375E+00	1.032E-06	8.892E+06	0.003
1s 5d <sup>3</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	2.5815E+01	5.070E-03	5.639E+09	2.5711E+01	5.076E-03	5.642E+09	0.000
1s 5d <sup>3</sup> D <sub>3</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6244E+01	5.114E-04	5.504E+08	2.6137E+01	5.132E-04	5.520E+08	0.000
1s 5d <sup>1</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6262E+01	4.852E-05	5.214E+07	2.6155E+01	4.698E-05	5.047E+07	0.000
1s 5g <sup>3</sup> G <sub>4</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6470E+01	5.388E-04	5.699E+08	2.6356E+01	5.393E-04	5.705E+08	0.000
1s 5g <sup>3</sup> G <sub>3</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6475E+01	4.880E-05	5.160E+07	2.6361E+01	4.899E-05	5.180E+07	0.000
1s 5g <sup>3</sup> G <sub>5</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6601E+01	4.984E-05	5.220E+07	2.6487E+01	4.993E-05	5.231E+07	0.000
1s 5g <sup>1</sup> G <sub>4</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6605E+01	3.575E-06	3.744E+06	2.6491E+01	3.402E-06	3.562E+06	0.000
1s 6d <sup>3</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	1.8045E+03	3.645E-08	8.298E+00	1.8335E+03	3.427E-08	7.491E+00	0.002
1s 6d <sup>3</sup> D <sub>3</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	5.3075E+03	1.458E-10	3.836E-03	5.5194E+03	1.284E-10	3.097E-03	0.000
1s 6d <sup>1</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	5.7864E+03	1.077E-11	2.384E-04				0.038
1s 2s <sup>3</sup> S <sub>1</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	1.3658E+00	5.739E-11	2.931E+04				0.903
1s 3s <sup>3</sup> S <sub>1</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	3.6666E+00	3.747E-09	2.656E+05				0.102
1s 3d <sup>3</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	3.8309E+00	3.753E-04	2.437E+10	3.8148E+00	3.787E-04	2.459E+10	0.000
1s 3d <sup>3</sup> D <sub>1</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	3.8326E+00	2.240E-03	1.453E+11	3.8166E+00	2.255E-03	1.463E+11	0.000
1s 3d <sup>3</sup> D <sub>3</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	3.8743E+00	4.181E-05	2.654E+09	3.8580E+00	4.175E-05	2.650E+09	0.000
1s 3d <sup>1</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	3.8760E+00	2.490E-04	1.579E+10	3.8597E+00	2.479E-04	1.572E+10	0.000
1s 4s <sup>3</sup> S <sub>1</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	8.7728E+00	1.855E-11	2.297E+02				0.573
1s 4d <sup>3</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	9.1665E+00	8.833E-06	1.002E+08	9.1289E+00	9.173E-06	1.039E+08	0.000
1s 4d <sup>3</sup> D <sub>1</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	9.1706E+00	5.325E-05	6.034E+08	9.1329E+00	5.436E-05	6.157E+08	0.002
1s 4d <sup>3</sup> D <sub>3</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	9.2715E+00	1.365E-06	1.513E+07	9.2332E+00	1.401E-06	1.553E+07	0.000
1s 4d <sup>1</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	9.2759E+00	8.174E-06	9.052E+07	9.2375E+00	8.299E-06	9.189E+07	0.001
1s 5s <sup>3</sup> S <sub>1</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	2.4252E+01	9.019E-09	1.461E+04				0.014
1s 5d <sup>3</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	2.5812E+01	5.697E-04	8.147E+08	2.5711E+01	5.708E-04	8.158E+08	0.000
1s 5d <sup>3</sup> D <sub>1</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	2.5829E+01	3.383E-03	4.832E+09	2.5727E+01	3.382E-03	4.827E+09	0.000
1s 5d <sup>3</sup> D <sub>3</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6241E+01	6.159E-05	8.523E+07	2.6137E+01	6.159E-05	8.518E+07	0.000
1s 5d <sup>1</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6259E+01	3.639E-04	5.028E+08	2.6155E+01	3.629E-04	5.012E+08	0.000
1s 5g <sup>3</sup> G <sub>4</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6467E+01	4.878E-05	6.636E+07	2.6356E+01	4.884E-05	6.644E+07	0.000
1s 5g <sup>3</sup> G <sub>3</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6472E+01	4.079E-04	5.547E+08	2.6361E+01	4.082E-04	5.505E+08	0.000
1s 5g <sup>3</sup> G <sub>5</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6598E+01	2.379E-06	3.205E+06	2.6487E+01	2.378E-06	3.202E+06	0.001
1s 5g <sup>1</sup> G <sub>4</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6602E+01	3.946E-05	5.314E+07	2.6491E+01	3.938E-05	5.302E+07	0.000
1s 6s <sup>3</sup> S <sub>1</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	5.0108E+02	3.106E-12	1.179E-02				0.128
1s 6d <sup>3</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	1.7904E+03	4.198E-09	1.248E+00	1.8335E+03	3.889E-09	1.093E+00	0.003
1s 6d <sup>3</sup> D <sub>1</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	1.8364E+03	2.308E-08	6.523E+00	1.8221E+03	2.333E-08	6.639E+00	0.002
1s 6d <sup>3</sup> D <sub>3</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	5.1873E+03	1.881E-11	6.661E-04				0.003
1s 6d <sup>1</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	5.6439E+03	8.622E-11	2.579E-03	5.6946E+03	8.174E-11	2.381E-03	0.011
1s 6g <sup>3</sup> G <sub>4</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	2.2908E+05	1.468E-15	2.666E-11				0.552
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.3775E+00	1.744E-06	8.756E+08	1.3718E+00	2.023E-06	1.016E+09	0.014
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4397E+00	1.779E-04	8.177E+10	1.4336E+00	1.854E-04	8.523E+10	0.000
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4456E+00	1.064E-03	4.851E+11	1.4396E+00	1.098E-03	5.009E+11	0.001
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.6895E+00	3.092E-09	2.165E+05	3.6743E+00	3.901E-08	2.730E+06	0.011
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.8210E+00	3.586E-06	2.340E+08	3.8051E+00	4.156E-06	3.711E+08	0.011
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.8327E+00	2.406E-05	1.561E+09	3.8169E+00	2.471E-05	1.602E+09	0.008
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	8.8264E+00	6.111E-07	7.475E+06	8.7892E+00	4.307E-07	5.268E+06	0.001
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.1428E+00	5.020E-05	5.723E+08	9.1041E+00	4.900E-05	5.585E+08	0.001
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.1705E+00	2.897E-04	3.283E+09	9.1320E+00	2.914E-04	3.302E+09	0.000
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.2731E+00	2.362E-06	2.618E+07	9.2341E+00	2.453E-06	2.718E+07	0.001
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.2753E+00	1.418E-05	1.571E+08	9.2363E+00	1.414E-05	1.566E+08	0.001
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.3260E+00	1.458E-05	1.598E+08	9.2866E+00	1.446E-05	1.585E+08	0.000
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.3276E+00	1.208E-04	1.323E+09	9.2883E+00	1.206E-04	1.320E+09	0.000
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.4458E+01	4.144E-06	6.601E+06	2.4355E+01	4.367E-06	6.957E+06	0.000
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.5717E+01	4.804E-04	6.921E+08	2.5607E+01	4.825E-04	6.952E+08	0.000
1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.5828E+01	2.861E-03	4.087E+09	2.5719E+01	2.859E-03	4.084E+09	0.000
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.6248E+01	1.311E-05	1.813E+07	2.6139E+01	1.363E-05	1.885E+07	0.000

(continued on next page)

Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	
1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.6257E+01	7.903E-05	1.092E+08	2.6148E+01	7.877E-05	1.088E+08	0.000
1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.6465E+01	8.283E-05	1.127E+08	2.6355E+01	8.250E-05	1.122E+08	0.000
1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.6472E+01	6.865E-04	9.335E+08	2.6362E+01	6.876E-04	9.348E+08	0.000
1s6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	5.5676E+02	1.886E-09	5.797E+00	5.5347E+02	2.833E-09	8.739E+00	0.006
1s6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.5574E+03	1.007E-08	3.956E+00	1.5396E+03	1.023E-08	4.078E+00	0.008
1s6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.8325E+03	3.684E-08	1.045E+01	1.7754E+03	4.001E-08	1.199E+01	0.009
1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	5.3394E+03	2.665E-11	8.908E-04				0.009
1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	5.5655E+03	1.419E-10	4.365E-03	5.5161E+03	1.428E-10	4.435E-03	0.004
1s6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.7466E+05	4.802E-15	1.500E-10				0.228
1s3d <sup>3</sup> D <sub>3</sub>	1s6g <sup>3</sup> G <sub>5</sub>	3.8728E+00	4.582E-03	1.853E+11	3.8564E+00	4.660E-03	1.884E+11	0.000
1s4d <sup>3</sup> D <sub>3</sub>	1s6g <sup>3</sup> G <sub>5</sub>	9.2626E+00	1.359E-04	9.604E+08	9.2240E+00	1.404E-04	9.926E+08	0.001
1s5d <sup>3</sup> D <sub>3</sub>	1s6g <sup>3</sup> G <sub>5</sub>	2.6170E+01	6.805E-03	6.026E+09	2.6063E+01	6.824E-03	6.040E+09	0.000
1s5g <sup>3</sup> G <sub>4</sub>	1s6g <sup>3</sup> G <sub>5</sub>	2.6394E+01	4.948E-05	4.307E+07	2.6281E+01	4.968E-05	4.325E+07	0.000
1s5g <sup>3</sup> G <sub>3</sub>	1s6g <sup>3</sup> G <sub>5</sub>	2.6399E+01	2.359E-06	2.053E+06	2.6286E+01	2.367E-06	2.059E+06	0.000
1s5g <sup>3</sup> G <sub>5</sub>	1s6g <sup>3</sup> G <sub>5</sub>	2.6525E+01	6.910E-04	5.955E+08	2.6411E+01	6.918E-04	5.963E+08	0.000
1s5g <sup>1</sup> G <sub>4</sub>	1s6g <sup>3</sup> G <sub>5</sub>	2.6529E+01	4.004E-05	3.450E+07	2.6415E+01	4.006E-05	3.452E+07	0.000
1s6d <sup>3</sup> D <sub>3</sub>	1s6g <sup>3</sup> G <sub>5</sub>	3.3718E+03	7.594E-09	4.050E-01	3.4576E+03	6.952E-09	3.496E-01	0.001
1s6g <sup>3</sup> G <sub>4</sub>	1s6g <sup>3</sup> G <sub>5</sub>	9.2456E+03	2.278E-11	1.616E-04	9.2559E+03	2.249E-11	1.578E-04	0.004
1s6g <sup>3</sup> G <sub>3</sub>	1s6g <sup>3</sup> G <sub>5</sub>	9.6344E+03	9.609E-13	6.277E-06				0.063
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	9.2643E+00	9.005E-03	6.362E+10	9.2249E+00	9.057E-03	6.399E+10	0.000
1s4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	9.3170E+00	5.230E-04	3.653E+09	9.2773E+00	5.243E-04	3.662E+09	0.000
1s4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	9.3187E+00	2.439E-05	1.703E+08	9.2790E+00	2.295E-05	1.602E+08	0.000
1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	2.6177E+01	5.783E-03	5.118E+09	2.6065E+01	5.792E-03	5.126E+09	0.000
1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	2.6394E+01	3.283E-04	2.858E+08	2.6281E+01	3.291E-04	2.864E+08	0.000
1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	2.6400E+01	1.539E-05	1.339E+07	2.6287E+01	1.448E-05	1.259E+07	0.000
1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	3.4460E+03	2.908E-09	1.485E-01	3.4619E+03	2.830E-09	1.420E-01	0.000
1s6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	9.2055E+03	8.735E-12	6.251E-05	9.2780E+03	8.447E-12	5.900E-05	0.006
1s6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	9.7177E+03	3.492E-13	2.242E-06				0.010
1s2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1.4395E+00	2.079E-12	7.436E+02				0.948
1s3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	3.8195E+00	1.741E-13	8.847E+00				0.800
1s4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	9.1340E+00	7.955E-10	7.067E+03				0.008
1s4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	9.2640E+00	5.435E-04	4.694E+09	9.2249E+00	5.467E-04	4.721E+09	0.000
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	9.2662E+00	6.821E-03	5.888E+10	9.2271E+00	6.855E-03	5.917E+10	0.000
1s4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	9.3168E+00	3.746E-05	3.198E+08	9.2773E+00	3.745E-05	3.197E+08	0.000
1s4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	9.3184E+00	4.142E-04	3.535E+09	9.2790E+00	4.138E-04	3.531E+09	0.000
1s5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	2.5647E+01	9.502E-10	1.071E+03				0.001
1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	2.6175E+01	3.493E-04	3.778E+08	2.6065E+01	3.497E-04	3.783E+08	0.000
1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	2.6184E+01	4.378E-03	4.733E+09	2.6074E+01	4.383E-03	4.737E+09	0.000
1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	2.6392E+01	2.352E-05	2.503E+07	2.6281E+01	2.350E-05	2.501E+07	0.000
1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	2.6398E+01	2.598E-04	2.763E+08	2.6287E+01	2.595E-04	2.760E+08	0.000
1s6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.3372E+03	1.003E-14	4.157E-06				0.006
1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	3.4128E+03	1.808E-10	1.151E-02	3.4619E+03	1.717E-10	1.053E-02	0.001
1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	3.5038E+03	2.095E-09	1.265E-01	3.4609E+03	2.146E-09	1.317E-01	0.000
1s6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	8.9725E+03	6.759E-13	6.222E-06				0.002
1s6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	9.4584E+03	6.374E-12	5.281E-05	9.2889E+03	6.605E-12	5.625E-05	0.006
1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	3.5443E+05	1.836E-16	1.083E-12				0.747
1s3d <sup>3</sup> D <sub>2</sub>	1s6g <sup>1</sup> G <sub>4</sub>	3.8293E+00	9.113E-08	4.606E+06				0.015
1s3d <sup>3</sup> D <sub>3</sub>	1s6g <sup>1</sup> G <sub>4</sub>	3.8727E+00	2.790E-04	1.379E+10	3.8564E+00	2.824E-04	1.395E+10	0.000
1s3d <sup>1</sup> D <sub>2</sub>	1s6g <sup>1</sup> G <sub>4</sub>	3.8744E+00	3.470E-03	1.713E+11	3.8580E+00	3.526E-03	1.740E+11	0.000
1s4d <sup>3</sup> D <sub>2</sub>	1s6g <sup>1</sup> G <sub>4</sub>	9.1575E+00	3.631E-09	3.209E+04				0.043
1s4d <sup>3</sup> D <sub>3</sub>	1s6g <sup>1</sup> G <sub>4</sub>	9.2623E+00	8.247E-06	7.125E+07	9.2240E+00	8.512E-06	7.352E+07	0.000
1s4d <sup>1</sup> D <sub>2</sub>	1s6g <sup>1</sup> G <sub>4</sub>	9.2666E+00	1.039E-04	8.965E+08	9.2283E+00	1.062E-04	9.168E+08	0.001
1s5d <sup>3</sup> D <sub>2</sub>	1s6g <sup>1</sup> G <sub>4</sub>	2.5741E+01	3.250E-07	3.635E+05				0.002
1s5d <sup>3</sup> D <sub>3</sub>	1s6g <sup>1</sup> G <sub>4</sub>	2.6167E+01	4.142E-04	4.484E+08	2.6063E+01	4.135E-04	4.474E+08	0.000
1s5d <sup>1</sup> D <sub>2</sub>	1s6g <sup>1</sup> G <sub>4</sub>	2.6185E+01	5.151E-03	5.567E+09	2.6082E+01	5.158E-03	5.572E+09	0.000
1s5g <sup>3</sup> G <sub>4</sub>	1s6g <sup>1</sup> G <sub>4</sub>	2.6392E+01	3.549E-06	3.777E+06	2.6281E+01	3.733E-06	3.972E+06	0.000
1s5g <sup>3</sup> G <sub>3</sub>	1s6g <sup>1</sup> G <sub>4</sub>	2.6397E+01	3.919E-05	4.168E+07	2.6286E+01	3.914E-05	4.163E+07	0.000
1s5g <sup>3</sup> G <sub>5</sub>	1s6g <sup>1</sup> G <sub>4</sub>	2.6522E+01	4.003E-05	4.218E+07	2.6411E+01	3.991E-05	4.205E+07	0.000
1s5g <sup>1</sup> G <sub>4</sub>	1s6g <sup>1</sup> G <sub>4</sub>	2.6527E+01	5.878E-04	5.875E+08	2.6415E+01	5.883E-04	5.880E+08	0.000
1s6d <sup>3</sup> D <sub>2</sub>	1s6g <sup>1</sup> G <sub>4</sub>	1.5020E+03	4.543E-12	1.492E-03	1.5304E+03	8.482E-12	2.661E-03	0.073
1s6d <sup>3</sup> D <sub>3</sub>	1s6g <sup>1</sup> G <sub>4</sub>	3.3331E+03	4.786E-10	3.193E-02	3.4576E+03	4.213E-10	2.590E-02	0.003
1s6d <sup>1</sup> D <sub>2</sub>	1s6g <sup>1</sup> G <sub>4</sub>	3.5158E+03	5.072E-09	3.041E-01	3.5255E+03	4.967E-09	2.936E-01	0.007
1s6g <sup>3</sup> G <sub>4</sub>	1s6g <sup>1</sup> G <sub>4</sub>	8.9597E+03	1.796E-12	1.658E-05				0.031
1s6g <sup>3</sup> G <sub>3</sub>	1s6g <sup>1</sup> G <sub>4</sub>	9.3244E+03	1.758E-11	1.499E-04	9.2557E+03	1.767E-11	1.515E-04	0.005
1s6g <sup>3</sup> G <sub>5</sub>	1s6g <sup>1</sup> G <sub>4</sub>	2.8974E+05	5.995E-16	5.293E-12				0.672
1s4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	9.3108E+00	1.132E-02	6.701E+10	9.2712E+00	1.142E-02	6.763E+10	0.000
1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	2.6344E+01	7.177E-03	5.306E+09	2.6231E+01	7.197E-03	5.321E+09	0.000
1s6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	5.5410E+03	8.762E-10	1.464E-02	5.5692E+03	8.520E-10	1.397E-02	0.003
1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1.3919E+04	3.060E-12	8.104E-06	1.3932E+04	3.021E-12	7.919E-06	0.005
1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1.4488E+04	8.641E-14	2.112E-07				0.178
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	9.2579E+00	3.678E-09	2.602E+04				0.007

(continued on next page)

Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	A (s <sup>-1</sup> )	$\lambda$ (Å)	gf	A (s <sup>-1</sup> )	
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	9.3106E+00	4.369E-04	3.056E+09	9.2712E+00	4.395E-04	3.074E+09	0.000
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	9.3123E+00	9.144E-03	6.394E+10	9.2728E+00	9.224E-03	6.450E+10	0.000
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	2.6126E+01	1.462E-09	1.299E+03				0.002
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	2.6342E+01	2.770E-04	2.421E+08	2.6231E+01	2.768E-04	2.419E+08	0.000
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	2.6349E+01	5.794E-03	5.061E+09	2.6238E+01	5.809E-03	5.073E+09	0.000
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	2.7445E+03	1.003E-15	8.072E-08				0.007
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	5.4702E+03	3.515E-11	7.124E-04	5.5692E+03	3.276E-11	6.352E-04	0.001
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	5.6471E+03	6.685E-10	1.271E-02	5.5731E+03	6.867E-10	1.329E-02	0.002
1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1.3481E+04	1.610E-13	5.370E-07				0.045
1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1.4014E+04	2.491E-12	7.690E-06	1.3932E+04	2.494E-12	7.725E-06	0.008
1s 6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.2819E+05	8.864E-17	2.932E-13				0.869
1s 2s <sup>3</sup> S <sub>1</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	1.3268E+00	4.817E-10	6.084E+05				0.985
1s 3s <sup>3</sup> S <sub>1</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	3.3983E+00	2.685E-10	5.170E+04				0.385
1s 3d <sup>3</sup> D <sub>2</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	3.5389E+00	6.769E-06	1.202E+09	3.5242E+00	7.076E-06	1.256E+09	0.040
1s 3d <sup>3</sup> D <sub>1</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	3.5404E+00	7.411E-06	1.315E+09	3.5257E+00	7.024E-06	1.245E+09	0.056
1s 3d <sup>3</sup> D <sub>3</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	3.5760E+00	1.602E-05	2.785E+09	3.5610E+00	1.650E-05	2.868E+09	0.040
1s 3d <sup>1</sup> D <sub>2</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	3.5774E+00	4.893E-06	8.502E+08	3.5624E+00	4.667E-06	8.108E+08	0.044
1s 4s <sup>3</sup> S <sub>1</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	7.3787E+00	3.123E-11	1.275E+03				0.933
1s 4d <sup>3</sup> D <sub>2</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	7.6552E+00	1.969E-05	7.471E+08	7.6242E+00	2.005E-05	7.606E+08	0.015
1s 4d <sup>3</sup> D <sub>1</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	7.6581E+00	2.030E-05	7.698E+08	7.6271E+00	1.984E-05	7.521E+08	0.023
1s 4d <sup>3</sup> D <sub>3</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	7.7284E+00	4.617E-05	1.719E+09	7.6969E+00	4.658E-05	1.733E+09	0.015
1s 4d <sup>1</sup> D <sub>2</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	7.7314E+00	1.334E-05	4.961E+08	7.6999E+00	1.311E-05	4.876E+08	0.017
1s 5s <sup>3</sup> S <sub>1</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	1.5931E+01	6.722E-10	5.899E+03				0.419
1s 5d <sup>3</sup> D <sub>2</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	1.6590E+01	4.953E-05	4.001E+08	1.6526E+01	4.980E-05	4.020E+08	0.004
1s 5d <sup>3</sup> D <sub>1</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	1.6597E+01	4.987E-05	4.025E+08	1.6532E+01	4.920E-05	3.968E+08	0.010
1s 5d <sup>3</sup> D <sub>3</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	1.6766E+01	1.160E-04	9.178E+08	1.6700E+01	1.158E-04	9.160E+08	0.004
1s 5d <sup>1</sup> D <sub>2</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	1.6773E+01	3.281E-05	2.593E+08	1.6708E+01	3.254E-05	2.570E+08	0.007
1s 5g <sup>3</sup> G <sub>3</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	1.6860E+01	3.065E-11	2.398E+02				0.060
1s 6s <sup>3</sup> S <sub>1</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	4.2495E+01	3.689E-09	4.543E+03				0.102
1s 6d <sup>3</sup> D <sub>2</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	4.5259E+01	1.803E-04	1.957E+08	4.5119E+01	1.799E-04	1.949E+08	0.001
1s 6d <sup>3</sup> D <sub>1</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	4.5288E+01	1.801E-04	1.952E+08	4.5112E+01	1.765E-04	1.912E+08	0.004
1s 6d <sup>3</sup> D <sub>3</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	4.6021E+01	4.306E-04	4.520E+08	4.5873E+01	4.241E-04	4.443E+08	0.001
1s 6d <sup>1</sup> D <sub>2</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	4.6054E+01	1.209E-04	1.267E+08	4.5885E+01	1.177E-04	1.232E+08	0.003
1s 6g <sup>3</sup> G <sub>3</sub>	1s 7s <sup>3</sup> S <sub>1</sub>	4.6433E+01	2.618E-10	2.700E+02				0.039
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.3376E+00	4.582E-08	5.693E+07	1.3321E+00	1.353E-07	1.681E+08	0.537
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3961E+00	1.583E-05	1.805E+10	1.3903E+00	1.652E-05	1.885E+10	0.058
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.4017E+00	1.535E-05	1.738E+10	1.3959E+00	1.409E-05	1.595E+10	0.029
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	3.4164E+00	2.188E-07	4.169E+07	3.4024E+00	2.384E-07	4.540E+07	0.201
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	3.5289E+00	3.518E-05	6.282E+09	3.5142E+00	3.240E-05	5.784E+09	0.079
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	3.5388E+00	3.051E-05	5.417E+09	3.5243E+00	2.782E-05	4.939E+09	0.053
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	7.4094E+00	3.166E-07	1.282E+07	7.3785E+00	3.980E-07	1.611E+07	0.067
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	7.6311E+00	5.802E-05	2.215E+09	7.5991E+00	5.725E-05	2.185E+09	0.017
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	7.6504E+00	5.135E-05	1.951E+09	7.6186E+00	4.936E-05	1.874E+09	0.007
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	7.7217E+00	1.128E-05	4.205E+08	7.6895E+00	1.078E-05	4.020E+08	0.032
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	7.7232E+00	3.454E-06	1.288E+08	7.6910E+00	3.342E-06	1.245E+08	0.033
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	7.7595E+00	1.761E-08	6.504E+05	7.7270E+00	2.587E-08	9.555E+05	0.017
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.5987E+01	5.833E-07	5.075E+06	1.5920E+01	7.664E-07	6.666E+06	0.015
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.6515E+01	1.159E-04	9.447E+08	1.6446E+01	1.167E-04	9.520E+08	0.003
1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.6561E+01	1.036E-04	8.397E+08	1.6492E+01	1.010E-04	8.193E+08	0.006
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.6732E+01	4.609E-05	3.661E+08	1.6664E+01	4.535E-05	3.601E+08	0.002
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.6736E+01	1.410E-05	1.119E+08	1.6667E+01	1.404E-05	1.114E+08	0.002
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.6823E+01	7.450E-08	5.853E+05	1.6754E+01	1.071E-07	8.412E+05	0.002
1s 6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.2622E+01	1.744E-06	2.135E+06	4.2444E+01	2.994E-06	3.664E+06	0.005
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.4826E+01	3.888E-04	4.302E+08	4.4636E+01	3.931E-04	4.350E+08	0.001
1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.5021E+01	3.515E-04	3.856E+08	4.4809E+01	3.422E-04	3.757E+08	0.000
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.5759E+01	2.138E-04	2.270E+08	4.5589E+01	2.114E-04	2.242E+08	0.002
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.5775E+01	6.539E-05	6.939E+07	4.5589E+01	6.507E-05	6.902E+07	0.002
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.6155E+01	3.481E-07	3.633E+05	4.5969E+01	4.043E-07	4.218E+05	0.001
1s 3d <sup>3</sup> D <sub>2</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	3.5373E+00	4.635E-06	2.471E+09	3.5228E+00	4.652E-06	2.479E+09	0.016
1s 3d <sup>1</sup> D <sub>2</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	3.5757E+00	7.727E-06	4.031E+09	3.5610E+00	7.113E-06	3.709E+09	0.063
1s 4d <sup>3</sup> D <sub>2</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	7.6475E+00	1.316E-05	1.501E+09	7.6177E+00	1.309E-05	1.492E+09	0.007
1s 4d <sup>1</sup> D <sub>2</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	7.7235E+00	2.094E-05	2.341E+09	7.6933E+00	2.017E-05	2.254E+09	0.024
1s 5d <sup>3</sup> D <sub>2</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	1.6554E+01	3.255E-05	7.924E+08	1.6495E+01	3.248E-05	7.896E+08	0.005
1s 5d <sup>1</sup> D <sub>2</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	1.6736E+01	5.105E-05	1.216E+09	1.6677E+01	5.040E-05	1.198E+09	0.006
1s 6d <sup>3</sup> D <sub>2</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	4.4992E+01	1.160E-04	3.821E+08	4.4893E+01	1.158E-04	3.801E+08	0.003
1s 6d <sup>1</sup> D <sub>2</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	4.5777E+01	1.847E-04	5.978E+08	4.5651E+01	1.878E-04	5.862E+08	0.000
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.3961E+00	1.007E-05	3.447E+10	1.3903E+00	1.030E-05	3.524E+10	0.058
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	3.5287E+00	2.240E-05	1.200E+10	3.5145E+00	2.021E-05	1.082E+10	0.080
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	7.6306E+00	3.690E-05	4.228E+09	7.6005E+00	3.577E-05	4.096E+09	0.017
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	7.7227E+00	4.908E-06	5.498E+08	7.6924E+00	4.701E-06	5.254E+08	0.033
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.6512E+01	7.368E-05	1.802E+09	1.6452E+01	7.311E-05	1.786E+09	0.003

(continued on next page)



Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	
1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.6733E+01	2.004E-05	4.773E+08	1.6674E+01	1.976E-05	4.701E+08	0.002
1s6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.4808E+01	2.469E-04	8.203E+08	4.4683E+01	2.466E-04	8.170E+08	0.001
1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.5756E+01	9.289E-05	2.959E+08	4.5638E+01	9.204E-05	2.922E+08	0.002
1s2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3363E+00	1.951E-05	1.457E+10	1.3308E+00	2.048E-05	1.529E+10	0.042
1s2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3372E+00	1.256E-05	9.370E+09	1.3316E+00	1.289E-05	9.615E+09	0.014
1s2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3947E+00	1.980E-05	1.358E+10	1.3889E+00	2.069E-05	1.419E+10	0.052
1s3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.4002E+00	7.809E-06	5.313E+09	1.3944E+00	7.795E-06	5.303E+09	0.015
1s3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.4080E+00	4.148E-05	4.764E+09	3.3940E+00	3.776E-05	4.336E+09	0.093
1s3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.4095E+00	2.597E-05	2.980E+09	3.3954E+00	2.386E-05	2.738E+09	0.083
1s3p <sup>1</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.5199E+00	4.316E-05	4.648E+09	3.5053E+00	3.919E-05	4.219E+09	0.088
1s3p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.5298E+00	1.624E-05	1.739E+09	3.5153E+00	1.492E-05	1.597E+09	0.074
1s4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.3699E+00	6.450E-05	1.584E+09	7.3391E+00	6.330E-05	1.554E+09	0.017
1s4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.3726E+00	4.081E-05	1.002E+09	7.3418E+00	4.004E-05	9.826E+08	0.013
1s4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.5892E+00	6.902E-05	1.599E+09	7.5574E+00	6.734E-05	1.559E+09	0.019
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.6083E+00	2.631E-05	6.063E+08	7.5766E+00	2.576E-05	5.936E+08	0.014
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.6787E+00	2.525E-06	5.713E+07	7.6467E+00	2.419E-06	5.473E+07	0.035
1s4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.6803E+00	6.368E-07	1.440E+07	7.6482E+00	6.023E-07	1.362E+07	0.038
1s4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.7150E+00	1.674E-05	3.753E+08	7.6827E+00	1.660E-05	3.721E+08	0.011
1s4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.7161E+00	1.866E-06	4.181E+07	7.6838E+00	1.853E-06	4.152E+07	0.012
1s5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.5804E+01	1.192E-04	6.370E+08	1.5738E+01	1.193E-04	6.376E+08	0.006
1s5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.5810E+01	7.580E-05	4.046E+08	1.5744E+01	7.546E-05	4.027E+08	0.007
1s5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6320E+01	1.324E-04	6.632E+08	1.6251E+01	1.318E-04	6.605E+08	0.003
1s5p <sup>1</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6364E+01	5.081E-05	2.531E+08	1.6297E+01	5.059E-05	2.519E+08	0.005
1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6532E+01	1.040E-05	5.079E+07	1.6464E+01	1.026E-05	5.006E+07	0.002
1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6535E+01	2.619E-06	1.278E+07	1.6468E+01	2.556E-06	1.246E+07	0.003
1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6618E+01	7.173E-05	3.465E+08	1.6550E+01	7.050E-05	3.404E+08	0.000
1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6621E+01	7.995E-06	3.861E+07	1.6552E+01	7.865E-06	3.797E+07	0.000
1s6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.1345E+01	3.330E-04	2.599E+08	4.1174E+01	3.369E-04	2.629E+08	0.002
1s6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.1369E+01	2.124E-04	1.656E+08	4.1110E+01	2.102E-04	1.645E+08	0.002
1s6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.3416E+01	4.033E-04	2.854E+08	4.3234E+01	4.015E-04	2.841E+08	0.002
1s6p <sup>1</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.3599E+01	1.561E-04	1.096E+08	4.3396E+01	1.504E-04	1.056E+08	0.001
1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4291E+01	4.633E-05	3.151E+07	4.4127E+01	4.585E-05	3.114E+07	0.002
1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4306E+01	1.166E-05	7.924E+06	4.4127E+01	1.145E-05	7.778E+06	0.002
1s6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4650E+01	3.218E-04	2.154E+08	4.4483E+01	3.160E-04	2.112E+08	0.002
1s6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4661E+01	3.588E-05	2.400E+07	4.4483E+01	3.507E-05	2.344E+07	0.002
1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4873E+01	1.000E-11	6.626E+00				0.004
1s7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3800E+03	1.615E-07	1.131E+02	1.3760E+03	1.671E-07	1.167E+02	0.050
1s7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3975E+03	9.892E-08	6.757E+01	1.3328E+03	1.150E-07	8.569E+01	0.056
1s <sup>2</sup> 1S <sub>0</sub>	1s7d <sup>3</sup> D <sub>2</sub>	3.1400E-01	8.874E-05	1.201E+12	3.1269E-01	8.899E-05	1.203E+12	0.003
1s2s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>2</sub>	1.3252E+00	5.634E-06	4.804E+09	1.3196E+00	4.807E-06	3.652E+09	0.011
1s2s <sup>1</sup> S <sub>0</sub>	1s7d <sup>3</sup> D <sub>2</sub>	1.3374E+00	2.905E-06	2.166E+09	1.3319E+00	2.936E-06	2.189E+09	0.005
1s3s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>2</sub>	3.3879E+00	3.868E-05	4.496E+09	3.3736E+00	3.838E-05	4.460E+09	0.019
1s3s <sup>1</sup> S <sub>0</sub>	1s7d <sup>3</sup> D <sub>2</sub>	3.4088E+00	2.598E-05	2.982E+09	3.3947E+00	2.385E-05	2.738E+09	0.083
1s3d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>2</sub>	3.5276E+00	1.899E-05	2.036E+09	3.5127E+00	1.903E-05	2.040E+09	0.014
1s3d <sup>3</sup> D <sub>1</sub>	1s7d <sup>3</sup> D <sub>2</sub>	3.5291E+00	8.666E-06	9.282E+08	3.5142E+00	8.452E-06	9.053E+08	0.033
1s3d <sup>3</sup> D <sub>3</sub>	1s7d <sup>3</sup> D <sub>2</sub>	3.5644E+00	8.974E-06	9.422E+08	3.5492E+00	9.129E-06	9.585E+08	0.026
1s3d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>2</sub>	3.5659E+00	2.321E-06	2.435E+08	3.5507E+00	2.101E-06	2.204E+08	0.049
1s4s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>2</sub>	7.3299E+00	8.891E-05	2.208E+09	7.2988E+00	8.993E-05	2.233E+09	0.018
1s4s <sup>1</sup> S <sub>0</sub>	1s7d <sup>3</sup> D <sub>2</sub>	7.3694E+00	6.004E-05	1.475E+09	7.3385E+00	5.614E-05	1.378E+09	0.065
1s4d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>2</sub>	7.6027E+00	4.717E-05	1.089E+09	7.5707E+00	4.709E-05	1.086E+09	0.005
1s4d <sup>3</sup> D <sub>1</sub>	1s7d <sup>3</sup> D <sub>2</sub>	7.6055E+00	2.106E-05	4.857E+08	7.5734E+00	2.095E-05	4.831E+08	0.015
1s4d <sup>3</sup> D <sub>3</sub>	1s7d <sup>3</sup> D <sub>2</sub>	7.6748E+00	2.282E-05	5.168E+08	7.6422E+00	2.304E-05	5.219E+08	0.009
1s4d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>2</sub>	7.6778E+00	5.714E-06	1.293E+08	7.6453E+00	5.373E-06	1.216E+08	0.022
1s5s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>2</sub>	1.5705E+01	1.967E-04	1.064E+09	1.5637E+01	1.998E-04	1.080E+09	0.010
1s5s <sup>1</sup> S <sub>0</sub>	1s7d <sup>3</sup> D <sub>2</sub>	1.5796E+01	1.300E-04	6.949E+08	1.5728E+01	1.247E-04	6.669E+08	0.032
1s5d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>2</sub>	1.6345E+01	1.087E-04	5.426E+08	1.6276E+01	1.083E-04	5.410E+08	0.002
1s5d <sup>3</sup> D <sub>1</sub>	1s7d <sup>3</sup> D <sub>2</sub>	1.6352E+01	4.805E-05	2.397E+08	1.6283E+01	4.822E-05	2.406E+08	0.006
1s5d <sup>3</sup> D <sub>3</sub>	1s7d <sup>3</sup> D <sub>2</sub>	1.6516E+01	5.357E-05	2.620E+08	1.6446E+01	5.404E-05	2.643E+08	0.003
1s5d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>2</sub>	1.6523E+01	1.324E-05	6.468E+07	1.6453E+01	1.267E-05	6.194E+07	0.008
1s5g <sup>3</sup> G <sub>4</sub>	1s7d <sup>3</sup> D <sub>2</sub>	1.6605E+01	1.575E-05	7.622E+07	1.6532E+01	1.579E-05	7.646E+07	0.004
1s5g <sup>3</sup> G <sub>3</sub>	1s7d <sup>3</sup> D <sub>2</sub>	1.6607E+01	1.787E-06	8.644E+06	1.6534E+01	1.793E-06	8.675E+06	0.006
1s5g <sup>1</sup> G <sub>4</sub>	1s7d <sup>3</sup> D <sub>2</sub>	1.6658E+01	1.251E-09	6.016E+03				0.062
1s6s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>2</sub>	4.0924E+01	6.099E-04	4.858E+08	4.0701E+01	6.286E-04	5.019E+08	0.005
1s6s <sup>1</sup> S <sub>0</sub>	1s7d <sup>3</sup> D <sub>2</sub>	4.1279E+01	4.030E-04	3.155E+08	4.1000E+01	3.906E-04	3.073E+08	0.010
1s6d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>2</sub>	4.3482E+01	3.650E-04	2.575E+08	4.3306E+01	3.626E-04	2.557E+08	0.000
1s6d <sup>3</sup> D <sub>1</sub>	1s7d <sup>3</sup> D <sub>2</sub>	4.3508E+01	1.610E-04	1.134E+08	4.3299E+01	1.611E-04	1.136E+08	0.002
1s6d <sup>3</sup> D <sub>3</sub>	1s7d <sup>3</sup> D <sub>2</sub>	4.4184E+01	1.862E-04	1.273E+08	4.4000E+01	1.879E-04	1.284E+08	0.001
1s6d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>2</sub>	4.4215E+01	4.585E-05	3.129E+07	4.4010E+01	4.550E-05	3.107E+07	0.002
1s6g <sup>3</sup> G <sub>4</sub>	1s7d <sup>3</sup> D <sub>2</sub>	4.4555E+01	1.252E-04	8.413E+07	4.4353E+01	1.252E-04	8.424E+07	0.001
1s6g <sup>3</sup> G <sub>3</sub>	1s7d <sup>3</sup> D <sub>2</sub>	4.4564E+01	1.411E-05	9.479E+06	4.4353E+01	1.421E-05	9.558E+06	0.001
1s6g <sup>1</sup> G <sub>4</sub>	1s7d <sup>3</sup> D <sub>2</sub>	4.4778E+01	9.656E-09	6.424E+03				0.020

(continued on next page)

Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	gf	$A$ ( $s^{-1}$ )	
1s7s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>2</sub>	1.1072E+03	2.944E-07	3.203E+02	1.0773E+03	3.188E-07	3.634E+02	0.006
1s7s <sup>1</sup> S <sub>0</sub>	1s7d <sup>3</sup> D <sub>2</sub>	1.2957E+03	1.189E-07	9.449E+01	1.2249E+03	1.375E-07	1.212E+02	0.126
1s2s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.3252E+00	5.552E-06	7.029E+09	1.3196E+00	4.696E-06	5.945E+09	0.006
1s3s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	3.3878E+00	3.820E-05	7.401E+09	3.3737E+00	3.769E-05	7.300E+09	0.030
1s3d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	3.5275E+00	8.231E-06	1.471E+09	3.5127E+00	8.300E-06	1.483E+09	0.022
1s3d <sup>3</sup> D <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	3.5290E+00	8.464E-06	1.511E+09	3.5142E+00	8.198E-06	1.463E+09	0.028
1s3d <sup>3</sup> D <sub>3</sub>	1s7d <sup>3</sup> D <sub>1</sub>	3.5643E+00	1.509E-06	2.641E+08	3.5493E+00	1.491E-06	2.609E+08	0.001
1s3d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	3.5657E+00	5.413E-06	9.465E+08	3.5507E+00	5.166E-06	9.033E+08	0.024
1s4s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	7.3294E+00	8.823E-05	3.652E+09	7.2989E+00	8.841E-05	3.658E+09	0.022
1s4d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	7.6021E+00	2.061E-05	7.929E+08	7.5708E+00	2.062E-05	7.933E+08	0.010
1s4d <sup>3</sup> D <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	7.6050E+00	2.052E-05	7.888E+08	7.5736E+00	2.029E-05	7.799E+08	0.011
1s4d <sup>3</sup> D <sub>3</sub>	1s7d <sup>3</sup> D <sub>1</sub>	7.6743E+00	3.729E-06	1.408E+08	7.6424E+00	3.765E-06	1.421E+08	0.009
1s4d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	7.6772E+00	1.328E-05	5.009E+08	7.6454E+00	1.298E-05	4.895E+08	0.009
1s5s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.5703E+01	1.954E-04	1.762E+09	1.5638E+01	1.965E-04	1.771E+09	0.012
1s5d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.6343E+01	4.762E-05	3.964E+08	1.6277E+01	4.755E-05	3.957E+08	0.004
1s5d <sup>3</sup> D <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.6349E+01	4.677E-05	3.891E+08	1.6283E+01	4.670E-05	3.883E+08	0.004
1s5d <sup>3</sup> D <sub>3</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.6513E+01	8.732E-06	7.120E+07	1.6446E+01	8.833E-06	7.199E+07	0.004
1s5d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.6521E+01	3.074E-05	2.504E+08	1.6453E+01	3.038E-05	2.474E+08	0.003
1s5g <sup>3</sup> G <sub>3</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.6605E+01	1.059E-05	8.544E+07	1.6535E+01	1.055E-05	8.509E+07	0.005
1s6s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	4.0910E+01	6.049E-04	8.036E+08	4.0705E+01	6.166E-04	8.204E+08	0.005
1s6d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	4.3465E+01	1.599E-04	1.882E+08	4.3310E+01	1.611E-04	1.893E+08	0.001
1s6d <sup>3</sup> D <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	4.3492E+01	1.564E-04	1.839E+08	4.3303E+01	1.580E-04	1.858E+08	0.001
1s6d <sup>3</sup> D <sub>3</sub>	1s7d <sup>3</sup> D <sub>1</sub>	4.4167E+01	3.032E-05	3.456E+07	4.4004E+01	3.073E-05	3.498E+07	0.001
1s6d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	4.4198E+01	1.063E-04	1.210E+08	4.4015E+01	1.044E-04	1.188E+08	0.001
1s6g <sup>3</sup> G <sub>3</sub>	1s7d <sup>3</sup> D <sub>1</sub>	4.4547E+01	8.358E-05	9.356E+07	4.4358E+01	8.369E-05	9.377E+07	0.001
1s7s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.0966E+03	3.011E-07	5.566E+02	1.0799E+03	3.104E-07	5.869E+02	0.012
1s7d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.1420E+05	1.309E-13	2.231E-08				0.944
1s2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.3362E+00	1.852E-05	2.307E+10	1.3307E+00	1.812E-05	2.256E+10	0.019
1s2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.3946E+00	7.635E-06	8.728E+09	1.3888E+00	7.793E-06	8.907E+09	0.061
1s2p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.4001E+00	1.156E-05	1.311E+10	1.3943E+00	1.090E-05	1.237E+10	0.054
1s3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	3.4073E+00	3.665E-05	7.020E+09	3.3933E+00	3.370E-05	6.452E+09	0.076
1s3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	3.5191E+00	1.673E-05	3.003E+09	3.5046E+00	1.472E-05	2.642E+09	0.087
1s3p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	3.5290E+00	2.143E-05	3.826E+09	3.5146E+00	2.066E-05	3.687E+09	0.042
1s4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	7.3666E+00	5.772E-05	2.365E+09	7.3362E+00	5.662E-05	2.319E+09	0.010
1s4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	7.5857E+00	2.671E-05	1.032E+09	7.5543E+00	2.524E-05	9.753E+08	0.018
1s4p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	7.6047E+00	3.529E-05	1.357E+09	7.5735E+00	3.553E-05	1.365E+09	0.001
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	7.6752E+00	5.944E-07	2.244E+07	7.6436E+00	6.387E-07	2.410E+07	0.038
1s4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	7.6767E+00	1.327E-06	5.007E+07	7.6451E+00	1.227E-06	4.628E+07	0.037
1s4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	7.7125E+00	1.103E-05	4.124E+08	7.6807E+00	1.104E-05	4.127E+08	0.012
1s5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.5788E+01	1.070E-04	9.547E+08	1.5725E+01	1.067E-04	9.520E+08	0.009
1s5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.6303E+01	5.105E-05	4.271E+08	1.6237E+01	4.929E-05	4.121E+08	0.003
1s5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.6348E+01	6.835E-05	5.686E+08	1.6282E+01	6.968E-05	5.795E+08	0.009
1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.6515E+01	2.442E-06	1.991E+07	1.6450E+01	2.714E-06	2.211E+07	0.003
1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.6519E+01	5.460E-06	4.449E+07	1.6453E+01	5.203E-06	4.237E+07	0.003
1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.6604E+01	4.732E-05	3.817E+08	1.6538E+01	4.695E-05	3.785E+08	0.000
1s6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.1241E+01	2.976E-04	3.891E+08	4.1082E+01	2.898E-04	3.786E+08	0.001
1s6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.3302E+01	1.543E-04	1.829E+08	4.3133E+01	1.489E-04	1.764E+08	0.002
1s6p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.3483E+01	2.090E-04	2.457E+08	4.3294E+01	2.181E-04	2.565E+08	0.001
1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.4172E+01	1.082E-05	1.233E+07	4.4022E+01	1.212E-05	1.379E+07	0.002
1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.4186E+01	2.423E-05	2.759E+07	4.4022E+01	2.300E-05	2.617E+07	0.002
1s6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.4540E+01	2.117E-04	2.373E+08	4.4376E+01	2.118E-04	2.371E+08	0.002
1s7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.2731E+03	1.853E-07	2.541E+02	1.2808E+03	1.800E-07	2.420E+02	0.047
1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.6436E+04	4.209E-11	3.465E-04				0.021
1s2s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>3</sub>	1.3248E+00	1.758E-05	9.543E+09	1.3192E+00	1.588E-05	8.622E+09	0.002
1s3s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>3</sub>	3.3852E+00	9.868E-05	8.205E+09	3.3710E+00	9.907E-05	8.237E+09	0.026
1s3d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>3</sub>	3.5248E+00	9.707E-06	7.445E+08	3.5099E+00	9.973E-06	7.649E+08	0.021
1s3d <sup>3</sup> D <sub>1</sub>	1s7d <sup>3</sup> D <sub>3</sub>	3.5263E+00	1.642E-06	1.258E+08	3.5113E+00	1.619E-06	1.240E+08	0.023
1s3d <sup>3</sup> D <sub>3</sub>	1s7d <sup>3</sup> D <sub>3</sub>	3.5615E+00	3.721E-05	2.795E+09	3.5464E+00	3.778E-05	2.838E+09	0.022
1s3d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>3</sub>	3.5629E+00	6.409E-06	4.811E+08	3.5478E+00	6.234E-06	4.679E+08	0.024
1s4s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>3</sub>	7.3175E+00	2.171E-04	3.863E+09	7.2866E+00	2.196E-04	3.908E+09	0.021
1s4d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>3</sub>	7.5894E+00	2.398E-05	3.967E+08	7.5575E+00	2.428E-05	4.016E+08	0.009
1s4d <sup>3</sup> D <sub>1</sub>	1s7d <sup>3</sup> D <sub>3</sub>	7.5922E+00	3.931E-06	6.498E+07	7.5603E+00	3.920E-06	6.479E+07	0.007
1s4d <sup>3</sup> D <sub>3</sub>	1s7d <sup>3</sup> D <sub>3</sub>	7.6613E+00	9.279E-05	1.506E+09	7.6289E+00	9.340E-05	1.516E+09	0.009
1s4d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>3</sub>	7.6642E+00	1.550E-05	2.515E+08	7.6319E+00	1.533E-05	2.487E+08	0.010
1s5s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>3</sub>	1.5649E+01	4.656E-04	1.812E+09	1.5581E+01	4.708E-04	1.832E+09	0.011
1s5d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>3</sub>	1.6284E+01	5.459E-05	1.962E+08	1.6216E+01	5.492E-05	1.973E+08	0.003
1s5d <sup>3</sup> D <sub>1</sub>	1s7d <sup>3</sup> D <sub>3</sub>	1.6290E+01	8.844E-06	3.176E+07	1.6222E+01	8.848E-06	3.176E+07	0.002
1s5d <sup>3</sup> D <sub>3</sub>	1s7d <sup>3</sup> D <sub>3</sub>	1.6453E+01	2.142E-04	7.541E+08	1.6384E+01	2.148E-04	7.562E+08	0.003
1s5d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>3</sub>	1.6460E+01	3.535E-05	1.243E+08	1.6391E+01	3.519E-05	1.237E+08	0.004
1s5g <sup>3</sup> G <sub>4</sub>	1s7d <sup>3</sup> D <sub>3</sub>	1.6542E+01	1.538E-06	5.355E+06	1.6470E+01	1.547E-06	5.389E+06	0.004
1s5g <sup>3</sup> G <sub>3</sub>	1s7d <sup>3</sup> D <sub>3</sub>	1.6544E+01	1.868E-07	6.503E+05	1.6472E+01	1.859E-07	6.476E+05	0.006

(continued on next page)

Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	
1s 5g <sup>3</sup> G <sub>5</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	1.6593E+01	2.071E-05	7.169E+07	1.6521E+01	2.073E-05	7.178E+07	0.003
1s 5g <sup>1</sup> G <sub>4</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	1.6595E+01	1.270E-06	4.394E+06	1.6522E+01	1.261E-06	4.366E+06	0.005
1s 6s <sup>3</sup> S <sub>1</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.0543E+01	1.383E-03	8.018E+08	4.0325E+01	1.412E-03	8.208E+08	0.005
1s 6d <sup>3</sup> D <sub>2</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.3051E+01	1.778E-04	9.140E+07	4.2880E+01	1.798E-04	9.239E+07	0.001
1s 6d <sup>3</sup> D <sub>1</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.3077E+01	2.870E-05	1.474E+07	4.2874E+01	2.939E-05	1.510E+07	0.001
1s 6d <sup>3</sup> D <sub>3</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.3740E+01	4.3740E-04	3.587E+08	4.3560E+01	7.214E-04	3.592E+08	0.001
1s 6d <sup>1</sup> D <sub>2</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.3770E+01	1.184E-04	5.887E+07	4.3571E+01	1.168E-04	5.813E+07	0.001
1s 6g <sup>3</sup> G <sub>4</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.4103E+01	1.214E-05	5.945E+06	4.3907E+01	1.220E-05	5.980E+06	0.001
1s 6g <sup>3</sup> G <sub>3</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.4112E+01	1.464E-06	7.171E+05	4.3907E+01	1.464E-06	7.176E+05	0.001
1s 6g <sup>3</sup> G <sub>5</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.4315E+01	1.637E-04	7.941E+07	4.4116E+01	1.636E-04	7.946E+07	0.001
1s 6g <sup>1</sup> G <sub>4</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.4321E+01	9.975E-06	4.839E+06	4.4116E+01	9.920E-06	4.815E+06	0.001
1s 7s <sup>3</sup> S <sub>1</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	8.8243E+02	1.362E-06	1.667E+03	8.6393E+02	1.431E-06	1.811E+03	0.002
1s 7d <sup>3</sup> D <sub>2</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.3459E+03	2.721E-09	1.373E-01				0.004
1s 7d <sup>3</sup> D <sub>1</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.5178E+03	3.927E-10	1.833E-02				0.021
1s 2p <sup>3</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	1.3358E+00	5.669E-04	3.027E-11	1.3303E+00	5.764E-04	3.077E+11	0.000
1s 2p <sup>3</sup> P <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	1.3942E+00	1.500E-04	7.354E+10	1.3883E+00	1.493E-04	7.322E+10	0.014
1s 2p <sup>1</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	1.3997E+00	3.473E-05	1.689E+10	1.3939E+00	3.421E-05	1.663E+10	0.036
1s 3p <sup>3</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	3.4047E+00	1.597E-05	1.313E+09	3.3906E+00	1.883E-05	1.547E+09	0.110
1s 3p <sup>3</sup> P <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	3.5164E+00	9.649E-06	7.436E+08	3.5016E+00	1.109E-05	8.551E+08	0.073
1s 3p <sup>1</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	3.5263E+00	2.608E-06	1.999E+08	3.5116E+00	2.267E-06	1.737E+08	0.007
1s 4p <sup>3</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	7.3546E+00	6.464E-05	1.139E+09	7.3233E+00	6.291E-05	1.108E+09	0.012
1s 4p <sup>3</sup> P <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	7.5729E+00	7.761E-06	1.290E+08	7.5406E+00	7.141E-06	1.186E+08	0.023
1s 4p <sup>1</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	7.5920E+00	1.634E-06	2.702E+07	7.5597E+00	1.856E-06	3.069E+07	0.016
1s 4f <sup>3</sup> F <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	7.6621E+00	4.344E-05	7.051E+08	7.6295E+00	4.280E-05	6.948E+08	0.011
1s 4f <sup>3</sup> F <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	7.6636E+00	7.207E-06	1.169E+08	7.6310E+00	7.140E-06	1.158E+08	0.011
1s 4f <sup>3</sup> F <sub>4</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	7.6982E+00	7.258E-06	1.167E+08	7.6653E+00	7.235E-06	1.163E+08	0.004
1s 4f <sup>1</sup> F <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	7.6993E+00	8.713E-07	1.401E+07	7.6665E+00	8.328E-07	1.338E+07	0.003
1s 5p <sup>3</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	1.5734E+01	4.148E-04	1.597E+09	1.5665E+01	4.152E-04	1.598E+09	0.004
1s 5p <sup>3</sup> P <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	1.6245E+01	8.271E-05	2.987E+08	1.6174E+01	8.226E-05	2.971E+08	0.002
1s 5p <sup>1</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	1.6289E+01	1.901E-05	6.828E+07	1.6219E+01	1.921E-05	6.900E+07	0.008
1s 5f <sup>3</sup> F <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	1.6455E+01	1.515E-04	5.333E+08	1.6385E+01	1.511E-04	5.319E+08	0.001
1s 5f <sup>3</sup> F <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	1.6459E+01	2.517E-05	8.855E+07	1.6388E+01	2.523E-05	8.877E+07	0.001
1s 5f <sup>3</sup> F <sub>4</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	1.6540E+01	2.593E-05	9.030E+07	1.6469E+01	2.592E-05	9.031E+07	0.000
1s 5f <sup>1</sup> F <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	1.6543E+01	3.118E-06	1.086E+07	1.6472E+01	2.991E-06	1.041E+07	0.000
1s 6p <sup>3</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	4.0868E+01	1.936E-03	1.105E+09	4.0680E+01	1.929E-03	1.101E+09	0.001
1s 6p <sup>3</sup> P <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	4.2891E+01	4.845E-04	2.510E+08	4.2690E+01	4.909E-04	2.545E+08	0.001
1s 6p <sup>1</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	4.3069E+01	1.141E-04	5.864E+07	4.2848E+01	1.182E-04	6.086E+07	0.000
1s 6f <sup>3</sup> F <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	4.3744E+01	6.234E-04	3.104E+08	4.3561E+01	6.229E-04	3.101E+08	0.000
1s 6f <sup>3</sup> F <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	4.3758E+01	1.037E-04	5.161E+07	4.3560E+01	1.039E-04	5.177E+07	0.000
1s 6f <sup>3</sup> F <sub>4</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	4.4094E+01	1.088E-04	5.331E+07	4.3907E+01	1.091E-04	5.351E+07	0.000
1s 6f <sup>1</sup> F <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	4.4105E+01	1.310E-05	6.419E+06	4.3907E+01	1.307E-05	6.406E+06	0.000
1s 6h <sup>3</sup> H <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	4.4306E+01	4.016E-05	1.949E+07	4.4116E+01	4.014E-05	1.949E+07	0.001
1s 6h <sup>3</sup> H <sub>4</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	4.4312E+01	2.427E-06	1.178E+06	4.4116E+01	2.436E-06	1.182E+06	0.001
1s 6h <sup>1</sup> H <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	4.4452E+01	5.514E-12	2.659E+00				0.017
1s 7p <sup>3</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	9.9322E+02	7.907E-07	7.638E+02	9.7893E+02	8.183E-07	8.067E+02	0.104
1s 7p <sup>3</sup> P <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	3.5436E+03	4.295E-09	3.259E-01	3.3920E+03	4.895E-09	4.019E-01	0.273
1s 7p <sup>1</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>3</sub>	4.5177E+03	4.880E-10	2.279E-02				0.371
1s 2p <sup>3</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	1.3358E+00	1.757E-04	1.314E+11	1.3303E+00	1.782E-04	1.332E+11	0.010
1s 2p <sup>3</sup> P <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	1.3367E+00	2.481E-04	1.852E+11	1.3311E+00	2.514E-04	1.876E+11	0.002
1s 2p <sup>1</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	1.3942E+00	3.754E-05	2.577E+10	1.3883E+00	3.730E-05	2.559E+10	0.012
1s 2p <sup>1</sup> P <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	1.3997E+00	7.771E-05	5.292E+10	1.3939E+00	7.705E-05	5.245E+10	0.006
1s 3p <sup>3</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	3.4047E+00	4.739E-06	5.454E+08	3.3906E+00	5.997E-06	6.900E+08	0.127
1s 3p <sup>3</sup> P <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	3.4061E+00	6.996E-06	8.044E+08	3.3920E+00	8.272E-06	9.510E+08	0.112
1s 3p <sup>1</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	3.5163E+00	2.405E-06	2.595E+08	3.5016E+00	2.771E-06	2.990E+08	0.079
1s 3p <sup>1</sup> P <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	3.5262E+00	5.409E-06	5.803E+08	3.5116E+00	5.984E-06	6.419E+08	0.060
1s 4p <sup>3</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	7.3543E+00	1.993E-05	4.916E+08	7.3233E+00	1.884E-05	4.647E+08	0.016
1s 4p <sup>3</sup> P <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	7.3571E+00	2.804E-05	6.912E+08	7.3259E+00	2.725E-05	6.717E+08	0.013
1s 4p <sup>1</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	7.5727E+00	1.956E-06	4.550E+07	7.5406E+00	1.789E-06	4.163E+07	0.025
1s 4p <sup>1</sup> P <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	7.5917E+00	3.790E-06	8.772E+07	7.5597E+00	3.599E-06	8.193E+07	0.018
1s 4f <sup>3</sup> F <sub>3</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	7.6619E+00	7.214E-06	1.639E+08	7.6295E+00	7.104E-06	1.614E+08	0.010
1s 4f <sup>3</sup> F <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	7.6634E+00	2.888E-05	6.561E+08	7.6310E+00	2.850E-05	6.474E+08	0.010
1s 4f <sup>3</sup> F <sub>4</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	7.6979E+00	5.832E-07	1.313E+07	7.6653E+00	5.781E-07	1.301E+07	0.001
1s 4f <sup>1</sup> F <sub>3</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	7.6990E+00	5.275E-06	1.187E+08	7.6665E+00	5.227E-06	1.176E+08	0.004
1s 5p <sup>3</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	1.5732E+01	1.269E-04	6.840E+08	1.5665E+01	1.261E-04	6.801E+08	0.003
1s 5p <sup>3</sup> P <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	1.5739E+01	1.803E-04	9.713E+08	1.5671E+01	1.804E-04	9.720E+08	0.004
1s 5p <sup>1</sup> P <sub>0</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	1.6243E+01	2.078E-05	1.051E+08	1.6174E+01	2.059E-05	1.041E+08	0.002
1s 5p <sup>1</sup> P <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	1.6288E+01	4.275E-05	2.150E+08	1.6219E+01	4.240E-05	2.132E+08	0.003
1s 5f <sup>3</sup> F <sub>3</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	1.6454E+01	2.516E-05	1.240E+08	1.6385E+01	2.509E-05	1.236E+08	0.001
1s 5f <sup>3</sup> F <sub>2</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	1.6457E+01	1.008E-04	4.967E+08	1.6388E+01	1.006E-04	4.955E+08	0.001
1s 5f <sup>3</sup> F <sub>4</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	1.6539E+01	2.071E-06	1.010E+07	1.6469E+01	2.072E-06	1.010E+07	0.001
1s 5f <sup>1</sup> F <sub>3</sub>	1s 7f <sup>3</sup> F <sub>2</sub>	1.6542E+01	1.883E-05	9.182E+07	1.6472E+01	1.872E-05	9.128E+07	0.000

(continued on next page)

Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	A (s <sup>-1</sup> )	$\lambda$ (Å)	gf	A (s <sup>-1</sup> )	
1s 6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.0860E+01	5.906E-04	4.719E+08	4.0680E+01	6.038E-04	4.826E+08	0.001
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.0884E+01	8.426E-04	6.725E+08	4.0618E+01	8.498E-04	6.814E+08	0.001
1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.2882E+01	1.216E-04	8.820E+07	4.2690E+01	1.225E-04	8.897E+07	0.001
1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.3060E+01	2.556E-04	1.839E+08	4.2848E+01	2.487E-04	1.792E+08	0.001
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.3735E+01	1.035E-04	7.216E+07	4.3561E+01	1.039E-04	7.247E+07	0.000
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.3749E+01	4.148E-04	2.891E+08	4.3561E+01	4.154E-04	2.896E+08	0.000
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.4085E+01	8.672E-06	5.953E+06	4.3907E+01	8.726E-06	5.987E+06	0.000
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.4096E+01	7.898E-05	5.418E+07	4.3907E+01	7.843E-05	5.381E+07	0.000
1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.4302E+01	3.039E-05	2.066E+07	4.4116E+01	3.041E-05	2.067E+07	0.001
1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	9.8851E+02	2.450E-07	3.345E+02	9.7899E+02	2.541E-07	3.507E+02	0.101
1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	9.9743E+02	3.397E-07	4.556E+02	9.5689E+02	3.834E-07	5.539E+02	0.104
1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.8444E+03	1.135E-09	1.247E-01	3.3927E+03	1.221E-09	1.403E-01	0.269
1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.4219E+03	1.166E-09	7.956E-02	4.1543E+03	1.350E-09	1.035E-01	0.323
1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	2.0860E+05	1.383E-14	4.240E-10				0.119
1s <sup>2</sup> S <sub>0</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	3.1390E-01	1.285E-04	1.738E+12	3.1267E-01	1.498E-04	2.027E+12	0.002
1s 2s <sup>3</sup> S <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.3248E+00	5.060E-06	3.847E+09	1.3192E+00	4.425E-06	3.363E+09	0.012
1s 2s <sup>1</sup> S <sub>0</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.3369E+00	6.434E-06	4.802E+09	1.3314E+00	6.727E-06	5.019E+09	0.002
1s 3s <sup>3</sup> S <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	3.3851E+00	2.803E-05	3.263E+09	3.3710E+00	2.747E-05	3.197E+09	0.019
1s 3s <sup>1</sup> S <sub>0</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	3.4060E+00	4.485E-05	5.158E+09	3.3920E+00	4.243E-05	4.878E+09	0.081
1s 3d <sup>3</sup> D <sub>2</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	3.5247E+00	2.531E-06	2.717E+08	3.5098E+00	2.588E-06	2.779E+08	0.006
1s 3d <sup>3</sup> D <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	3.5261E+00	5.861E-06	6.288E+08	3.5113E+00	5.640E-06	6.051E+08	0.033
1s 3d <sup>3</sup> D <sub>3</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	3.5614E+00	6.094E-06	6.409E+08	3.5463E+00	6.116E-06	6.433E+08	0.027
1s 3d <sup>1</sup> D <sub>2</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	3.5628E+00	2.633E-05	2.767E+09	3.5477E+00	2.540E-05	2.669E+09	0.033
1s 4s <sup>3</sup> S <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	7.3170E+00	6.124E-05	1.526E+09	7.2864E+00	6.084E-05	1.515E+09	0.018
1s 4s <sup>1</sup> S <sub>0</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	7.3564E+00	9.856E-05	2.430E+09	7.3260E+00	9.436E-05	2.325E+09	0.064
1s 4d <sup>3</sup> D <sub>2</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	7.5888E+00	6.059E-06	1.403E+08	7.5573E+00	6.203E-06	1.436E+08	0.003
1s 4d <sup>3</sup> D <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	7.5916E+00	1.403E-05	3.247E+08	7.5601E+00	1.369E-05	3.169E+08	0.015
1s 4d <sup>3</sup> D <sub>3</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	7.6607E+00	1.525E-05	3.466E+08	7.6287E+00	1.511E-05	3.435E+08	0.010
1s 4d <sup>1</sup> D <sub>2</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	7.6636E+00	6.371E-05	1.447E+09	7.6317E+00	6.287E-05	1.427E+09	0.014
1s 5s <sup>3</sup> S <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.5646E+01	1.309E-04	7.133E+08	1.5580E+01	1.303E-04	7.100E+08	0.010
1s 5s <sup>1</sup> S <sub>0</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.5737E+01	2.061E-04	1.110E+09	1.5671E+01	2.021E-04	1.088E+09	0.033
1s 5d <sup>3</sup> D <sub>2</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.6281E+01	1.358E-05	6.833E+07	1.6215E+01	1.394E-05	7.013E+07	0.001
1s 5d <sup>3</sup> D <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.6288E+01	3.146E-05	1.582E+08	1.6221E+01	3.092E-05	1.554E+08	0.006
1s 5d <sup>3</sup> D <sub>3</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.6451E+01	3.517E-05	1.734E+08	1.6383E+01	3.475E-05	1.712E+08	0.004
1s 5d <sup>1</sup> D <sub>2</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.6458E+01	1.450E-04	7.144E+08	1.6390E+01	1.447E-04	7.124E+08	0.005
1s 5g <sup>3</sup> G <sub>4</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.6539E+01	1.475E-07	7.192E+05	1.6469E+01	1.668E-07	8.136E+05	0.010
1s 5g <sup>3</sup> G <sub>3</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.6541E+01	1.101E-06	5.368E+06	1.6471E+01	1.083E-06	5.283E+06	0.005
1s 5g <sup>1</sup> G <sub>4</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.6592E+01	1.578E-05	7.645E+07	1.6521E+01	1.569E-05	7.608E+07	0.004
1s 6s <sup>3</sup> S <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	4.0526E+01	3.877E-04	3.150E+08	4.0319E+01	3.915E-04	3.186E+08	0.005
1s 6s <sup>1</sup> S <sub>0</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	4.0874E+01	6.098E-04	4.870E+08	4.0613E+01	6.046E-04	4.848E+08	0.010
1s 6d <sup>3</sup> D <sub>2</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	4.3033E+01	4.383E-05	3.157E+07	4.2873E+01	4.367E-05	3.143E+07	0.000
1s 6d <sup>3</sup> D <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	4.3059E+01	1.018E-04	7.325E+07	4.2867E+01	9.979E-05	7.183E+07	0.002
1s 6d <sup>3</sup> D <sub>3</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	4.3721E+01	1.180E-04	8.234E+07	4.3553E+01	1.166E-04	8.133E+07	0.001
1s 6d <sup>1</sup> D <sub>2</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	4.3751E+01	4.848E-04	3.379E+08	4.3564E+01	4.878E-04	3.400E+08	0.001
1s 6g <sup>3</sup> G <sub>4</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	4.4084E+01	1.166E-06	8.003E+05	4.3900E+01	1.267E-06	8.701E+05	0.003
1s 6g <sup>3</sup> G <sub>3</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	4.4092E+01	8.625E-06	5.918E+06	4.3900E+01	8.518E-06	5.846E+06	0.001
1s 6g <sup>1</sup> G <sub>4</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	4.4302E+01	1.239E-04	8.420E+07	4.4109E+01	1.240E-04	8.433E+07	0.001
1s 7s <sup>3</sup> S <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	8.7478E+02	3.916E-07	6.827E+02	8.6126E+02	4.005E-07	7.142E+02	0.006
1s 7s <sup>1</sup> S <sub>0</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	9.8833E+02	4.178E-07	5.706E+02	9.5307E+02	4.657E-07	6.782E+02	0.090
1s 7d <sup>3</sup> D <sub>2</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	4.1666E+03	7.586E-10	5.829E-02				0.042
1s 7d <sup>3</sup> D <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	4.3244E+03	1.574E-09	1.123E-01				0.014
1s 7d <sup>3</sup> D <sub>3</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.0098E+05	1.418E-13	1.855E-08				0.727
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.3940E+00	1.003E-03	3.825E+11	1.3881E+00	1.037E-03	3.957E+11	0.013
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	3.5150E+00	5.714E-05	3.428E+09	3.5002E+00	6.732E-05	4.038E+09	0.079
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	7.5664E+00	6.079E-05	7.869E+08	7.5341E+00	5.644E-05	7.306E+08	0.021
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	7.6554E+00	7.647E-06	9.670E+07	7.6229E+00	7.602E-06	9.614E+07	0.010
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	7.6569E+00	6.110E-07	7.724E+06	7.6244E+00	6.060E-07	7.660E+06	0.012
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	7.6914E+00	6.132E-05	7.682E+08	7.6587E+00	6.131E-05	7.682E+08	0.004
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	7.6926E+00	5.597E-06	7.009E+07	7.6598E+00	5.600E-06	7.013E+07	0.004
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.6215E+01	5.823E-04	1.642E+09	1.6144E+01	5.789E-04	1.632E+09	0.002
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.6424E+01	2.639E-05	7.251E+07	1.6354E+01	2.644E-05	7.266E+07	0.001
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.6428E+01	2.088E-06	5.735E+06	1.6358E+01	2.090E-06	5.741E+06	0.001
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.6509E+01	2.165E-04	5.887E+08	1.6439E+01	2.163E-04	5.883E+08	0.000
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.6512E+01	1.977E-05	5.373E+07	1.6441E+01	1.975E-05	5.369E+07	0.000
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.2681E+01	3.276E-03	1.333E+09	4.2483E+01	3.308E-03	1.346E+09	0.001
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.3526E+01	1.066E-04	4.170E+07	4.3345E+01	1.073E-04	4.197E+07	0.000
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.3541E+01	8.390E-06	3.280E+06	4.3345E+01	8.576E-06	3.354E+06	0.000
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.3873E+01	8.912E-04	3.432E+08	4.3688E+01	8.920E-04	3.434E+08	0.000
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.3884E+01	8.141E-05	3.133E+07	4.3689E+01	8.098E-05	3.118E+07	0.000
1s 6h <sup>3</sup> H <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.4083E+01	2.238E-06	8.534E+05	4.3895E+01	2.247E-06	8.571E+05	0.001
1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.4089E+01	1.604E-07	6.116E+04				0.001

(continued on next page)

Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	
1s 6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.4223E+01	4.928E-05	1.868E+07	4.4034E+01	4.929E-05	1.868E+07	0.000
1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.4228E+01	1.903E-06	7.210E+05	4.4034E+01	1.895E-06	7.184E+05	0.000
1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	2.5222E+03	8.144E-08	9.488E+00	2.4461E+03	8.879E-08	1.090E+01	0.215
1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	8.7508E+03	1.956E-10	1.893E-03	8.7713E+03	1.926E-10	1.840E-03	0.012
1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	9.1339E+03	1.364E-11	1.211E-04				0.004
1s 3d <sup>3</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	3.5233E+00	1.943E-03	1.160E+11	3.5085E+00	1.957E-03	1.168E+11	0.001
1s 3d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	3.5600E+00	2.000E-04	1.170E+10	3.5449E+00	1.996E-04	1.167E+10	0.002
1s 3d <sup>1</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	3.5614E+00	1.781E-05	1.041E+09	3.5464E+00	1.724E-05	1.007E+09	0.006
1s 4d <sup>3</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	7.5825E+00	3.212E-04	4.141E+09	7.5510E+00	3.252E-04	4.191E+09	0.002
1s 4d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	7.6543E+00	3.711E-05	4.695E+08	7.6223E+00	3.748E-05	4.741E+08	0.003
1s 4d <sup>1</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	7.6572E+00	3.439E-06	4.347E+07	7.6253E+00	3.353E-06	4.237E+07	0.011
1s 5d <sup>3</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	1.6252E+01	1.272E-04	3.569E+08	1.6186E+01	1.258E-04	3.529E+08	0.002
1s 5d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	1.6421E+01	1.005E-05	2.763E+07	1.6353E+01	9.930E-06	2.728E+07	0.003
1s 5d <sup>1</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	1.6428E+01	9.544E-07	2.621E+06	1.6361E+01	9.268E-07	2.544E+06	0.013
1s 5g <sup>3</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	1.6509E+01	1.030E-04	2.801E+08	1.6439E+01	1.029E-04	2.799E+08	0.001
1s 5g <sup>3</sup> G <sub>3</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	1.6511E+01	9.340E-06	2.539E+07	1.6441E+01	9.352E-06	2.542E+07	0.001
1s 5g <sup>3</sup> G <sub>5</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	1.6560E+01	9.418E-06	2.545E+07	1.6490E+01	9.404E-06	2.541E+07	0.001
1s 5g <sup>1</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	1.6562E+01	6.755E-07	1.825E+06	1.6491E+01	6.402E-07	1.730E+06	0.000
1s 6d <sup>3</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	4.2832E+01	4.032E-03	1.629E+09	4.2672E+01	4.028E-03	1.625E+09	0.000
1s 6d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	4.3514E+01	4.098E-04	1.604E+08	4.3345E+01	4.110E-04	1.607E+08	0.000
1s 6d <sup>1</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	4.3543E+01	3.925E-05	1.534E+07	4.3356E+01	4.179E-05	1.633E+07	0.001
1s 6g <sup>3</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	4.3873E+01	6.859E-04	2.641E+08	4.3688E+01	6.861E-04	2.641E+08	0.000
1s 6g <sup>3</sup> G <sub>3</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	4.3882E+01	6.214E-05	2.392E+07	4.3688E+01	6.237E-05	2.401E+07	0.000
1s 6g <sup>3</sup> G <sub>5</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	4.4082E+01	6.352E-05	2.423E+07	4.3896E+01	6.369E-05	2.429E+07	0.000
1s 6g <sup>1</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	4.4089E+01	4.557E-06	1.737E+06	4.3896E+01	4.548E-06	1.734E+06	0.000
1s 7d <sup>3</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	2.8662E+03	4.119E-08	3.716E+00	2.9148E+03	3.861E-08	3.339E+00	0.001
1s 7d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	8.4183E+03	1.657E-10	1.733E-03	8.7854E+03	1.443E-10	1.374E-03	0.001
1s 7d <sup>1</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>4</sub>	9.1839E+03	1.227E-11	1.078E-04				0.142
1s 2s <sup>3</sup> S <sub>1</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	1.3246E+00	1.973E-11	1.072E+04				0.848
1s 3s <sup>3</sup> S <sub>1</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	3.3838E+00	3.349E-09	2.787E+05				0.424
1s 3d <sup>3</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	3.5233E+00	2.174E-04	1.669E+10	3.5085E+00	2.189E-04	1.680E+10	0.002
1s 3d <sup>3</sup> D <sub>1</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	3.5248E+00	1.293E-03	9.919E+10	3.5099E+00	1.304E-03	1.000E+11	0.002
1s 3d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	3.5600E+00	2.399E-05	1.804E+09	3.5449E+00	2.396E-05	1.801E+09	0.003
1s 3d <sup>1</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	3.5614E+00	1.430E-04	1.074E+10	3.5464E+00	1.423E-04	1.069E+10	0.002
1s 4s <sup>3</sup> S <sub>1</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	7.3110E+00	5.849E-10	1.043E+04				0.588
1s 4d <sup>3</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	7.5824E+00	3.602E-05	5.970E+08	7.5510E+00	3.653E-05	6.054E+08	0.002
1s 4d <sup>3</sup> D <sub>1</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	7.5852E+00	2.142E-04	3.547E+09	7.5538E+00	2.168E-04	3.590E+09	0.004
1s 4d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	7.6541E+00	4.463E-06	7.260E+07	7.6223E+00	4.498E-06	7.314E+07	0.001
1s 4d <sup>1</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	7.6571E+00	2.646E-05	4.300E+08	7.6253E+00	2.660E-05	4.323E+08	0.003
1s 5s <sup>3</sup> S <sub>1</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	1.5619E+01	3.106E-10	1.213E+03				0.374
1s 5d <sup>3</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	1.6252E+01	1.432E-05	5.167E+07	1.6186E+01	1.412E-05	5.095E+07	0.002
1s 5d <sup>3</sup> D <sub>1</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	1.6258E+01	8.465E-05	3.052E+08	1.6192E+01	8.387E-05	3.022E+08	0.004
1s 5d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	1.6420E+01	1.213E-06	4.288E+06	1.6353E+01	1.192E-06	4.211E+06	0.003
1s 5d <sup>1</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	1.6428E+01	7.124E-06	2.515E+07	1.6361E+01	7.012E-06	2.475E+07	0.003
1s 5g <sup>3</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	1.6509E+01	9.333E-06	3.263E+07	1.6439E+01	9.323E-06	3.259E+07	0.001
1s 5g <sup>3</sup> G <sub>3</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	1.6511E+01	7.814E-05	2.732E+08	1.6441E+01	7.792E-05	2.723E+08	0.001
1s 5g <sup>3</sup> G <sub>5</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	1.6560E+01	4.513E-07	1.568E+06	1.6490E+01	4.478E-07	1.556E+06	0.001
1s 5g <sup>1</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	1.6561E+01	7.471E-06	2.595E+07	1.6491E+01	7.418E-06	2.577E+07	0.001
1s 6s <sup>3</sup> S <sub>1</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	4.0344E+01	7.208E-09	4.220E+03				0.052
1s 6d <sup>3</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	4.2827E+01	4.534E-04	2.355E+08	4.2672E+01	4.574E-04	2.373E+08	0.000
1s 6d <sup>3</sup> D <sub>1</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	4.2853E+01	2.691E-03	1.397E+09	4.2665E+01	2.693E-03	1.397E+09	0.000
1s 6d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	4.3508E+01	4.934E-05	2.484E+07	4.3345E+01	4.933E-05	2.480E+07	0.000
1s 6d <sup>1</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	4.3538E+01	2.913E-04	1.465E+08	4.3356E+01	2.873E-04	1.444E+08	0.000
1s 6g <sup>3</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	4.3868E+01	6.210E-05	3.075E+07	4.3688E+01	6.237E-05	3.087E+07	0.000
1s 6g <sup>3</sup> G <sub>3</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	4.3876E+01	5.195E-04	2.571E+08	4.3688E+01	5.197E-04	2.573E+08	0.000
1s 6g <sup>3</sup> G <sub>5</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	4.4077E+01	3.033E-06	1.488E+06	4.3896E+01	3.033E-06	1.487E+06	0.001
1s 6g <sup>1</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	4.4084E+01	5.031E-05	2.467E+07	4.3896E+01	5.004E-05	2.453E+07	0.000
1s 7s <sup>3</sup> S <sub>1</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	7.9695E+02	3.661E-12	5.493E-03				0.386
1s 7d <sup>3</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	2.8438E+03	4.743E-09	5.589E-01	2.9148E+03	4.385E-09	4.876E-01	0.015
1s 7d <sup>3</sup> D <sub>1</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	2.9164E+03	2.608E-08	2.922E+00	2.8963E+03	2.630E-08	2.962E+00	0.002
1s 7d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	8.2277E+03	2.137E-11	3.008E-04				0.039
1s 7d <sup>1</sup> D <sub>2</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	8.9575E+03	9.678E-11	1.160E-03	9.0724E+03	9.158E-11	1.051E-03	0.002
1s 7g <sup>3</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>3</sub>	3.6344E+05	1.613E-15	1.163E-11				0.864
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.3356E+00	1.408E-06	7.519E+08	1.3301E+00	1.248E-06	6.667E+08	0.241
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.3940E+00	1.120E-04	5.494E+10	1.3881E+00	1.151E-04	5.645E+10	0.014
1s 2p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.3995E+00	6.566E-04	3.195E+11	1.3937E+00	6.826E-04	3.320E+11	0.007
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	3.4034E+00	1.180E-08	9.704E+05	3.3893E+00	6.892E-08	5.669E+06	0.526
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	3.5149E+00	6.355E-06	4.902E+08	3.5002E+00	7.469E-06	5.759E+08	0.079
1s 3p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	3.5248E+00	4.161E-05	3.192E+09	3.5102E+00	4.445E-05	3.408E+09	0.049
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	7.3482E+00	1.302E-07	2.298E+06	7.3172E+00	5.346E-08	9.435E+05	0.117
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	7.5662E+00	6.809E-06	1.133E+08	7.5341E+00	6.257E-06	1.041E+08	0.022

(continued on next page)

Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	A (s <sup>-1</sup> )	$\lambda$ (Å)	gf	A (s <sup>-1</sup> )	
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	7.5852E+00	3.726E-05	6.171E+08	7.5532E+00	3.730E-05	6.177E+08	0.008
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	7.6552E+00	9.269E-07	1.507E+07	7.6229E+00	9.527E-07	1.549E+07	0.010
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	7.6567E+00	5.558E-06	9.034E+07	7.6244E+00	5.487E-06	8.918E+07	0.011
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	7.6912E+00	5.600E-06	9.020E+07	7.6586E+00	5.566E-06	8.966E+07	0.005
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	7.6923E+00	4.638E-05	7.469E+08	7.6598E+00	4.641E-05	7.473E+08	0.004
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.5704E+01	7.014E-07	2.710E+06	1.5637E+01	5.464E-07	2.111E+06	0.020
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.6214E+01	6.503E-05	2.357E+08	1.6144E+01	6.420E-05	2.327E+08	0.002
1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.6258E+01	3.793E-04	1.367E+09	1.6189E+01	3.824E-04	1.378E+09	0.004
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.6423E+01	3.189E-06	1.127E+07	1.6354E+01	3.307E-06	1.168E+07	0.001
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.6427E+01	1.919E-05	6.775E+07	1.6358E+01	1.910E-05	6.744E+07	0.001
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.6508E+01	1.977E-05	6.914E+07	1.6439E+01	1.963E-05	6.866E+07	0.000
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.6511E+01	1.638E-04	5.726E+08	1.6441E+01	1.637E-04	5.723E+08	0.000
1s 6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.0672E+01	3.065E-06	1.766E+06	4.0492E+01	5.449E-06	3.139E+06	0.004
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.2675E+01	3.654E-04	1.912E+08	4.2483E+01	3.670E-04	1.921E+08	0.001
1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.2851E+01	2.180E-03	1.131E+09	4.2639E+01	2.177E-03	1.131E+09	0.001
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.3519E+01	1.285E-05	6.468E+06	4.3345E+01	1.287E-05	6.472E+06	0.000
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.3534E+01	7.753E-05	3.898E+07	4.3345E+01	7.707E-05	3.875E+07	0.000
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.3866E+01	8.135E-05	4.029E+07	4.3688E+01	8.097E-05	4.008E+07	0.000
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.3877E+01	6.744E-04	3.338E+08	4.3688E+01	6.760E-04	3.346E+08	0.000
1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.4076E+01	1.054E-07	5.168E+04				0.001
1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.4082E+01	1.770E-06	8.681E+05	4.3895E+01	1.763E-06	8.646E+05	0.001
1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.4221E+01	3.978E-05	1.938E+07	4.4034E+01	3.981E-05	1.939E+07	0.000
1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	8.8911E+02	1.783E-09	2.149E+00	8.8057E+02	2.686E-09	3.273E+00	0.046
1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.4995E+03	9.333E-09	1.424E+00	2.4456E+03	9.858E-09	1.557E+00	0.214
1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.9477E+03	3.391E-08	3.719E+00	2.8179E+03	3.864E-08	4.598E+00	0.254
1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	8.4824E+03	2.588E-11	3.428E-04				0.007
1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	8.8420E+03	1.378E-10	1.679E-03	8.7598E+03	1.389E-10	1.710E-03	0.012
1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.7665E+05	4.698E-15	5.850E-11				0.132
1s 3d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	3.5591E+00	2.642E-03	1.265E+11	3.5441E+00	2.685E-03	1.285E+11	0.001
1s 4d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	7.6503E+00	4.732E-04	4.903E+09	7.6183E+00	4.810E-04	4.983E+09	0.003
1s 5d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	1.6403E+01	1.449E-04	3.266E+08	1.6335E+01	1.433E-04	3.230E+08	0.003
1s 5g <sup>3</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	1.6491E+01	9.575E-06	2.135E+07	1.6420E+01	9.612E-06	2.143E+07	0.001
1s 5g <sup>3</sup> G <sub>3</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	1.6493E+01	4.578E-07	1.021E+06	1.6423E+01	4.587E-07	1.022E+06	0.002
1s 5g <sup>3</sup> G <sub>5</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	1.6542E+01	1.322E-04	2.929E+08	1.6471E+01	1.320E-04	2.927E+08	0.001
1s 5g <sup>1</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	1.6543E+01	7.667E-06	1.699E+07	1.6473E+01	7.651E-06	1.695E+07	0.001
1s 6d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	4.3385E+01	5.440E-03	1.753E+09	4.3218E+01	5.448E-03	1.753E+09	0.000
1s 6g <sup>3</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	4.3743E+01	6.292E-05	1.994E+07	4.3559E+01	6.329E-05	2.005E+07	0.000
1s 6g <sup>3</sup> G <sub>3</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	4.3751E+01	3.000E-06	9.504E+05	4.3559E+01	3.014E-06	9.551E+05	0.001
1s 6g <sup>3</sup> G <sub>5</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	4.3950E+01	8.795E-04	2.761E+08	4.3765E+01	8.804E-04	2.763E+08	0.000
1s 6g <sup>1</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	4.3957E+01	5.098E-05	1.600E+07	4.3765E+01	5.079E-05	1.594E+07	0.000
1s 7d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	5.3499E+03	8.610E-09	1.824E-01	5.4978E+03	7.830E-09	1.557E-01	0.002
1s 7g <sup>3</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	1.4677E+04	2.497E-11	7.029E-05	1.4692E+04	2.466E-11	6.870E-05	0.006
1s 7g <sup>3</sup> G <sub>3</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	1.5295E+04	1.053E-12	2.729E-06				0.076
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	7.6514E+00	4.645E-03	4.811E+10	7.6190E+00	4.671E-03	4.838E+10	0.000
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	7.6874E+00	2.681E-04	2.751E+09	7.6547E+00	2.682E-04	2.752E+09	0.000
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	7.6885E+00	1.250E-05	1.282E+08	7.6558E+00	1.173E-05	1.203E+08	0.000
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1.6406E+01	5.665E-04	1.276E+09	1.6336E+01	5.720E-04	1.288E+09	0.000
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1.6491E+01	3.505E-05	7.816E+07	1.6420E+01	3.535E-05	7.882E+07	0.000
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1.6493E+01	1.647E-06	3.671E+06	1.6423E+01	1.560E-06	3.478E+06	0.000
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	4.3397E+01	5.768E-03	1.857E+09	4.3218E+01	5.771E-03	1.857E+09	0.000
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	4.3742E+01	3.291E-04	1.043E+08	4.3559E+01	3.298E-04	1.045E+08	0.000
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	4.3753E+01	1.547E-05	4.902E+06	4.3560E+01	1.605E-05	5.087E+06	0.000
1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	4.3951E+01	5.094E-04	1.599E+08	4.3765E+01	5.095E-04	1.599E+08	0.000
1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	4.3956E+01	2.930E-05	9.194E+06	4.3765E+01	2.939E-05	9.227E+06	0.000
1s 6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	4.4090E+01	2.964E-05	9.245E+06	4.3903E+01	2.968E-05	9.258E+06	0.000
1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	4.4094E+01	1.416E-06	4.417E+05	4.3903E+01	1.413E-06	4.408E+05	0.000
1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	5.4734E+03	4.836E-09	9.789E-02	5.5022E+03	4.700E-09	9.334E-02	0.005
1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1.4614E+04	1.456E-11	4.135E-05	1.4763E+04	1.399E-11	3.860E-05	0.019
1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1.5429E+04	5.832E-13	1.485E-06				0.016
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.3938E+00	1.355E-12	5.171E+02				0.965
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	3.5141E+00	1.656E-13	9.938E+00				0.818
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	7.5624E+00	4.126E-10	5.348E+03				0.039
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	7.6513E+00	2.804E-04	3.550E+09	7.6190E+00	2.819E-04	3.569E+09	0.000
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	7.6528E+00	3.518E-03	4.452E+10	7.6205E+00	3.536E-03	4.474E+10	0.000
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	7.6873E+00	1.920E-05	2.408E+08	7.6547E+00	1.916E-05	2.403E+08	0.000
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	7.6884E+00	2.123E-04	2.662E+09	7.6558E+00	2.117E-04	2.654E+09	0.000
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.6196E+01	6.804E-11	1.922E+02				0.031
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.6405E+01	3.416E-05	9.407E+07	1.6336E+01	3.453E-05	9.509E+07	0.000
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.6409E+01	4.298E-04	1.183E+09	1.6340E+01	4.329E-04	1.191E+09	0.000
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.6490E+01	2.507E-06	6.833E+06	1.6420E+01	2.525E-06	6.881E+06	0.001
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.6493E+01	2.778E-05	7.568E+07	1.6423E+01	2.788E-05	7.597E+07	0.000

(continued on next page)

Table 4 (continued)

Lower	Upper	GRASP2K			FAC			dT
		$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	gf	$A$ (s <sup>-1</sup> )	
1s6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.2554E+01	1.171E-09	4.791E+02				0.003
1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.3394E+01	3.484E-04	1.371E+08	4.3218E+01	3.501E-04	1.377E+08	0.000
1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.3408E+01	4.367E-03	1.718E+09	4.3218E+01	4.372E-03	1.720E+09	0.000
1s6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.3738E+01	2.358E-05	9.134E+06	4.3559E+01	2.356E-05	9.125E+06	0.000
1s6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.3749E+01	2.604E-04	1.008E+08	4.3560E+01	2.588E-04	1.002E+08	0.000
1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.3947E+01	2.929E-05	1.124E+07	4.3765E+01	2.939E-05	1.127E+07	0.000
1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.3953E+01	4.113E-04	1.578E+08	4.3765E+01	4.115E-04	1.578E+08	0.000
1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.4086E+01	9.436E-07	3.598E+05	4.3903E+01	9.422E-07	3.592E+05	0.000
1s6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.4091E+01	2.461E-05	9.384E+06	4.3903E+01	2.449E-05	9.340E+06	0.000
1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	2.1428E+03	1.866E-14	3.013E-06				0.042
1s7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	5.4206E+03	3.007E-10	7.586E-03	5.5022E+03	2.852E-10	6.922E-03	0.007
1s7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	5.5652E+03	3.484E-09	8.338E-02	5.5003E+03	3.564E-09	8.658E-02	0.006
1s7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.4244E+04	1.127E-12	4.117E-06				0.019
1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.5017E+04	1.062E-11	3.491E-05	1.4782E+04	1.093E-11	3.677E-05	0.022
1s7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	5.6215E+05	2.508E-16	5.883E-13				0.445
1s3d <sup>3</sup> D <sub>2</sub>	1s7g <sup>1</sup> G <sub>4</sub>	3.5224E+00	5.663E-08	3.382E+06				0.083
1s3d <sup>3</sup> D <sub>3</sub>	1s7g <sup>1</sup> G <sub>4</sub>	3.5591E+00	1.610E-04	9.419E+09	3.5441E+00	1.627E-04	9.520E+09	0.002
1s3d <sup>1</sup> D <sub>2</sub>	1s7g <sup>1</sup> G <sub>4</sub>	3.5605E+00	1.996E-03	1.167E+11	3.5455E+00	2.031E-03	1.187E+11	0.002
1s4d <sup>3</sup> D <sub>2</sub>	1s7g <sup>1</sup> G <sub>4</sub>	7.5785E+00	1.751E-08	2.260E+05				0.121
1s4d <sup>3</sup> D <sub>3</sub>	1s7g <sup>1</sup> G <sub>4</sub>	7.6502E+00	2.879E-05	3.646E+08	7.6183E+00	2.915E-05	3.691E+08	0.002
1s4d <sup>1</sup> D <sub>2</sub>	1s7g <sup>1</sup> G <sub>4</sub>	7.6531E+00	3.580E-04	4.530E+09	7.6213E+00	3.640E-04	4.605E+09	0.004
1s5d <sup>3</sup> D <sub>2</sub>	1s7g <sup>1</sup> G <sub>4</sub>	1.6234E+01	8.108E-09	2.280E+04				0.102
1s5d <sup>3</sup> D <sub>3</sub>	1s7g <sup>1</sup> G <sub>4</sub>	1.6402E+01	8.842E-06	2.436E+07	1.6335E+01	8.687E-06	2.392E+07	0.002
1s5d <sup>1</sup> D <sub>2</sub>	1s7g <sup>1</sup> G <sub>4</sub>	1.6409E+01	1.093E-04	3.008E+08	1.6342E+01	1.084E-04	2.984E+08	0.004
1s5g <sup>3</sup> G <sub>4</sub>	1s7g <sup>1</sup> G <sub>4</sub>	1.6490E+01	6.864E-07	1.871E+06	1.6420E+01	7.222E-07	1.968E+06	0.003
1s5g <sup>3</sup> G <sub>3</sub>	1s7g <sup>1</sup> G <sub>4</sub>	1.6492E+01	7.595E-06	2.069E+07	1.6423E+01	7.575E-06	2.064E+07	0.001
1s5g <sup>3</sup> G <sub>5</sub>	1s7g <sup>1</sup> G <sub>4</sub>	1.6541E+01	7.660E-06	2.075E+07	1.6471E+01	7.620E-06	2.064E+07	0.001
1s5g <sup>1</sup> G <sub>4</sub>	1s7g <sup>1</sup> G <sub>4</sub>	1.6543E+01	1.069E-04	2.894E+08	1.6473E+01	1.066E-04	2.887E+08	0.001
1s6d <sup>3</sup> D <sub>2</sub>	1s7g <sup>1</sup> G <sub>4</sub>	4.2703E+01	2.860E-07	1.162E+05	4.2548E+01	6.028E-07	2.447E+05	0.010
1s6d <sup>3</sup> D <sub>3</sub>	1s7g <sup>1</sup> G <sub>4</sub>	4.3381E+01	3.312E-04	1.304E+08	4.3218E+01	3.302E-04	1.299E+08	0.000
1s6d <sup>1</sup> D <sub>2</sub>	1s7g <sup>1</sup> G <sub>4</sub>	4.3410E+01	4.120E-03	1.620E+09	4.3228E+01	4.124E-03	1.621E+09	0.000
1s6g <sup>3</sup> G <sub>4</sub>	1s7g <sup>1</sup> G <sub>4</sub>	4.3738E+01	4.512E-06	1.748E+06	4.3559E+01	4.522E-06	1.751E+06	0.001
1s6g <sup>3</sup> G <sub>3</sub>	1s7g <sup>1</sup> G <sub>4</sub>	4.3747E+01	4.984E-05	1.930E+07	4.3559E+01	4.973E-05	1.926E+07	0.000
1s6g <sup>3</sup> G <sub>5</sub>	1s7g <sup>1</sup> G <sub>4</sub>	4.3946E+01	5.095E-05	1.955E+07	4.3765E+01	5.079E-05	1.948E+07	0.000
1s6g <sup>1</sup> G <sub>4</sub>	1s7g <sup>1</sup> G <sub>4</sub>	4.3953E+01	7.102E-04	2.725E+08	4.3765E+01	7.111E-04	2.728E+08	0.000
1s7d <sup>3</sup> D <sub>2</sub>	1s7g <sup>1</sup> G <sub>4</sub>	2.3855E+03	5.465E-12	7.117E-04	2.4322E+03	1.002E-11	1.245E-03	0.288
1s7d <sup>3</sup> D <sub>3</sub>	1s7g <sup>1</sup> G <sub>4</sub>	5.2883E+03	5.425E-10	1.438E-02	5.4978E+03	4.745E-10	1.153E-02	0.023
1s7d <sup>1</sup> D <sub>2</sub>	1s7g <sup>1</sup> G <sub>4</sub>	5.5805E+03	5.741E-09	1.366E-01	5.6088E+03	5.585E-09	1.304E-01	0.009
1s7g <sup>3</sup> G <sub>4</sub>	1s7g <sup>1</sup> G <sub>4</sub>	1.4223E+04	1.969E-12	7.213E-06				0.050
1s7g <sup>3</sup> G <sub>3</sub>	1s7g <sup>1</sup> G <sub>4</sub>	1.4802E+04	1.927E-11	6.519E-05	1.4691E+04	1.938E-11	6.599E-05	0.001
1s7g <sup>3</sup> G <sub>5</sub>	1s7g <sup>1</sup> G <sub>4</sub>	4.5954E+05	6.580E-16	2.309E-12				0.926
1s4f <sup>3</sup> F <sub>6</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	7.6847E+00	5.821E-03	5.058E+10	7.6520E+00	5.875E-03	5.104E+10	0.000
1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1.6478E+01	7.392E-04	1.397E+09	1.6408E+01	7.475E-04	1.412E+09	0.000
1s6f <sup>3</sup> F <sub>6</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	4.3655E+01	7.178E-03	1.933E+09	4.3474E+01	7.190E-03	1.935E+09	0.000
1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	4.3863E+01	2.951E-05	7.870E+06	4.3678E+01	2.967E-05	7.912E+06	0.000
1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	4.3869E+01	9.395E-07	2.505E+05	4.3678E+01	9.419E-07	2.511E+05	0.000
1s6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	4.4002E+01	6.178E-04	1.637E+08	4.3816E+01	6.182E-04	1.638E+08	0.000
1s6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	4.4006E+01	2.480E-05	6.570E+06	4.3816E+01	2.473E-05	6.553E+06	0.000
1s7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	8.7953E+03	1.460E-09	9.686E-03	8.8520E+03	1.414E-09	9.182E-03	0.009
1s7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	2.2090E+04	4.176E-12	4.392E-06	2.2109E+04	4.124E-12	4.292E-06	0.008
1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	2.2993E+04	1.179E-13	1.144E-07				0.100
1s5g <sup>3</sup> G <sub>4</sub>	1s7i <sup>3</sup> I <sub>6</sub>	1.6478E+01	1.124E-02	2.123E+10	1.6408E+01	1.128E-02	2.131E+10	0.000
1s5g <sup>3</sup> G <sub>5</sub>	1s7i <sup>3</sup> I <sub>6</sub>	1.6529E+01	4.191E-04	7.871E+08	1.6459E+01	4.199E-04	7.886E+08	0.000
1s5g <sup>1</sup> G <sub>4</sub>	1s7i <sup>3</sup> I <sub>6</sub>	1.6531E+01	1.290E-05	2.422E+07	1.6460E+01	1.190E-05	2.234E+07	0.000
1s6g <sup>3</sup> G <sub>4</sub>	1s7i <sup>3</sup> I <sub>6</sub>	4.3656E+01	5.574E-03	1.501E+09	4.3473E+01	5.578E-03	1.501E+09	0.000
1s6g <sup>3</sup> G <sub>5</sub>	1s7i <sup>3</sup> I <sub>6</sub>	4.3863E+01	2.052E-04	5.471E+07	4.3678E+01	2.055E-04	5.481E+07	0.000
1s6g <sup>1</sup> G <sub>4</sub>	1s7i <sup>3</sup> I <sub>6</sub>	4.3870E+01	6.313E-06	1.683E+06	4.3678E+01	6.525E-06	1.740E+06	0.000
1s7g <sup>3</sup> G <sub>4</sub>	1s7i <sup>3</sup> I <sub>6</sub>	8.8113E+03	5.733E-10	3.789E-03	8.8262E+03	5.630E-10	3.677E-03	0.006
1s7g <sup>3</sup> G <sub>5</sub>	1s7i <sup>3</sup> I <sub>6</sub>	2.2046E+04	1.354E-12	1.429E-06	2.2108E+04	1.328E-12	1.383E-06	0.019
1s7g <sup>1</sup> G <sub>4</sub>	1s7i <sup>3</sup> I <sub>6</sub>	2.3157E+04	3.597E-14	3.442E-08				0.064
1s3d <sup>3</sup> D <sub>3</sub>	1s7i <sup>3</sup> I <sub>5</sub>	3.5586E+00	2.773E-12	1.328E+02				1.000
1s4d <sup>3</sup> D <sub>3</sub>	1s7i <sup>3</sup> I <sub>5</sub>	7.6476E+00	9.356E-14	9.701E-01				0.538
1s5d <sup>3</sup> D <sub>3</sub>	1s7i <sup>3</sup> I <sub>5</sub>	1.6390E+01	3.142E-12	7.092E+00				0.057
1s5g <sup>3</sup> G <sub>4</sub>	1s7i <sup>3</sup> I <sub>5</sub>	1.6478E+01	4.307E-04	9.619E+08	1.6408E+01	4.324E-04	9.656E+08	0.000
1s5g <sup>3</sup> G <sub>3</sub>	1s7i <sup>3</sup> I <sub>5</sub>	1.6480E+01	9.076E-03	2.026E+10	1.6410E+01	9.108E-03	2.033E+10	0.000
1s5g <sup>3</sup> G <sub>5</sub>	1s7i <sup>3</sup> I <sub>5</sub>	1.6529E+01	2.000E-05	4.439E+07	1.6459E+01	1.999E-05	4.438E+07	0.000
1s5g <sup>1</sup> G <sub>4</sub>	1s7i <sup>3</sup> I <sub>5</sub>	1.6531E+01	3.483E-04	7.728E+08	1.6460E+01	3.479E-04	7.721E+08	0.000
1s6d <sup>3</sup> D <sub>3</sub>	1s7i <sup>3</sup> I <sub>5</sub>	4.3297E+01	3.945E-12	1.276E+00				0.033
1s6g <sup>3</sup> G <sub>4</sub>	1s7i <sup>3</sup> I <sub>5</sub>	4.3654E+01	2.137E-04	6.799E+07	4.3473E+01	2.145E-04	6.825E+07	0.000
1s6g <sup>3</sup> G <sub>3</sub>	1s7i <sup>3</sup> I <sub>5</sub>	4.3662E+01	4.500E-03	1.431E+09	4.3473E+01	4.505E-03	1.433E+09	0.000
1s6g <sup>3</sup> G <sub>5</sub>	1s7i <sup>3</sup> I <sub>5</sub>	4.3861E+01	9.795E-06	3.088E+06	4.3678E+01	9.787E-06	3.084E+06	0.000

(continued on next page)

Table 4 (continued)

Lower	Upper	GRASP2K			FAC			<i>dT</i>
		$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )	$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )	
1s 6g <sup>1</sup> G <sub>4</sub>	1s 7i <sup>3</sup> I <sub>5</sub>	4.3867E+01	1.704E-04	5.371E+07	4.3678E+01	1.696E-04	5.346E+07	0.000
1s 7d <sup>3</sup> D <sub>3</sub>	1s 7i <sup>3</sup> I <sub>5</sub>	4.2822E+03	5.348E-18	1.769E-10				0.999
1s 7g <sup>3</sup> G <sub>4</sub>	1s 7i <sup>3</sup> I <sub>5</sub>	8.7156E+03	2.271E-11	1.813E-04	8.8262E+03	2.165E-11	1.671E-04	0.016
1s 7g <sup>3</sup> G <sub>3</sub>	1s 7i <sup>3</sup> I <sub>5</sub>	8.9298E+03	4.447E-10	3.382E-03	8.8261E+03	4.547E-10	3.510E-03	0.007
1s 7g <sup>3</sup> G <sub>5</sub>	1s 7i <sup>3</sup> I <sub>5</sub>	2.1457E+04	7.011E-14	9.234E-08				0.044
1s 7g <sup>1</sup> G <sub>4</sub>	1s 7i <sup>3</sup> I <sub>5</sub>	2.2508E+04	1.057E-12	1.265E-06	2.2108E+04	1.096E-12	1.349E-06	0.014
1s 7i <sup>3</sup> I <sub>6</sub>	1s 7i <sup>3</sup> I <sub>5</sub>	8.0263E+05	4.303E-17	4.051E-14				0.989
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	7.6487E+00	1.890E-09	1.959E+04				0.012
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	7.6846E+00	2.247E-04	2.307E+09	7.6520E+00	2.259E-04	2.320E+09	0.000
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	7.6858E+00	4.701E-03	4.826E+10	7.6532E+00	4.743E-03	4.868E+10	0.000
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1.6393E+01	1.359E-10	3.067E+02				0.012
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1.6478E+01	2.850E-05	6.365E+07	1.6408E+01	2.875E-05	6.420E+07	0.000
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1.6481E+01	5.977E-04	1.334E+09	1.6411E+01	6.034E-04	1.347E+09	0.000
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3309E+01	1.004E-09	3.246E+02				0.001
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3652E+01	2.771E-04	8.817E+07	4.3474E+01	2.765E-04	8.798E+07	0.000
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3663E+01	5.796E-03	1.843E+09	4.3474E+01	5.807E-03	1.847E+09	0.000
1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3860E+01	1.410E-06	4.444E+05	4.3678E+01	1.412E-06	4.452E+05	0.000
1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3866E+01	2.451E-05	7.724E+06	4.3678E+01	2.449E-05	7.718E+06	0.000
1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3999E+01	2.480E-05	7.767E+06	4.3816E+01	2.473E-05	7.744E+06	0.000
1s 6h <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.4004E+01	5.188E-04	1.625E+08	4.3816E+01	5.193E-04	1.626E+08	0.000
1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3583E+03	1.278E-15	4.080E-08				0.059
1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	8.6829E+03	5.859E-11	4.712E-04	8.8520E+03	5.439E-11	4.174E-04	0.007
1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	8.9642E+03	1.114E-09	8.405E-03	8.8589E+03	1.139E-09	8.731E-03	0.008
1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	2.1394E+04	2.197E-13	2.911E-07				0.012
1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	2.2240E+04	3.399E-12	4.167E-06	2.2109E+04	3.404E-12	4.187E-06	0.007
1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	6.7907E+05	1.209E-16	1.590E-13				0.542
1s 5g <sup>3</sup> G <sub>5</sub>	1s 7i <sup>3</sup> I <sub>7</sub>	1.6520E+01	1.348E-02	2.196E+10	1.6450E+01	1.355E-02	2.208E+10	0.000
1s 6g <sup>3</sup> G <sub>5</sub>	1s 7i <sup>3</sup> I <sub>7</sub>	4.3801E+01	6.642E-03	1.539E+09	4.3617E+01	6.653E-03	1.541E+09	0.000
1s 7g <sup>3</sup> G <sub>5</sub>	1s 7i <sup>3</sup> I <sub>7</sub>	1.2886E+04	2.195E-10	5.879E-04	1.2907E+04	2.156E-10	5.708E-04	0.009
1s 7i <sup>3</sup> I <sub>6</sub>	1s 7i <sup>3</sup> I <sub>7</sub>	3.1014E+04	7.499E-13	3.467E-07	3.1015E+04	7.421E-13	3.401E-07	0.006
1s 7i <sup>3</sup> I <sub>5</sub>	1s 7i <sup>3</sup> I <sub>7</sub>	3.2260E+04	1.518E-14	6.488E-09				0.243
1s 5g <sup>3</sup> G <sub>4</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	1.6469E+01	3.770E-09	7.132E+03				0.005
1s 5g <sup>3</sup> G <sub>5</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	1.6520E+01	3.605E-04	6.777E+08	1.6450E+01	3.615E-04	6.796E+08	0.000
1s 5g <sup>1</sup> G <sub>4</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	1.6522E+01	1.132E-02	2.128E+10	1.6452E+01	1.138E-02	2.139E+10	0.000
1s 6g <sup>3</sup> G <sub>4</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	4.3593E+01	1.872E-09	5.054E+02				0.006
1s 6g <sup>3</sup> G <sub>5</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	4.3799E+01	1.776E-04	4.751E+07	4.3617E+01	1.774E-04	4.744E+07	0.000
1s 6g <sup>1</sup> G <sub>4</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	4.3806E+01	5.577E-03	1.491E+09	4.3617E+01	5.588E-03	1.494E+09	0.000
1s 7g <sup>3</sup> G <sub>4</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	6.8121E+03	4.202E-16	4.646E-09				0.315
1s 7g <sup>3</sup> G <sub>5</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	1.2712E+04	6.116E-12	1.942E-05	1.2907E+04	5.751E-12	1.756E-05	0.019
1s 7g <sup>1</sup> G <sub>4</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	1.3074E+04	1.765E-10	5.300E-04	1.2907E+04	1.811E-10	5.532E-04	0.008
1s 7i <sup>3</sup> I <sub>6</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	3.0023E+04	2.826E-14	1.609E-08				0.071
1s 7i <sup>3</sup> I <sub>5</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	3.1190E+04	6.317E-13	3.332E-07	3.1015E+04	6.325E-13	3.345E-07	0.006
1s 7i <sup>3</sup> I <sub>7</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	9.4020E+05	2.328E-17	1.351E-14			0.998	



**Table 5**  
Magnetic dipole transitions  $M1$  calculated with GRASP2K and FAC for all  $n = 1-7$  configurations. For the GRASP2K calculation, the active set is expanded to  $n = 10$  (GRASP3) and only the length form is considered. A comparison between the wavelengths, weighted oscillator strengths and transition probabilities is given.

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s <sup>2</sup> 1S <sub>0</sub>	1s 2s 3S <sub>1</sub>	4.1150E-01	2.918E-05	3.831E+11	4.0980E-01	2.867E-05	3.763E+11
1s 2p 3P <sub>0</sub> <sup>o</sup>	1s 2p 3P <sub>0</sub> <sup>o</sup>	2.0697E+03	2.433E-06	3.788E+03	2.1628E+03	2.322E-06	3.283E+03
1s 2s 3S <sub>1</sub>	1s 2s 1S <sub>0</sub>	1.4576E+02	1.373E-07	4.310E+04	1.4307E+02	1.353E-07	4.373E+04
1s 2p 3P <sub>1</sub> <sup>o</sup>	1s 2p 3P <sub>2</sub> <sup>o</sup>	3.1908E+01	2.163E-04	2.834E+08	3.1815E+01	2.161E-04	2.824E+08
1s 2p 3P <sub>0</sub> <sup>o</sup>	1s 2p 1P <sub>1</sub> <sup>o</sup>	2.9274E+01	4.310E-05	1.118E+08	2.9150E+01	4.314E-05	1.119E+08
1s 2p 3P <sub>1</sub> <sup>o</sup>	1s 2p 1P <sub>1</sub> <sup>o</sup>	2.9694E+01	7.934E-05	2.001E+08	2.9548E+01	7.919E-05	1.999E+08
1s 2p 3P <sub>2</sub> <sup>o</sup>	1s 2p 1P <sub>1</sub> <sup>o</sup>	3.5465E+02	6.279E-06	1.110E+05	3.4797E+02	6.377E-06	1.161E+05
1s <sup>2</sup> 1S <sub>0</sub>	1s 3s 3S <sub>1</sub>	3.4600E-01	8.922E-06	1.656E+11	3.4464E-01	8.819E-06	1.637E+11
1s 2s 3S <sub>1</sub>	1s 3s 3S <sub>1</sub>	2.1766E+00	6.344E-07	2.977E+08	2.1673E+00	6.310E-07	2.961E+08
1s 2s 1S <sub>0</sub>	1s 3s 3S <sub>1</sub>	2.2096E+00	3.489E-07	1.589E+08	2.2006E+00	1.177E-07	1.454E+08
1s 2p 3P <sub>0</sub> <sup>o</sup>	1s 3p 3P <sub>0</sub> <sup>o</sup>	2.1983E+00	1.490E-07	6.856E+07	2.1892E+00	1.782E-07	8.199E+07
1s 2p 3P <sub>1</sub> <sup>o</sup>	1s 3p 3P <sub>0</sub> <sup>o</sup>	2.2006E+00	7.444E-08	3.417E+07	2.1914E+00	1.063E-07	4.884E+07
1s 2p 3P <sub>2</sub> <sup>o</sup>	1s 3p 3P <sub>1</sub> <sup>o</sup>	2.3610E+00	5.406E-06	2.156E+09	2.3509E+00	5.520E-06	2.202E+09
1s 2p 1P <sub>1</sub> <sup>o</sup>	1s 3p 3P <sub>0</sub> <sup>o</sup>	2.3768E+00	1.276E-06	5.023E+08	2.3669E+00	1.177E-06	4.633E+08
1s 2s 3S <sub>1</sub>	1s 3s 1S <sub>0</sub>	2.1681E+00	2.934E-07	4.163E+08	2.1587E+00	3.141E-07	4.459E+08
1s 3s 3S <sub>1</sub>	1s 3s 1S <sub>0</sub>	5.5160E+02	5.089E-08	1.116E+03	5.4343E+02	5.012E-08	1.122E+03
1s 2p 3P <sub>0</sub> <sup>o</sup>	1s 3p 3P <sub>0</sub> <sup>o</sup>	2.1977E+00	1.005E-07	1.389E+08	2.1886E+00	5.046E-08	6.967E+07
1s 2p 1P <sub>1</sub> <sup>o</sup>	1s 3p 3P <sub>0</sub> <sup>o</sup>	2.3761E+00	2.226E-06	2.630E+09	2.3662E+00	2.678E-06	2.678E+09
1s 3p 3P <sub>0</sub> <sup>o</sup>	1s 3p 3P <sub>0</sub> <sup>o</sup>	7.8853E+03	6.217E-07	6.669E+01	8.1583E+03	5.996E-07	5.958E+01
1s 2p 3P <sub>1</sub> <sup>o</sup>	1s 3p 3P <sub>1</sub> <sup>o</sup>	2.1541E+00	2.836E-06	8.154E+08	2.1452E+00	2.941E-06	8.454E+08
1s 2p 3P <sub>2</sub> <sup>o</sup>	1s 3p 3P <sub>2</sub> <sup>o</sup>	2.3101E+00	2.316E-06	5.790E+08	2.3003E+00	2.323E-06	5.808E+08
1s 2p 1P <sub>1</sub> <sup>o</sup>	1s 3p 3P <sub>2</sub> <sup>o</sup>	2.3252E+00	2.020E-07	4.984E+07	2.3156E+00	1.970E-07	4.859E+07
1s 3p 3P <sub>1</sub> <sup>o</sup>	1s 3p 3P <sub>2</sub> <sup>o</sup>	1.0725E+02	6.475E-05	7.509E+06	1.0689E+02	6.471E-05	7.491E+06
1s 2s 3S <sub>1</sub>	1s 3d 3D <sub>2</sub>	2.1226E+00	8.050E-08	2.384E+07	2.1136E+00	8.285E-08	2.453E+07
1s 3s 3S <sub>1</sub>	1s 3d 3D <sub>2</sub>	8.5509E+01	7.271E-10	1.327E+02	8.5230E+01	7.255E-10	1.322E+02
1s <sup>2</sup> 1S <sub>0</sub>	1s 3d 3D <sub>1</sub>	3.4460E-01	9.108E-08	1.705E+09	3.4323E-01	9.156E-08	1.713E+09
1s 2s 3S <sub>1</sub>	1s 3d 3D <sub>1</sub>	2.1220E+00	2.165E-08	1.069E+07	2.1130E+00	1.630E-08	8.048E+06
1s 2s 1S <sub>0</sub>	1s 3d 3D <sub>1</sub>	2.1534E+00	3.345E-08	1.604E+07	2.1447E+00	3.438E-08	1.647E+07
1s 3s 3S <sub>1</sub>	1s 3d 3D <sub>1</sub>	8.4639E+01	6.335E-10	1.966E+02	8.4368E+01	6.521E-10	2.019E+02
1s 3s 1S <sub>0</sub>	1s 3d 3D <sub>1</sub>	9.9981E+01	7.121E-11	1.584E+01	9.9873E+01	7.246E-11	1.601E+01
1s 3d 3D <sub>2</sub>	1s 3d 3D <sub>1</sub>	8.3264E+03	1.110E-06	3.561E+01	8.3383E+03	1.107E-06	3.511E+01
1s 2p 3P <sub>0</sub> <sup>o</sup>	1s 3p 1P <sub>1</sub> <sup>o</sup>	2.1504E+00	5.477E-07	2.633E+08	2.1415E+00	5.343E-07	2.568E+08
1s 2p 3P <sub>1</sub> <sup>o</sup>	1s 3p 1P <sub>1</sub> <sup>o</sup>	2.1527E+00	1.076E-06	5.162E+08	2.1436E+00	1.127E-06	5.408E+08
1s 2p 3P <sub>2</sub> <sup>o</sup>	1s 3p 1P <sub>1</sub> <sup>o</sup>	2.3058E+00	4.193E-07	1.754E+08	2.2961E+00	3.571E-07	1.493E+08
1s 2p 1P <sub>1</sub> <sup>o</sup>	1s 3p 1P <sub>1</sub> <sup>o</sup>	2.3209E+00	1.288E-06	5.315E+08	2.3113E+00	1.266E-06	5.227E+08
1s 3p 3P <sub>0</sub> <sup>o</sup>	1s 3p 1P <sub>1</sub> <sup>o</sup>	9.8786E+01	1.299E-05	2.960E+06	9.8358E+01	1.298E-05	2.959E+06
1s 3p 3P <sub>1</sub> <sup>o</sup>	1s 3p 1P <sub>1</sub> <sup>o</sup>	1.0004E+02	2.400E-05	5.332E+06	9.9559E+01	2.397E-05	5.331E+06
1s 3p 3P <sub>2</sub> <sup>o</sup>	1s 3p 1P <sub>1</sub> <sup>o</sup>	1.2519E+03	1.718E-06	2.437E+03	1.2319E+03	1.743E-06	2.532E+03
1s 3d 3D <sub>2</sub>	1s 3d 3D <sub>3</sub>	3.4166E+02	3.300E-05	2.694E+05	3.4098E+02	3.294E-05	2.677E+05
1s 2s 3S <sub>1</sub>	1s 3d 1D <sub>2</sub>	2.1090E+00	5.714E-11	1.714E+04	2.1000E+00	1.086E-12	3.258E+02
1s 3s 3S <sub>1</sub>	1s 3d 1D <sub>2</sub>	6.7876E+01	1.745E-10	5.052E+01	6.7664E+01	1.801E-10	5.205E+01
1s 3d 3D <sub>2</sub>	1s 3d 1D <sub>2</sub>	3.2917E+02	2.437E-06	3.000E+04	3.2831E+02	2.433E-06	2.985E+04
1s 3d 3D <sub>1</sub>	1s 3d 1D <sub>2</sub>	3.4272E+02	2.090E-05	2.374E+05	3.4177E+02	2.084E-05	2.360E+05
1s 3d 3D <sub>3</sub>	1s 3d 1D <sub>2</sub>	8.9990E+03	6.377E-07	1.050E+01			
1s <sup>2</sup> 1S <sub>0</sub>	1s 4s 3S <sub>1</sub>	3.2800E-01	3.766E-06	7.780E+10	3.2669E-01	3.731E-06	7.706E+10
1s 2s 3S <sub>1</sub>	1s 4s 3S <sub>1</sub>	1.6177E+00	2.937E-07	2.495E+08	1.6108E+00	2.937E-07	2.495E+08
1s 2s 1S <sub>0</sub>	1s 4s 3S <sub>1</sub>	1.6358E+00	1.581E-07	1.313E+08	1.6291E+00	1.481E-07	1.230E+08
1s 3s 3S <sub>1</sub>	1s 4s 3S <sub>1</sub>	6.2995E+00	5.467E-08	3.063E+06	6.2733E+00	5.451E-08	3.053E+06
1s 3s 1S <sub>0</sub>	1s 4s 3S <sub>1</sub>	6.3723E+00	3.304E-08	1.809E+06	6.3465E+00	2.752E-08	1.506E+06
1s 3d 3D <sub>2</sub>	1s 4s 3S <sub>1</sub>	6.8005E+00	7.832E-12	3.766E+02	6.7717E+00	2.642E-11	1.270E+03
1s 3d 3D <sub>1</sub>	1s 4s 3S <sub>1</sub>	6.8061E+00	5.861E-11	2.813E+03			
1s 3d 1D <sub>2</sub>	1s 4s 3S <sub>1</sub>	6.9440E+00	7.996E-12	3.687E+02			
1s 2p 3P <sub>0</sub> <sup>o</sup>	1s 4p 3P <sub>0</sub> <sup>o</sup>	1.6323E+00	6.280E-08	5.241E+07	1.6255E+00	7.524E-08	6.277E+07
1s 2p 3P <sub>1</sub> <sup>o</sup>	1s 4p 3P <sub>0</sub> <sup>o</sup>	1.6336E+00	3.333E-08	2.777E+07	1.6268E+00	4.319E-08	3.598E+07
1s 2p 3P <sub>2</sub> <sup>o</sup>	1s 4p 3P <sub>1</sub> <sup>o</sup>	1.7203E+00	1.671E-06	1.255E+09	1.7131E+00	1.700E-06	1.277E+09
1s 2p 1P <sub>1</sub> <sup>o</sup>	1s 4p 3P <sub>0</sub> <sup>o</sup>	1.7287E+00	3.958E-07	2.945E+08	1.7215E+00	3.662E-07	2.724E+08
1s 3p 3P <sub>0</sub> <sup>o</sup>	1s 4p 3P <sub>1</sub> <sup>o</sup>	6.3396E+00	1.616E-08	8.938E+05	6.3138E+00	1.862E-08	1.029E+06
1s 3p 3P <sub>1</sub> <sup>o</sup>	1s 4p 3P <sub>0</sub> <sup>o</sup>	6.3447E+00	6.591E-09	3.640E+05	6.3187E+00	1.409E-08	7.784E+05
1s 3p 3P <sub>2</sub> <sup>o</sup>	1s 4p 3P <sub>1</sub> <sup>o</sup>	6.7379E+00	1.885E-06	9.233E+07	6.7101E+00	1.933E-06	9.466E+07
1s 3p 1P <sub>1</sub> <sup>o</sup>	1s 4p 3P <sub>0</sub> <sup>o</sup>	6.7743E+00	4.274E-07	2.071E+07	6.7469E+00	4.002E-07	1.938E+07
1s 2s 3S <sub>1</sub>	1s 4s 1S <sub>0</sub>	1.6158E+00	1.404E-07	3.587E+08	1.6089E+00	1.466E-07	3.746E+08
1s 3s 3S <sub>1</sub>	1s 4s 1S <sub>0</sub>	6.2706E+00	2.269E-08	3.850E+06	6.2442E+00	2.713E-08	4.602E+06
1s 3d 3D <sub>1</sub>	1s 4s 1S <sub>0</sub>	6.7723E+00	8.192E-12	1.191E+03	6.7433E+00	9.074E-12	1.319E+03
1s 4s 3S <sub>1</sub>	1s 4s 1S <sub>0</sub>	1.3658E+03	2.282E-08	8.159E+01	1.3474E+03	2.246E-08	8.184E+01
1s 2p 3P <sub>0</sub> <sup>o</sup>	1s 4p 3P <sub>0</sub> <sup>o</sup>	1.6322E+00	4.224E-08	1.058E+08	1.6254E+00	2.329E-08	5.831E+07
1s 2p 1P <sub>1</sub> <sup>o</sup>	1s 4p 3P <sub>0</sub> <sup>o</sup>	1.7285E+00	6.899E-07	1.540E+09	1.7214E+00	7.028E-07	1.568E+09
1s 3p 3P <sub>0</sub> <sup>o</sup>	1s 4p 3P <sub>0</sub> <sup>o</sup>	6.3375E+00	1.172E-08	1.946E+06	6.3118E+00	7.308E-09	5.619E+05
1s 3p 1P <sub>1</sub> <sup>o</sup>	1s 4p 3P <sub>0</sub> <sup>o</sup>	6.7720E+00	7.666E-07	1.115E+08	6.7446E+00	7.828E-07	1.138E+08
1s 4p 3P <sub>0</sub> <sup>o</sup>	1s 4p 3P <sub>0</sub> <sup>o</sup>	1.9682E+04	2.467E-07	4.247E+00	2.0312E+04	2.386E-07	3.825E+00

(continued on next page)

Table 5 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	$gf$	$A$ (s <sup>-1</sup> )
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6219E+00	8.188E-07	4.153E+08	1.6152E+00	8.517E-07	4.318E+08
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.7088E+00	9.864E-07	4.507E+08	1.7016E+00	9.961E-07	4.550E+08
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.7170E+00	9.347E-08	4.230E+07	1.7100E+00	8.866E-08	4.010E+07
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	6.1858E+00	1.301E-06	4.535E+07	6.1607E+00	1.338E-06	4.665E+07
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	6.5644E+00	2.489E-07	7.705E+06	6.5375E+00	2.511E-07	7.773E+06
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	6.5991E+00	1.418E-08	4.343E+05	6.5723E+00	1.571E-08	4.812E+05
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	2.5504E+02	2.729E-05	5.597E+05	2.5410E+02	2.728E-05	5.589E+05
1s 2s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>3</sup> D <sub>2</sub>	1.6050E+00	2.666E-08	1.380E+07	1.5981E+00	2.759E-08	1.429E+07
1s 3s <sup>3</sup> S <sub>2</sub>	1s 4d <sup>3</sup> D <sub>2</sub>	6.1111E+00	2.618E-09	9.352E+04	6.0854E+00	2.952E-09	1.054E+05
1s 3d <sup>3</sup> D <sub>1</sub>	1s 4d <sup>3</sup> D <sub>2</sub>	6.5814E+00	9.907E-08	3.051E+06	6.5534E+00	9.901E-08	3.049E+06
1s 3d <sup>3</sup> D <sub>3</sub>	1s 4d <sup>3</sup> D <sub>2</sub>	6.5866E+00	7.839E-09	2.410E+05	6.5585E+00	1.134E-08	3.487E+05
1s 3d <sup>3</sup> D <sub>3</sub>	1s 4d <sup>3</sup> D <sub>2</sub>	6.7107E+00	3.091E-07	9.158E+06	6.6818E+00	3.090E-07	9.155E+06
1s 3d <sup>1</sup> D <sub>2</sub>	1s 4d <sup>3</sup> D <sub>2</sub>	6.7157E+00	2.412E-08	7.136E+05	6.6868E+00	2.277E-08	6.736E+05
1s 4s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>3</sup> D <sub>2</sub>	2.0428E+02	2.882E-10	9.211E+00	2.0324E+02	2.883E-10	9.234E+00
1s <sup>2</sup> S <sub>0</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	3.2750E-01	5.115E-08	1.060E+09	3.2616E-01	5.140E-08	1.065E+09
1s 2s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	1.6048E+00	7.191E-09	6.208E+06	1.5980E+00	5.396E-09	4.658E+06
1s 2s <sup>1</sup> S <sub>0</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	1.6227E+00	1.101E-08	9.298E+06	1.6161E+00	1.127E-08	9.515E+06
1s 3s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	6.1092E+00	1.076E-09	6.410E+04	6.0836E+00	5.912E-10	3.521E+04
1s 3s <sup>1</sup> S <sub>0</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	6.1777E+00	1.224E-09	7.130E+04	6.1525E+00	1.246E-09	7.260E+04
1s 3d <sup>3</sup> D <sub>2</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	6.5793E+00	1.479E-08	7.599E+05	6.5513E+00	1.065E-08	5.475E+05
1s 3d <sup>3</sup> D <sub>1</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	6.5845E+00	5.503E-08	2.822E+06	6.5564E+00	5.496E-08	2.818E+06
1s 3d <sup>1</sup> D <sub>2</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	6.7135E+00	1.969E-07	9.715E+06	6.6847E+00	1.995E-07	9.846E+06
1s 4s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	2.0227E+02	4.243E-10	2.306E+01	2.0125E+02	4.340E-10	2.362E+01
1s 4s <sup>1</sup> S <sub>0</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	2.3744E+02	2.003E-11	7.899E-01	2.3659E+02	2.025E-11	7.976E-01
1s 4d <sup>3</sup> D <sub>2</sub>	1s 4d <sup>3</sup> D <sub>1</sub>	2.0536E+04	4.486E-07	2.365E+00	2.0610E+04	4.464E-07	2.317E+00
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.6210E+00	1.525E-07	1.290E+08	1.6143E+00	1.504E-07	1.272E+08
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.6223E+00	3.076E-07	2.598E+08	1.6155E+00	3.230E-07	2.728E+08
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.7078E+00	1.729E-07	1.318E+08	1.7006E+00	1.452E-07	1.107E+08
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.7161E+00	5.523E-07	4.170E+08	1.7090E+00	5.447E-07	4.112E+08
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	6.1732E+00	2.703E-07	1.577E+07	6.1480E+00	2.570E-07	1.499E+07
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	6.1780E+00	5.068E-07	2.952E+07	6.1526E+00	5.255E-07	3.060E+07
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	6.5502E+00	5.703E-08	2.955E+06	6.5232E+00	4.794E-08	2.483E+06
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	6.5847E+00	1.399E-07	7.175E+06	6.5579E+00	1.361E-07	6.978E+06
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	2.3520E+02	5.486E-06	2.205E+05	2.3412E+02	5.485E-06	2.206E+05
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	2.3804E+02	1.015E-05	3.983E+05	2.3685E+02	1.014E-05	3.986E+05
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	3.0236E+03	7.020E-07	1.707E+02	2.9782E+03	7.124E-07	1.770E+02
1s 3d <sup>3</sup> D <sub>2</sub>	1s 4d <sup>3</sup> D <sub>3</sub>	6.5283E+00	1.218E-07	2.724E+06	6.5006E+00	1.221E-07	2.731E+06
1s 3d <sup>3</sup> D <sub>3</sub>	1s 4d <sup>3</sup> D <sub>3</sub>	6.6555E+00	4.750E-07	1.022E+07	6.6270E+00	4.735E-07	1.018E+07
1s 3d <sup>1</sup> D <sub>2</sub>	1s 4d <sup>3</sup> D <sub>3</sub>	6.6604E+00	2.024E-08	4.348E+05	6.6320E+00	2.330E-08	5.005E+05
1s 4d <sup>3</sup> D <sub>2</sub>	1s 4d <sup>3</sup> D <sub>3</sub>	8.0890E+02	1.403E-05	2.043E+04	8.0816E+02	1.399E-05	2.032E+04
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.7043E+00	2.513E-08	8.245E+06	1.6971E+00	2.356E-08	7.728E+06
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	6.4989E+00	1.254E-08	2.829E+05	6.4721E+00	1.209E-08	2.729E+05
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	6.5059E+02	1.536E-11	3.458E-02	6.4694E+02	1.460E-11	3.297E-02
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6178E+00	3.126E-11	1.593E+04	1.6111E+00	1.478E-11	7.535E+03
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.7042E+00	1.963E-09	9.016E+05	1.6971E+00	1.712E-09	7.863E+05
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.7124E+00	1.619E-08	7.364E+06	1.7054E+00	1.552E-08	7.060E+06
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	6.1266E+00	2.174E-11	7.726E+02	6.1016E+00	1.249E-11	4.437E+02
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	6.4978E+00	1.077E-09	3.402E+04	6.4710E+00	8.534E-10	2.696E+04
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	6.5317E+00	8.213E-09	2.568E+05	6.5052E+00	7.853E-09	2.454E+05
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.8236E+02	4.207E-12	1.688E-01	1.8158E+02	4.868E-12	1.953E-01
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	6.3989E+02	1.075E-11	3.504E-02	6.3631E+02	1.094E-11	3.574E-02
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	8.1166E+02	1.204E-12	2.438E-03	8.0920E+02	1.035E-12	2.090E-03
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.8916E+04	3.280E-07	2.889E-01	3.8737E+04	3.272E-07	2.884E-01
1s 2s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	1.6017E+00	2.260E-11	1.175E+04	1.5948E+00	8.840E-13	4.597E+02
1s 3s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	6.0634E+00	1.398E-11	5.074E+02			
1s 3d <sup>3</sup> D <sub>2</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	6.5262E+00	9.491E-09	2.973E+05	6.4985E+00	8.647E-09	2.708E+05
1s 3d <sup>3</sup> D <sub>1</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	6.5313E+00	7.615E-08	2.382E+06	6.5035E+00	7.788E-08	2.435E+06
1s 3d <sup>3</sup> D <sub>3</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	6.6532E+00	2.818E-08	8.493E+05	6.6247E+00	2.465E-08	7.431E+05
1s 3d <sup>1</sup> D <sub>2</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	6.6582E+00	3.320E-07	9.989E+06	6.6297E+00	3.309E-07	9.959E+06
1s 4s <sup>3</sup> S <sub>1</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	1.6177E+02	1.007E-10	5.133E+00	1.6105E+02	1.039E-10	5.302E+00
1s 4d <sup>3</sup> D <sub>2</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	7.7722E+02	1.036E-06	2.289E+03	7.7592E+02	1.033E-06	2.271E+03
1s 4d <sup>3</sup> D <sub>1</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	8.0779E+02	8.860E-06	1.811E+04	8.0628E+02	8.829E-06	1.796E+04
1s 4d <sup>3</sup> D <sub>3</sub>	1s 4d <sup>1</sup> D <sub>2</sub>	1.9845E+04	2.845E-07	9.638E-01			
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.6355E+03	9.461E-06	2.621E+03	1.6325E+03	9.436E-06	2.602E+03
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.7025E+00	1.542E-12	5.069E+02	1.6953E+00	1.104E-13	3.631E+01
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	6.4724E+00	5.423E-13	1.234E+01	6.4457E+00	5.663E-14	1.287E+00
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.6135E+02	3.233E-12	1.447E-02			
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.5861E+03	3.618E-07	1.371E+02	1.5830E+03	3.609E-07	1.360E+02
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.6535E+03	6.987E-06	2.435E+03	1.6504E+03	6.969E-06	2.417E+03
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	5.2510E+04	1.734E-07	5.991E-02			
1s <sup>2</sup> S <sub>0</sub>	1s 5s <sup>3</sup> S <sub>1</sub>	3.2040E-01	1.922E-06	4.161E+10	3.1907E-01	1.905E-06	4.127E+10

(continued on next page)

Table 5 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s2s $^3S_1$	1s5s $^3S_1$	1.4473E+00	1.544E-07	1.639E+08	1.4412E+00	1.548E-07	1.643E+08
1s2s $^1S_0$	1s5s $^3S_1$	1.4618E+00	8.255E-08	8.589E+07	1.4559E+00	7.804E-08	8.117E+07
1s3s $^3S_1$	1s5s $^3S_1$	4.3197E+00	3.183E-08	3.792E+06	4.3017E+00	3.191E-08	3.802E+06
1s3s $^1S_0$	1s5s $^3S_1$	4.3538E+00	1.834E-08	2.152E+06	4.3360E+00	1.605E-08	1.882E+06
1s3d $^3D_2$	1s5s $^3S_1$	4.5495E+00	1.900E-12	2.041E+02	4.5304E+00	7.521E-12	8.078E+02
1s3d $^3D_1$	1s5s $^3S_1$	4.5520E+00	1.815E-11	1.948E+03			
1s3d $^1D_2$	1s5s $^3S_1$	4.6133E+00	2.661E-12	2.780E+02			
1s4s $^3S_1$	1s5s $^3S_1$	1.3745E+01	8.945E-09	1.053E+05	1.3688E+01	8.938E-09	1.051E+05
1s4s $^1S_0$	1s5s $^3S_1$	1.3885E+01	6.095E-09	7.030E+04	1.3828E+01	4.509E-09	5.198E+04
1s4d $^3D_2$	1s5s $^3S_1$	1.4736E+01	2.859E-12	2.927E+01	1.4676E+01	1.277E-11	1.308E+02
1s4d $^3D_1$	1s5s $^3S_1$	1.4747E+01	3.595E-11	3.675E+02	1.4686E+01	2.338E-12	2.389E+01
1s4d $^1D_2$	1s5s $^3S_1$	1.5021E+01	4.998E-12	4.925E+01			
1s2p $^3P_0^0$	1s5p $^3P_0^0$	1.4598E+00	3.325E-08	3.469E+07	1.4537E+00	3.812E-08	3.977E+07
1s2p $^3P_0^0$	1s5p $^3P_0^0$	1.4608E+00	1.660E-08	1.729E+07	1.4547E+00	2.159E-08	2.249E+07
1s2p $^3P_0^0$	1s5p $^3P_0^0$	1.5297E+00	7.583E-07	7.205E+08	1.5233E+00	7.714E-07	7.329E+08
1s2p $^1P_1^0$	1s5p $^3P_0^0$	1.5364E+00	1.790E-07	1.686E+08	1.5300E+00	1.667E-07	1.570E+08
1s3p $^3P_0^0$	1s5p $^3P_0^0$	4.3450E+00	9.303E-09	1.096E+06	4.3271E+00	1.018E-08	1.198E+06
1s3p $^3P_0^0$	1s5p $^3P_0^0$	4.3474E+00	3.783E-09	4.450E+05	4.3294E+00	7.068E-09	8.313E+05
1s3p $^3P_0^0$	1s5p $^3P_0^0$	4.5285E+00	6.596E-07	7.151E+07	4.5097E+00	6.741E-07	7.307E+07
1s3p $^1P_1^0$	1s5p $^3P_0^0$	4.5449E+00	1.499E-07	1.613E+07	4.5263E+00	1.410E-07	1.517E+07
1s4p $^3P_0^0$	1s5p $^3P_0^0$	1.3810E+01	3.141E-09	3.662E+04	1.3752E+01	3.286E-09	3.831E+04
1s4p $^3P_0^0$	1s5p $^3P_0^0$	1.3820E+01	8.034E-10	9.353E+03	1.3761E+01	3.266E-09	3.803E+04
1s4p $^3P_0^0$	1s5p $^3P_0^0$	1.4601E+01	8.508E-07	8.874E+06	1.4539E+01	8.744E-07	9.120E+06
1s4p $^1P_1^0$	1s5p $^3P_0^0$	1.4672E+01	1.898E-07	1.961E+06	1.4610E+01	1.785E-07	1.843E+06
1s4f $^3F_2^0$	1s5p $^3P_0^0$	1.4942E+01	2.377E-13	2.367E+00			
1s2s $^3S_1$	1s5s $^1S_0$	1.4466E+00	7.497E-08	2.390E+08	1.4404E+00	7.736E-08	2.466E+08
1s3s $^3S_1$	1s5s $^1S_0$	4.3129E+00	1.408E-08	5.050E+06	4.2949E+00	1.592E-08	5.711E+06
1s3d $^3D_1$	1s5s $^1S_0$	4.5444E+00	2.226E-12	7.191E+02	4.5252E+00	2.275E-12	7.347E+02
1s4s $^3S_1$	1s5s $^1S_0$	1.3676E+01	3.196E-09	1.140E+05	1.3618E+01	4.447E-09	1.585E+05
1s4d $^3D_1$	1s5s $^1S_0$	1.4668E+01	4.200E-12	1.302E+02	1.4607E+01	4.661E-12	1.445E+02
1s5s $^3S_1$	1s5s $^1S_0$	2.7268E+03	1.197E-08	1.074E+01	2.6934E+03	1.177E-08	1.073E+01
1s2p $^3P_0^0$	1s5p $^3P_0^0$	1.4597E+00	2.071E-08	6.482E+07	1.4537E+00	1.212E-08	3.793E+07
1s2p $^1P_1^0$	1s5p $^3P_0^0$	1.5363E+00	3.127E-07	8.836E+08	1.5300E+00	3.196E-07	9.030E+08
1s3p $^3P_0^0$	1s5p $^3P_0^0$	4.3445E+00	5.943E-09	2.100E+06	4.3267E+00	2.377E-09	8.397E+05
1s3p $^1P_1^0$	1s5p $^3P_0^0$	4.5444E+00	2.684E-07	8.670E+07	4.5258E+00	2.745E-07	8.864E+07
1s4p $^3P_0^0$	1s5p $^3P_0^0$	1.3805E+01	2.173E-09	7.604E+04	1.3747E+01	2.595E-10	9.084E+03
1s4p $^1P_1^0$	1s5p $^3P_0^0$	1.4666E+01	3.440E-07	1.067E+07	1.4605E+01	3.519E-07	1.091E+07
1s5p $^3P_0^0$	1s5p $^3P_0^0$	3.9500E+04	1.224E-07	5.231E-01	4.0718E+04	1.185E-07	4.729E-01
1s2p $^3P_1^0$	1s5p $^3P_2^0$	1.4555E+00	3.625E-07	2.283E+08	1.4495E+00	3.760E-07	2.367E+08
1s2p $^3P_1^0$	1s5p $^3P_2^0$	1.5251E+00	5.039E-07	2.890E+08	1.5187E+00	5.187E-07	2.912E+08
1s2p $^1P_1^0$	1s5p $^3P_2^0$	1.5317E+00	4.698E-08	2.672E+07	1.5253E+00	4.591E-08	2.610E+07
1s3p $^3P_0^0$	1s5p $^3P_2^0$	4.3076E+00	4.374E-07	3.145E+07	4.2899E+00	4.510E-07	3.242E+07
1s3p $^3P_0^0$	1s5p $^3P_2^0$	4.4878E+00	1.396E-07	9.247E+06	4.4692E+00	1.403E-07	9.293E+06
1s3p $^1P_1^0$	1s5p $^3P_2^0$	4.5039E+00	9.365E-09	6.158E+05	4.4855E+00	1.008E-08	6.628E+05
1s4p $^3P_1^0$	1s5p $^3P_2^0$	1.3439E+01	6.586E-07	4.865E+06	1.3383E+01	6.762E-07	4.994E+06
1s4p $^3P_2^0$	1s5p $^3P_2^0$	1.4186E+01	4.513E-08	2.991E+05	1.4127E+01	4.470E-08	2.963E+05
1s4p $^1P_1^0$	1s5p $^3P_2^0$	1.4253E+01	1.024E-09	6.726E+03	1.4194E+01	1.700E-09	1.116E+04
1s4f $^3F_3^0$	1s5p $^3P_2^0$	1.4503E+01	1.154E-12	7.318E+00			
1s4f $^3F_2^0$	1s5p $^3P_2^0$	1.4508E+01	3.204E-13	2.031E+00			
1s4f $^1F_3^0$	1s5p $^3P_2^0$	1.4636E+01	4.259E-14	2.652E-01			
1s5p $^3P_1^0$	1s5p $^3P_2^0$	4.9993E+02	1.394E-05	7.439E+04	4.9817E+02	1.393E-05	7.425E+04
1s2s $^3S_1$	1s5d $^3D_2$	1.4421E+00	1.207E-08	7.745E+06	1.4360E+00	1.251E-08	8.030E+06
1s3s $^3S_1$	1s5d $^3D_2$	4.2737E+00	1.741E-09	1.272E+05	4.2558E+00	1.922E-09	1.403E+05
1s3d $^3D_2$	1s5d $^3D_2$	4.4985E+00	4.750E-08	3.132E+06	4.4794E+00	4.750E-08	3.131E+06
1s3d $^3D_1$	1s5d $^3D_2$	4.5010E+00	4.030E-09	2.654E+05	4.4818E+00	5.426E-09	3.573E+05
1s3d $^3D_3$	1s5d $^3D_2$	4.5585E+00	1.063E-07	6.826E+06	4.5391E+00	1.063E-07	6.830E+06
1s3d $^1D_2$	1s5d $^3D_2$	4.5609E+00	8.379E-09	5.374E+05	4.5414E+00	7.951E-09	5.099E+05
1s4s $^3S_1$	1s5d $^3D_2$	1.3290E+01	1.420E-10	1.073E+03	1.3233E+01	1.983E-10	1.498E+03
1s4d $^3D_2$	1s5d $^3D_2$	1.4214E+01	2.217E-08	1.464E+05	1.4154E+01	2.214E-08	1.462E+05
1s4d $^3D_1$	1s5d $^3D_2$	1.4224E+01	1.417E-09	9.343E+03	1.4164E+01	2.610E-09	1.720E+04
1s4d $^3D_3$	1s5d $^3D_2$	1.4468E+01	1.506E-07	9.600E+05	1.4407E+01	1.507E-07	9.606E+05
1s4d $^1D_2$	1s5d $^3D_2$	1.4479E+01	1.171E-08	7.449E+04	1.4417E+01	1.098E-08	6.991E+04
1s5s $^3S_1$	1s5d $^3D_2$	4.0118E+02	1.290E-10	1.070E+00	3.9828E+02	1.291E-10	1.076E+00
1s2p $^3P_1^0$	1s5p $^1P_1^0$	1.4551E+00	6.636E-08	6.969E+07	1.4491E+00	6.566E-08	6.893E+07
1s2p $^3P_0^0$	1s5p $^1P_1^0$	1.4562E+00	1.354E-07	1.420E+08	1.4501E+00	1.420E-07	1.489E+08
1s2p $^3P_0^0$	1s5p $^1P_1^0$	1.5247E+00	8.556E-08	8.183E+07	1.5183E+00	7.479E-08	6.962E+07
1s2p $^1P_1^0$	1s5p $^1P_1^0$	1.5313E+00	2.795E-07	2.651E+08	1.5249E+00	2.779E-07	2.635E+08
1s3p $^3P_0^0$	1s5p $^1P_1^0$	4.3044E+00	8.940E-08	1.073E+07	4.2867E+00	8.521E-08	1.022E+07
1s3p $^3P_0^0$	1s5p $^1P_1^0$	4.3068E+00	1.695E-07	2.032E+07	4.2890E+00	1.758E-07	2.107E+07
1s3p $^3P_0^0$	1s5p $^1P_1^0$	4.4844E+00	2.833E-08	3.132E+06	4.4658E+00	2.453E-08	2.656E+06
1s3p $^1P_1^0$	1s5p $^1P_1^0$	4.5006E+00	7.769E-08	8.528E+06	4.4821E+00	7.651E-08	8.396E+06

(continued on next page)

Table 5 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )	$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.3409E+01	1.400E-07	1.732E+06	1.3352E+01	1.323E-07	1.636E+06
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.3418E+01	2.593E-07	3.202E+06	1.3361E+01	2.678E-07	3.307E+06
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>2</sub> <sup>o</sup>	1.4153E+01	1.282E-08	1.423E+05	1.4093E+01	1.104E-08	1.226E+05
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.4219E+01	2.450E-08	2.695E+05	1.4160E+01	2.407E-08	2.647E+05
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.4473E+01	1.066E-12	1.131E+01			
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.6126E+02	2.804E-06	2.931E+04	4.5925E+02	2.803E-06	2.930E+04
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.6671E+02	5.192E-06	5.300E+04	4.6449E+02	5.187E-06	5.301E+04
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	5.9640E+03	3.535E-07	2.210E+01	5.8780E+03	3.589E-07	2.290E+01
1s <sup>2</sup> 1S <sub>0</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	3.2010E-01	2.906E-08	6.303E+08	3.1882E-01	2.923E-08	6.341E+08
1s 2s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	1.4421E+00	3.269E-09	3.496E+06	1.4359E+00	2.440E-09	2.609E+06
1s 2s <sup>1</sup> S <sub>0</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	1.4565E+00	4.982E-09	5.221E+06	1.4505E+00	5.091E-09	5.335E+06
1s 3s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	4.2732E+00	6.295E-10	7.664E+04	4.2553E+00	3.832E-10	4.666E+04
1s 3s <sup>1</sup> S <sub>0</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	4.3066E+00	7.848E-10	9.408E+04	4.2889E+00	7.962E-10	9.543E+04
1s 3d <sup>3</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	4.4980E+00	6.754E-09	7.423E+05	4.4789E+00	5.140E-09	5.648E+05
1s 3d <sup>3</sup> D <sub>1</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	4.5005E+00	2.642E-08	2.900E+06	4.4813E+00	2.637E-08	2.895E+06
1s 3d <sup>1</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	4.5603E+00	6.789E-08	7.258E+06	4.5409E+00	6.881E-08	7.357E+06
1s 4s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	1.3285E+01	1.345E-10	1.694E+03	1.3229E+01	4.034E-11	5.082E+02
1s 4s <sup>1</sup> S <sub>0</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	1.3416E+01	8.406E-11	1.038E+03	1.3360E+01	8.608E-11	1.063E+03
1s 4d <sup>3</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	1.4209E+01	3.779E-09	4.162E+04	1.4150E+01	2.284E-09	2.515E+04
1s 4d <sup>3</sup> D <sub>1</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	1.4219E+01	1.231E-08	1.354E+05	1.4159E+01	1.228E-08	1.350E+05
1s 4d <sup>1</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	1.4474E+01	9.593E-08	1.018E+06	1.4412E+01	9.728E-08	1.032E+06
1s 5s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	3.9728E+02	2.647E-10	3.728E+00	3.9446E+02	2.698E-10	3.823E+00
1s 5s <sup>1</sup> S <sub>0</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	4.6504E+02	6.464E-12	6.646E-02	4.6214E+02	6.512E-12	6.722E-02
1s 5d <sup>3</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>1</sub>	4.0886E+04	2.249E-07	2.991E-01	4.1075E+04	2.236E-07	2.922E-01
1s 3d <sup>3</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	4.4858E+00	3.427E-08	1.623E+06	4.4668E+00	3.435E-08	1.627E+06
1s 3d <sup>3</sup> D <sub>3</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	4.5454E+00	2.279E-07	1.051E+07	4.5261E+00	2.277E-07	1.050E+07
1s 3d <sup>1</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	4.5477E+00	1.002E-08	4.616E+05	4.5284E+00	1.125E-08	5.183E+05
1s 4d <sup>3</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	1.4088E+01	8.337E-08	4.003E+05	1.4029E+01	8.359E-08	4.013E+05
1s 4d <sup>3</sup> D <sub>3</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	1.4337E+01	1.068E-07	4.952E+05	1.4277E+01	1.064E-07	4.936E+05
1s 4d <sup>1</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	1.4348E+01	4.050E-09	1.875E+04	1.4287E+01	5.092E-09	2.357E+04
1s 5d <sup>3</sup> D <sub>2</sub>	1s 5d <sup>3</sup> D <sub>3</sub>	1.5807E+03	7.199E-06	2.745E+03	1.5799E+03	7.177E-06	2.716E+03
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.5232E+00	1.777E-08	7.298E+06	1.5168E+00	1.651E-08	6.783E+06
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.4720E+00	2.760E-09	1.315E+05	4.4534E+00	2.752E-09	1.311E+05
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4030E+01	1.450E-09	7.019E+03	1.3970E+01	1.413E-09	6.842E+03
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4339E+01	1.073E-08	4.974E+04	1.4278E+01	4.705E-08	2.180E+05
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4344E+01	2.972E-08	1.376E+05	1.4283E+01	2.334E-09	1.081E+04
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4466E+01	4.502E-08	2.050E+05	1.4404E+01	4.477E-08	2.039E+05
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4470E+01	1.697E-09	7.722E+03	1.4408E+01	1.639E-09	7.462E+03
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.2712E+03	9.159E-12	5.401E-03	1.2579E+03	8.880E-12	5.302E-03
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4538E+00	2.242E-11	1.415E+04	1.4478E+00	1.093E-11	6.903E+03
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.5232E+00	1.262E-09	7.255E+05	1.5168E+00	1.202E-09	6.912E+05
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.5298E+00	1.114E-08	6.351E+06	1.5234E+00	1.084E-08	6.179E+06
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.2928E+00	5.686E-12	4.116E+02	4.2750E+00	3.642E-12	2.636E+02
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.4718E+00	2.443E-10	1.630E+04	4.4531E+00	1.918E-10	1.279E+04
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.4878E+00	1.807E-09	1.197E+05	4.4693E+00	1.767E-09	1.170E+05
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.3296E+01	3.412E-12	2.575E+01			
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4027E+01	1.361E-10	9.228E+02	1.3967E+01	1.003E-10	6.806E+02
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4093E+01	9.657E-10	6.487E+03	1.4033E+01	9.194E-10	6.175E+03
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4336E+01	3.412E-08	2.215E+05	1.4275E+01	2.392E-09	1.552E+04
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4342E+01	6.360E-08	4.125E+05	1.4281E+01	3.295E-08	2.137E+05
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.4467E+01	3.281E-08	2.091E+05	1.4405E+01	3.308E-08	2.109E+05
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.5713E+02	3.711E-12	3.882E-02	3.5518E+02	4.170E-12	4.372E-02
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.2503E+03	9.975E-12	8.513E-03	1.2374E+03	9.996E-12	8.635E-03
1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.5820E+03	3.550E-13	1.892E-04	1.5673E+03	3.191E-13	1.718E-04
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	7.6009E+04	1.688E-07	3.897E-02	7.5649E+04	1.670E-07	3.861E-02
1s 2s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>1</sup> D <sub>2</sub>	1.4408E+00	1.086E-11	6.980E+03	1.4346E+00	5.345E-13	3.435E+02
1s 3s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>1</sup> D <sub>2</sub>	4.2617E+00	6.144E-12	4.513E+02			
1s 3d <sup>3</sup> D <sub>2</sub>	1s 5d <sup>1</sup> D <sub>2</sub>	4.4852E+00	2.704E-09	1.793E+05	4.4662E+00	2.441E-09	1.619E+05
1s 3d <sup>3</sup> D <sub>1</sub>	1s 5d <sup>1</sup> D <sub>2</sub>	4.4876E+00	2.134E-08	1.413E+06	4.4686E+00	2.183E-08	1.446E+06
1s 3d <sup>3</sup> D <sub>3</sub>	1s 5d <sup>1</sup> D <sub>2</sub>	4.5449E+00	1.323E-08	8.542E+05	4.5255E+00	1.184E-08	7.652E+05
1s 3d <sup>1</sup> D <sub>2</sub>	1s 5d <sup>1</sup> D <sub>2</sub>	4.5472E+00	1.594E-07	1.028E+07	4.5278E+00	1.591E-07	1.026E+07
1s 4s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>1</sup> D <sub>2</sub>	1.3174E+01	5.744E-12	4.415E+01			
1s 4d <sup>3</sup> D <sub>2</sub>	1s 5d <sup>1</sup> D <sub>2</sub>	1.4082E+01	6.400E-09	4.306E+04	1.4023E+01	5.870E-09	3.948E+04
1s 4d <sup>3</sup> D <sub>1</sub>	1s 5d <sup>1</sup> D <sub>2</sub>	1.4092E+01	5.236E-08	3.517E+05	1.4033E+01	5.341E-08	3.587E+05
1s 4d <sup>3</sup> D <sub>3</sub>	1s 5d <sup>1</sup> D <sub>2</sub>	1.4332E+01	6.968E-09	4.525E+04	1.4271E+01	5.701E-09	3.703E+04
1s 4d <sup>1</sup> D <sub>2</sub>	1s 5d <sup>1</sup> D <sub>2</sub>	1.4342E+01	7.473E-08	4.847E+05	1.4282E+01	7.441E-08	4.825E+05
1s 5s <sup>3</sup> S <sub>1</sub>	1s 5d <sup>1</sup> D <sub>2</sub>	3.1728E+02	5.803E-11	7.691E-01	3.1538E+02	5.834E-11	7.758E-01
1s 5d <sup>3</sup> D <sub>2</sub>	1s 5d <sup>1</sup> D <sub>2</sub>	1.5170E+03	5.320E-07	3.084E+02	1.5150E+03	5.304E-07	3.056E+02
1s 5d <sup>3</sup> D <sub>1</sub>	1s 5d <sup>1</sup> D <sub>2</sub>	1.5755E+03	4.542E-06	2.441E+03	1.5730E+03	4.524E-06	2.418E+03
1s 5d <sup>3</sup> D <sub>3</sub>	1s 5d <sup>1</sup> D <sub>2</sub>	3.7649E+04	1.489E-07	1.401E-01			
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.4275E+01	1.498E-08	5.450E+04	1.4214E+01	1.496E-08	5.443E+04

(continued on next page)

Table 5 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s 4f $^3F_4^0$	1s 5f $^3F_4^0$	1.4401E+01	1.395E-07	4.986E+05	1.4339E+01	1.440E-07	5.146E+05
1s 4f $^1F_4^0$	1s 5f $^3F_4^0$	1.4404E+01	4.779E-09	1.707E+04	1.4343E+01	4.148E-09	1.481E+04
1s 5f $^3F_3^0$	1s 5f $^3F_4^0$	3.1889E+03	4.861E-06	3.543E+02	3.1838E+03	4.848E-06	3.514E+02
1s 3d $^3D_3$	1s 5g $^3G_4$	4.5387E+00	6.705E-09	2.412E+05	4.5195E+00	6.765E-09	2.433E+05
1s 4d $^3D_3$	1s 5g $^3G_4$	1.4271E+01	2.645E-09	9.626E+03	1.4212E+01	2.645E-09	9.624E+03
1s 5d $^3D_3$	1s 5g $^3G_4$	3.0779E+03	3.885E-13	3.040E-05	3.1417E+03	4.330E-13	3.223E-05
1s 3d $^3D_2$	1s 5g $^3G_3$	4.4791E+00	4.386E-13	2.083E+01			
1s 3d $^3D_3$	1s 5g $^3G_3$	4.5386E+00	2.962E-10	1.370E+04	4.5194E+00	2.508E-10	1.160E+04
1s 3d $^1D_2$	1s 5g $^3G_3$	4.5409E+00	5.076E-09	2.346E+05	4.5217E+00	5.023E-09	2.321E+05
1s 4d $^3D_2$	1s 5g $^3G_3$	1.4022E+01	1.928E-13	9.345E-01			
1s 4d $^3D_3$	1s 5g $^3G_3$	1.4269E+01	1.108E-10	5.186E+02	1.4210E+01	9.782E-11	4.576E+02
1s 4d $^1D_2$	1s 5g $^3G_3$	1.4280E+01	1.987E-09	9.285E+03	1.4221E+01	1.961E-09	9.165E+03
1s 5d $^3D_2$	1s 5g $^3G_3$	1.0362E+03	4.213E-15	3.739E-06	1.0430E+03	4.189E-15	3.638E-06
1s 5d $^3D_3$	1s 5g $^3G_3$	3.0082E+03	1.694E-16	1.784E-08			
1s 5d $^1D_2$	1s 5g $^3G_3$	3.2694E+03	2.036E-13	1.815E-05	3.3474E+03	1.574E-13	1.327E-05
1s 5g $^3G_4$	1s 5g $^3G_3$	1.3281E+05	1.209E-07	6.534E-03	1.3215E+05	1.213E-07	6.564E-03
1s 2p $^3P_0^0$	1s 5f $^1F_3^0$	1.5225E+00	1.031E-12	4.240E+02	1.5161E+00	6.722E-14	2.763E+01
1s 3p $^3P_0^0$	1s 5f $^1F_3^0$	4.4656E+00	1.185E-13	5.664E+00	4.4470E+00	1.124E-14	5.370E-01
1s 4p $^3P_0^0$	1s 5f $^1F_3^0$	1.3966E+01	2.140E-13	1.045E+00			
1s 4f $^3F_3^0$	1s 5f $^1F_3^0$	1.4273E+01	6.420E-10	3.003E+03	1.4212E+01	5.692E-10	2.662E+03
1s 4f $^3F_2^0$	1s 5f $^1F_3^0$	1.4278E+01	1.100E-08	5.141E+04	1.4218E+01	1.112E-08	5.201E+04
1s 4f $^3F_4^0$	1s 5f $^1F_3^0$	1.4398E+01	5.942E-09	2.731E+04	1.4337E+01	4.059E-09	1.866E+04
1s 4f $^1F_3^0$	1s 5f $^1F_3^0$	1.4402E+01	1.154E-07	5.300E+05	1.4341E+01	1.111E-07	5.104E+05
1s 5p $^3P_0^0$	1s 5f $^1F_3^0$	9.0084E+02	2.726E-12	3.201E-03			
1s 5f $^3F_3^0$	1s 5f $^1F_3^0$	3.0918E+03	1.860E-07	1.854E+01	3.0864E+03	1.854E-07	1.839E+01
1s 5f $^3F_2^0$	1s 5f $^1F_3^0$	3.2229E+03	3.589E-06	3.293E+02	3.2177E+03	3.579E-06	3.266E+02
1s 5f $^3F_4^0$	1s 5f $^1F_3^0$	1.0160E+05	8.920E-08	8.235E-03			
1s 5g $^3G_4$	1s 5g $^3G_5$	5.3554E+03	3.669E-06	7.758E+01	5.3442E+03	3.661E-06	7.707E+01
1s 3d $^3D_3$	1s 5g $^1G_4$	4.5348E+00	1.337E-13	4.817E+00	4.5156E+00	2.425E-14	8.741E-01
1s 4d $^3D_3$	1s 5g $^1G_4$	1.4232E+01	1.748E-14	6.398E-02	1.4173E+01	9.478E-15	3.467E-02
1s 5d $^3D_3$	1s 5g $^1G_4$	1.9321E+03	3.849E-15	7.643E-07			
1s 5g $^3G_4$	1s 5g $^1G_4$	5.1900E+03	8.607E-08	2.368E+00	5.1787E+03	8.589E-08	2.353E+00
1s 5g $^3G_3$	1s 5g $^1G_4$	5.4011E+03	2.914E-06	7.403E+01	5.3899E+03	2.907E-06	7.354E+01
1s 5g $^3G_5$	1s 5g $^1G_4$	1.6804E+05	7.357E-08	1.931E-03			
1s $^2 1S_0$	1s 6s $^3S_1$	3.1640E-01	1.107E-06	2.457E+10	3.1511E-01	1.098E-06	2.438E+10
1s 2s $^3S_1$	1s 6s $^3S_1$	1.3696E+00	9.015E-08	1.069E+08	1.3638E+00	9.066E-08	1.074E+08
1s 2s $^1S_0$	1s 6s $^3S_1$	1.3825E+00	4.807E-08	5.592E+07	1.3769E+00	4.572E-08	5.317E+07
1s 3s $^3S_1$	1s 6s $^3S_1$	3.6936E+00	1.931E-08	3.147E+06	3.6786E+00	1.938E-08	3.157E+06
1s 3s $^1S_0$	1s 6s $^3S_1$	3.7185E+00	1.086E-08	1.747E+06	3.7036E+00	9.751E-09	1.567E+06
1s 3d $^3D_2$	1s 6s $^3S_1$	3.8604E+00	5.613E-13	8.374E+01			
1s 3d $^3D_1$	1s 6s $^3S_1$	3.8622E+00	8.232E-12	1.227E+03			
1s 3d $^1D_2$	1s 6s $^3S_1$	3.9062E+00	1.282E-12	1.868E+02			
1s 4s $^3S_1$	1s 6s $^3S_1$	8.9291E+00	6.023E-09	1.680E+05	8.8936E+00	6.051E-09	1.686E+05
1s 4s $^1S_0$	1s 6s $^3S_1$	8.9879E+00	3.778E-09	1.040E+05	8.9527E+00	3.044E-09	8.374E+04
1s 4d $^3D_2$	1s 6s $^3S_1$	9.3373E+00	1.297E-12	3.306E+01	9.3006E+00	4.837E-12	1.232E+02
1s 4d $^3D_1$	1s 6s $^3S_1$	9.3415E+00	1.313E-11	3.344E+02	9.3048E+00	1.214E-12	3.092E+01
1s 4d $^1D_2$	1s 6s $^3S_1$	9.4508E+00	1.784E-12	4.442E+01			
1s 5s $^3S_1$	1s 6s $^3S_1$	2.5485E+01	2.125E-09	7.273E+03	2.5393E+01	2.131E-09	7.285E+03
1s 5s $^1S_0$	1s 6s $^3S_1$	2.5726E+01	1.670E-09	5.611E+03	2.5635E+01	1.075E-09	3.606E+03
1s 5d $^3D_2$	1s 6s $^3S_1$	2.7214E+01	7.250E-13	2.176E+00	2.7122E+01	5.172E-12	1.550E+01
1s 5d $^3D_1$	1s 6s $^3S_1$	2.7232E+01	2.052E-11	6.152E+01	2.7140E+01	1.190E-12	3.562E+00
1s 5d $^1D_2$	1s 6s $^3S_1$	2.7711E+01	3.013E-12	8.724E+00			
1s 2p $^3P_0^0$	1s 6p $^3P_0^0$	1.3810E+00	2.067E-08	2.410E+07	1.3752E+00	2.129E-08	2.482E+07
1s 2p $^3P_1^0$	1s 6p $^3P_1^0$	1.3819E+00	8.740E-09	1.018E+07	1.3761E+00	1.295E-08	1.508E+07
1s 2p $^3P_2^0$	1s 6p $^3P_2^0$	1.4434E+00	4.128E-07	4.405E+08	1.4374E+00	4.168E-07	4.448E+08
1s 2p $^1P_1^0$	1s 6p $^3P_1^0$	1.4493E+00	9.654E-08	1.022E+08	1.4433E+00	9.341E-08	9.885E+07
1s 3p $^3P_0^0$	1s 6p $^3P_0^0$	3.7142E+00	6.133E-09	9.884E+05	3.6989E+00	5.685E-09	9.160E+05
1s 3p $^3P_1^0$	1s 6p $^3P_1^0$	3.7159E+00	2.025E-09	3.261E+05	3.7005E+00	4.431E-09	7.134E+05
1s 3p $^3P_2^0$	1s 6p $^3P_2^0$	3.8474E+00	3.258E-07	4.893E+07	3.8314E+00	3.312E-07	4.974E+07
1s 3p $^1P_1^0$	1s 6p $^3P_1^0$	3.8593E+00	7.372E-08	1.101E+07	3.8434E+00	7.108E-08	1.060E+07
1s 4p $^3P_0^0$	1s 6p $^3P_0^0$	8.9685E+00	2.399E-09	6.631E+04	8.9310E+00	1.888E-09	5.218E+04
1s 4p $^3P_1^0$	1s 6p $^3P_1^0$	8.9726E+00	4.830E-10	1.334E+04	8.9350E+00	2.091E-09	5.775E+04
1s 4p $^3P_2^0$	1s 6p $^3P_2^0$	9.2954E+00	3.183E-07	8.190E+06	9.2564E+00	3.253E-07	8.369E+06
1s 4p $^1P_1^0$	1s 6p $^3P_1^0$	9.3241E+00	7.090E-08	1.813E+06	9.2853E+00	6.788E-08	1.735E+06
1s 4f $^3F_2^0$	1s 6p $^3P_0^0$	9.4324E+00	7.883E-14	1.970E+00			
1s 5p $^3P_0^0$	1s 6p $^3P_0^0$	2.5582E+01	1.080E-09	3.667E+03	2.5476E+01	6.650E-10	2.258E+03
1s 5p $^3P_1^0$	1s 6p $^3P_1^0$	2.5599E+01	6.529E-11	2.215E+02	2.5492E+01	1.370E-09	4.650E+03
1s 5p $^3P_2^0$	1s 6p $^3P_2^0$	2.6962E+01	4.537E-07	1.388E+06	2.6849E+01	4.659E-07	1.424E+06
1s 5p $^1P_1^0$	1s 6p $^3P_1^0$	2.7084E+01	1.005E-07	3.045E+05	2.6972E+01	9.510E-08	2.881E+05
1s 5f $^3F_2^0$	1s 6p $^3P_1^0$	2.7556E+01	2.189E-13	6.408E-01			
1s 2s $^3S_1$	1s 6s $^1S_0$	1.3692E+00	4.431E-08	1.577E+08	1.3635E+00	4.532E-08	1.612E+08

(continued on next page)

Table 5 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	$gf$	$A$ (s <sup>-1</sup> )
1s 3s <sup>3</sup> S <sub>1</sub>	1s 6s <sup>1</sup> S <sub>0</sub>	3.6908E+00	8.788E-09	4.303E+06	3.6761E+00	9.684E-09	4.739E+06
1s 3d <sup>3</sup> D <sub>1</sub>	1s 6s <sup>1</sup> S <sub>0</sub>	3.8591E+00	9.086E-13	4.070E+02			
1s 4s <sup>3</sup> S <sub>1</sub>	1s 6s <sup>1</sup> S <sub>0</sub>	8.9125E+00	2.416E-09	2.029E+05	8.8795E+00	3.021E-09	2.534E+05
1s 4d <sup>3</sup> D <sub>1</sub>	1s 6s <sup>1</sup> S <sub>0</sub>	9.3233E+00	1.668E-12	1.280E+02	9.2893E+00	1.732E-12	1.327E+02
1s 5s <sup>3</sup> S <sub>1</sub>	1s 6s <sup>1</sup> S <sub>0</sub>	2.5350E+01	6.194E-10	6.429E+03	2.5278E+01	1.061E-09	1.098E+04
1s 5d <sup>3</sup> D <sub>1</sub>	1s 6s <sup>1</sup> S <sub>0</sub>	2.7078E+01	1.807E-12	1.644E+01	2.7009E+01	1.992E-12	1.806E+01
1s 6s <sup>3</sup> S <sub>1</sub>	1s 6s <sup>1</sup> S <sub>0</sub>	4.7691E+03	7.013E-09	2.057E+00	5.5745E+03	5.830E-09	1.240E+00
1s 2p <sup>3</sup> P <sub>0</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	1.3809E+00	1.094E-08	3.828E+07	1.3753E+00	7.037E-09	2.460E+07
1s 2p <sup>1</sup> P <sub>0</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	1.4493E+00	1.695E-07	5.381E+08	1.4434E+00	1.740E-07	5.525E+08
1s 3p <sup>3</sup> P <sub>0</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	3.7140E+00	3.120E-09	1.509E+06	3.6994E+00	1.511E-09	7.306E+05
1s 3p <sup>1</sup> P <sub>0</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	3.8591E+00	1.323E-07	5.925E+07	3.8440E+00	1.357E-07	6.077E+07
1s 4p <sup>3</sup> P <sub>0</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	8.9674E+00	1.092E-09	9.058E+04	8.9341E+00	3.075E-10	2.548E+04
1s 4p <sup>1</sup> P <sub>0</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	9.3228E+00	1.285E-07	9.865E+06	9.2885E+00	1.318E-07	1.010E+07
1s 5p <sup>3</sup> P <sub>0</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	2.5573E+01	4.594E-10	4.685E+03			
1s 5p <sup>1</sup> P <sub>0</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	2.7074E+01	1.828E-07	1.663E+06	2.7000E+01	1.870E-07	1.697E+06
1s 6p <sup>3</sup> P <sub>0</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	6.9398E+04	6.942E-08	9.614E-02			
1s 2p <sup>3</sup> P <sub>1</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	1.3788E+00	1.951E-07	1.369E+08	1.3731E+00	2.017E-07	1.415E+08
1s 2p <sup>3</sup> P <sub>2</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	1.4410E+00	2.930E-07	1.883E+08	1.4350E+00	2.925E-07	1.878E+08
1s 2p <sup>1</sup> P <sub>0</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	1.4469E+00	2.548E-08	1.624E+07	1.4409E+00	2.662E-08	1.696E+07
1s 3p <sup>3</sup> P <sub>0</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	3.6983E+00	2.115E-07	2.063E+07	3.6831E+00	2.178E-07	2.123E+07
1s 3p <sup>3</sup> P <sub>1</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	3.8304E+00	8.438E-08	7.672E+06	3.8145E+00	8.336E-08	7.578E+06
1s 3p <sup>1</sup> P <sub>0</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	3.8422E+00	5.285E-09	4.776E+05	3.8264E+00	6.273E-09	5.667E+05
1s 4p <sup>3</sup> P <sub>0</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	8.8767E+00	2.421E-07	4.098E+06	8.8397E+00	2.488E-07	4.212E+06
1s 4p <sup>3</sup> P <sub>1</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	9.1968E+00	3.073E-08	4.846E+05	9.1583E+00	2.935E-08	4.630E+05
1s 4p <sup>1</sup> P <sub>0</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	9.2248E+00	8.915E-10	1.398E+04	9.1865E+00	1.536E-09	2.408E+04
1s 4f <sup>3</sup> F <sub>3</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	9.3286E+00	6.451E-14	9.889E-01			
1s 4f <sup>3</sup> F <sub>2</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	9.3309E+00	3.163E-14	4.846E-01			
1s 4f <sup>1</sup> F <sub>3</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	9.3838E+00	1.153E-14	1.747E-01			
1s 5p <sup>3</sup> P <sub>0</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	2.4849E+01	3.725E-07	8.048E+05	2.4746E+01	3.819E-07	8.251E+05
1s 5p <sup>3</sup> P <sub>1</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	2.6148E+01	1.229E-08	2.397E+04	2.6040E+01	1.110E-08	2.166E+04
1s 5p <sup>1</sup> P <sub>0</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	2.6264E+01	4.017E-13	7.770E-01	2.6156E+01	1.763E-10	3.409E+02
1s 5f <sup>3</sup> F <sub>3</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	2.6698E+01	1.051E-12	1.966E+00			
1s 5f <sup>3</sup> F <sub>2</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	2.6707E+01	3.579E-13	6.695E-01			
1s 5f <sup>1</sup> F <sub>3</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	2.6930E+01	4.012E-14	7.380E-02			
1s 6p <sup>3</sup> P <sub>0</sub>	1s 6p <sup>3</sup> P <sub>0</sub>	8.6654E+02	8.046E-06	1.429E+04	8.6410E+02	8.128E-06	1.440E+04
1s 2s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	1.3669E+00	6.514E-09	4.651E+06	1.3610E+00	6.766E-09	4.831E+06
1s 3s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	3.6741E+00	1.083E-09	1.070E+05	3.6587E+00	1.183E-09	1.169E+05
1s 3d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	3.8391E+00	2.622E-08	2.373E+06	3.8228E+00	2.617E-08	2.369E+06
1s 3d <sup>3</sup> D <sub>1</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	3.8409E+00	2.274E-09	2.057E+05	3.8245E+00	3.045E-09	2.753E+05
1s 3d <sup>3</sup> D <sub>3</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	3.8827E+00	5.188E-08	4.591E+06	3.8661E+00	5.171E-08	4.576E+06
1s 3d <sup>1</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	3.8844E+00	4.104E-09	3.629E+05	3.8678E+00	4.089E-09	3.615E+05
1s 4s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	8.8160E+00	1.556E-10	2.671E+03	8.7783E+00	1.935E-10	3.322E+03
1s 4d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	9.2136E+00	1.330E-08	2.090E+05	9.1745E+00	1.325E-08	2.082E+05
1s 4d <sup>3</sup> D <sub>1</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	9.2178E+00	9.779E-10	1.535E+04	9.1786E+00	1.599E-09	2.511E+04
1s 4d <sup>3</sup> D <sub>3</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	9.3198E+00	5.775E-08	8.870E+05	9.2799E+00	5.767E-08	8.859E+05
1s 4d <sup>1</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	9.3242E+00	4.505E-09	6.913E+04	9.2843E+00	4.384E-09	6.727E+04
1s 5s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	2.4585E+01	7.247E-12	1.600E+01	2.4475E+01	1.833E-11	4.048E+01
1s 5d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	2.6190E+01	5.971E-09	1.161E+04	2.6077E+01	5.919E-09	1.151E+04
1s 5d <sup>3</sup> D <sub>1</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	2.6207E+01	2.824E-10	5.485E+02	2.6094E+01	7.777E-10	1.510E+03
1s 5d <sup>3</sup> D <sub>3</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	2.6631E+01	7.999E-08	1.505E+05	2.6515E+01	8.000E-08	1.505E+05
1s 5d <sup>1</sup> D <sub>2</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	2.6650E+01	6.203E-09	1.165E+04	2.6534E+01	5.909E-09	1.110E+04
1s 5g <sup>3</sup> G <sub>3</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	2.6869E+01	6.611E-17	1.222E-04			
1s 6s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>3</sup> D <sub>2</sub>	6.9582E+02	6.652E-11	1.833E-01	6.7673E+02	4.523E-12	1.306E-02
1s 2p <sup>3</sup> P <sub>1</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	1.3786E+00	3.538E-08	4.139E+07	1.3729E+00	3.559E-08	4.163E+07
1s 2p <sup>3</sup> P <sub>0</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	1.3795E+00	7.258E-08	8.481E+07	1.3738E+00	7.541E-08	8.809E+07
1s 2p <sup>3</sup> P <sub>2</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	1.4408E+00	4.726E-08	5.062E+07	1.4348E+00	4.441E-08	4.756E+07
1s 2p <sup>1</sup> P <sub>0</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	1.4467E+00	1.592E-07	1.691E+08	1.4407E+00	1.576E-07	1.674E+08
1s 3p <sup>3</sup> P <sub>0</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	3.6970E+00	4.301E-08	6.997E+06	3.6819E+00	4.116E-08	6.693E+06
1s 3p <sup>3</sup> P <sub>1</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	3.6987E+00	8.169E-08	1.328E+07	3.6836E+00	8.426E-08	1.368E+07
1s 3p <sup>3</sup> P <sub>2</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	3.8290E+00	1.541E-08	2.336E+06	3.8133E+00	1.521E-08	2.307E+06
1s 3p <sup>1</sup> P <sub>0</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	3.8407E+00	4.522E-08	6.817E+06	3.8251E+00	4.434E-08	6.680E+06
1s 4p <sup>3</sup> P <sub>0</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	8.8691E+00	5.110E-08	1.444E+06	8.8329E+00	4.835E-08	1.366E+06
1s 4p <sup>3</sup> P <sub>1</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	8.8731E+00	9.506E-08	2.685E+06	8.8368E+00	9.774E-08	2.759E+06
1s 4p <sup>3</sup> P <sub>2</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	9.1886E+00	6.437E-09	1.695E+05	9.1511E+00	7.060E-09	1.858E+05
1s 4p <sup>1</sup> P <sub>0</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	9.2166E+00	1.567E-08	4.102E+05	9.1793E+00	1.527E-08	3.997E+05
1s 4f <sup>3</sup> F <sub>2</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	9.3225E+00	8.951E-14	2.290E+00			
1s 5p <sup>3</sup> P <sub>0</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	2.4789E+01	7.996E-08	2.893E+05	2.4694E+01	7.555E-08	2.731E+05
1s 5p <sup>3</sup> P <sub>1</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	2.4805E+01	1.475E-07	5.332E+05	2.4708E+01	1.515E-07	5.473E+05
1s 5p <sup>3</sup> P <sub>2</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	2.6083E+01	3.633E-09	1.187E+04	2.5981E+01	4.572E-09	1.493E+04
1s 5p <sup>1</sup> P <sub>0</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	2.6197E+01	5.654E-09	1.832E+04	2.6097E+01	5.441E-09	1.761E+04
1s 5f <sup>3</sup> F <sub>2</sub>	1s 6p <sup>1</sup> P <sub>0</sub>	2.6638E+01	9.179E-13	2.876E+00			

(continued on next page)

Table 5 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s6p $^3P_0^o$	1s6p $^1P_1^o$	7.9973E+02	1.620E-06	5.631E+03	8.0416E+02	1.584E-06	5.402E+03
1s6p $^3P_1^o$	1s6p $^1P_1^o$	8.0906E+02	3.000E-06	1.019E+04	7.8043E+02	3.001E-06	1.086E+04
1s6p $^3P_2^o$	1s6p $^1P_1^o$	1.0374E+04	2.022E-07	4.177E+00	1.1592E+04	1.745E-07	2.864E+00
1s2 $^1S_0$	1s6d $^3D_1$	3.1620E-01	1.772E-08	3.939E+08	3.1497E-01	1.829E-08	4.066E+08
1s2s $^3S_1$	1s6d $^3D_1$	1.3668E+00	1.773E-09	2.110E+06	1.3611E+00	1.353E-09	1.610E+06
1s2s $^1S_0$	1s6d $^3D_1$	1.3798E+00	2.691E-09	3.142E+06	1.3741E+00	2.709E-09	3.163E+06
1s3s $^3S_1$	1s6d $^3D_1$	3.6740E+00	3.764E-10	6.199E+04	3.6587E+00	2.428E-10	3.998E+04
1s3s $^1S_0$	1s6d $^3D_1$	3.6986E+00	4.789E-10	7.785E+04	3.6835E+00	4.807E-10	7.811E+04
1s3d $^3D_2$	1s6d $^3D_1$	3.8389E+00	3.667E-09	5.532E+05	3.8228E+00	2.842E-09	4.287E+05
1s3d $^3D_1$	1s6d $^3D_1$	3.8407E+00	1.459E-08	2.199E+06	3.8246E+00	1.456E-08	2.194E+06
1s3d $^1D_2$	1s6d $^3D_1$	3.8842E+00	3.313E-08	4.882E+06	3.8678E+00	3.359E-08	4.950E+06
1s4s $^3S_1$	1s6d $^3D_1$	8.8149E+00	9.426E-11	2.697E+03	8.7785E+00	4.075E-11	1.165E+03
1s4s $^1S_0$	1s6d $^3D_1$	8.8722E+00	8.005E-11	2.261E+03	8.8361E+00	7.985E-11	2.254E+03
1s4d $^3D_2$	1s6d $^3D_1$	9.2124E+00	2.076E-09	5.438E+04	9.1748E+00	1.393E-09	3.648E+04
1s4d $^3D_1$	1s6d $^3D_1$	9.2166E+00	7.395E-09	1.936E+05	9.1789E+00	7.377E-09	1.930E+05
1s4d $^1D_2$	1s6d $^3D_1$	9.3230E+00	3.684E-08	9.425E+05	9.2846E+00	3.736E-08	9.555E+05
1s5s $^3S_1$	1s6d $^3D_1$	2.4577E+01	3.235E-11	1.191E+02			
1s5s $^1S_0$	1s6d $^3D_1$	2.4800E+01	7.939E-12	2.870E+01	2.4701E+01	8.057E-12	2.911E+01
1s5d $^3D_2$	1s6d $^3D_1$	2.6180E+01	1.194E-09	3.875E+03	2.6079E+01	5.867E-10	1.901E+03
1s5d $^3D_1$	1s6d $^3D_1$	2.6197E+01	3.318E-09	1.075E+04	2.6096E+01	3.305E-09	1.069E+04
1s5d $^1D_2$	1s6d $^3D_1$	2.6640E+01	5.090E-08	1.595E+05	2.6536E+01	5.161E-08	1.616E+05
1s6s $^3S_1$	1s6d $^3D_1$	6.8911E+02	1.701E-10	7.963E-01	6.7829E+02	9.027E-13	4.325E-03
1s6s $^1S_0$	1s6d $^3D_1$	8.0550E+02	2.477E-12	8.489E-03	7.7225E+02	1.588E-12	5.871E-03
1s6d $^3D_2$	1s6d $^3D_1$	7.1428E+04	1.286E-07	5.604E-02			
1s3d $^3D_2$	1s6d $^3D_3$	3.8337E+00	1.524E-08	9.880E+05	3.8174E+00	1.528E-08	9.910E+05
1s3d $^3D_3$	1s6d $^3D_3$	3.8772E+00	1.259E-07	7.984E+06	3.8607E+00	1.258E-07	7.977E+06
1s3d $^1D_2$	1s6d $^3D_3$	3.8789E+00	5.579E-09	3.533E+05	3.8624E+00	6.223E-09	3.941E+05
1s4d $^3D_2$	1s6d $^3D_3$	9.1827E+00	2.734E-08	3.090E+05	9.1440E+00	2.741E-08	3.097E+05
1s4d $^3D_3$	1s6d $^3D_3$	9.2881E+00	6.413E-08	7.083E+05	9.2486E+00	6.411E-08	7.081E+05
1s4d $^1D_2$	1s6d $^3D_3$	9.2925E+00	2.601E-09	2.870E+04	9.2530E+00	3.101E-09	3.422E+04
1s5d $^3D_2$	1s6d $^3D_3$	2.5941E+01	5.300E-08	7.505E+04	2.5832E+01	5.314E-08	7.524E+04
1s5d $^3D_3$	1s6d $^3D_3$	2.6374E+01	2.886E-08	3.954E+04	2.6261E+01	2.878E-08	3.944E+04
1s5d $^1D_2$	1s6d $^3D_3$	2.6393E+01	9.368E-10	1.281E+03	2.6280E+01	1.329E-09	1.818E+03
1s5g $^3G_4$	1s6d $^3D_3$	2.6602E+01	1.073E-13	1.445E-01			
1s5g $^3G_3$	1s6d $^3D_3$	2.6608E+01	3.697E-15	4.976E-03			
1s5g $^1G_4$	1s6d $^3D_3$	2.6739E+01	2.636E-18	3.513E-06			
1s6d $^3D_2$	1s6d $^3D_3$	2.7340E+03	4.169E-06	5.314E+02	2.7456E+03	4.164E-06	5.219E+02
1s2p $^3P_0^o$	1s6f $^3F_3^o$	1.4401E+00	1.195E-08	5.491E+06	1.4340E+00	1.080E-08	4.965E+06
1s3p $^3P_0^o$	1s6f $^3F_3^o$	3.8237E+00	9.083E-10	5.920E+04	3.8077E+00	9.348E-10	6.092E+04
1s4p $^3P_0^o$	1s6f $^3F_3^o$	9.1585E+00	7.725E-10	8.776E+03	9.1192E+00	7.636E-10	8.676E+03
1s4f $^3F_3^o$	1s6f $^3F_3^o$	9.2892E+00	1.742E-09	1.924E+04	9.2496E+00	2.338E-08	2.582E+05
1s4f $^3F_2^o$	1s6f $^3F_3^o$	9.2914E+00	6.431E-08	7.099E+05	9.2518E+00	1.172E-09	1.294E+04
1s4f $^3F_4^o$	1s6f $^3F_3^o$	9.3423E+00	1.585E-08	1.731E+05	9.3023E+00	1.577E-08	1.722E+05
1s4f $^1F_3^o$	1s6f $^3F_3^o$	9.3440E+00	5.753E-10	6.279E+03	9.3039E+00	6.071E-10	6.627E+03
1s5p $^3P_2^o$	1s6f $^3F_3^o$	2.5841E+01	2.188E-10	3.122E+02	2.5726E+01	2.180E-10	3.112E+02
1s5f $^3F_3^o$	1s6f $^3F_3^o$	2.6377E+01	2.923E-09	4.004E+03	2.6263E+01	1.627E-08	2.228E+04
1s5f $^3F_2^o$	1s6f $^3F_3^o$	2.6386E+01	5.326E-08	7.290E+04	2.6272E+01	6.180E-10	1.119E+03
1s5f $^3F_4^o$	1s6f $^3F_3^o$	2.6597E+01	2.772E-08	3.733E+04	2.6482E+01	2.755E-08	3.712E+04
1s5f $^1F_3^o$	1s6f $^3F_3^o$	2.6604E+01	1.038E-09	1.397E+03	2.6488E+01	1.044E-09	1.406E+03
1s6p $^3P_2^o$	1s6f $^3F_3^o$	2.1987E+03	5.085E-12	1.002E-03	2.1353E+03	1.018E-12	2.110E-04
1s2p $^3P_0^o$	1s6f $^3F_2^o$	1.3779E+00	1.521E-11	1.069E+04	1.3722E+00	8.594E-12	6.038E+03
1s2p $^3P_2^o$	1s6f $^3F_2^o$	1.4401E+00	7.687E-10	4.945E+05	1.4340E+00	7.719E-10	4.965E+05
1s2p $^1P_0^o$	1s6f $^3F_2^o$	1.4459E+00	7.214E-09	4.603E+06	1.4400E+00	7.095E-09	4.526E+06
1s3p $^3P_0^o$	1s6f $^3F_2^o$	3.6920E+00	2.140E-12	2.094E+02	3.6768E+00	9.298E-13	9.098E+01
1s3p $^3P_2^o$	1s6f $^3F_2^o$	3.8236E+00	8.615E-11	7.861E+03	3.8077E+00	6.677E-11	6.092E+03
1s3p $^1P_0^o$	1s6f $^3F_2^o$	3.8353E+00	6.057E-10	5.493E+04	3.8195E+00	5.957E-10	5.401E+04
1s4p $^3P_0^o$	1s6f $^3F_2^o$	8.8404E+00	1.764E-12	3.011E+01			
1s4p $^3P_2^o$	1s6f $^3F_2^o$	9.1578E+00	7.183E-11	1.143E+03	9.1192E+00	5.527E-11	8.792E+02
1s4p $^1P_0^o$	1s6f $^3F_2^o$	9.1856E+00	5.112E-10	8.083E+03	9.1472E+00	4.920E-10	7.779E+03
1s4f $^3F_3^o$	1s6f $^3F_2^o$	9.2886E+00	6.731E-08	1.041E+06	9.2496E+00	1.186E-09	1.833E+04
1s4f $^3F_2^o$	1s6f $^3F_2^o$	9.2908E+00	6.173E-08	9.540E+05	9.2518E+00	1.637E-08	2.530E+05
1s4f $^1F_3^o$	1s6f $^3F_2^o$	9.3433E+00	1.148E-08	1.754E+05	9.3039E+00	1.167E-08	1.783E+05
1s5p $^3P_0^o$	1s6f $^3F_2^o$	2.4566E+01	8.810E-13	1.948E+00			
1s5p $^3P_2^o$	1s6f $^3F_2^o$	2.5836E+01	2.337E-11	4.672E+01	2.5726E+01	1.599E-11	3.195E+01
1s5p $^1P_0^o$	1s6f $^3F_2^o$	2.5948E+01	1.502E-10	2.975E+02	2.5839E+01	1.421E-10	2.815E+02
1s5f $^3F_3^o$	1s6f $^3F_2^o$	2.6372E+01	5.803E-08	1.113E+05	2.6263E+01	8.311E-10	1.593E+03
1s5f $^3F_2^o$	1s6f $^3F_2^o$	2.6381E+01	4.801E-08	9.203E+04	2.6272E+01	1.140E-08	2.184E+04
1s5f $^1F_3^o$	1s6f $^3F_2^o$	2.6599E+01	2.011E-08	3.793E+04	2.6489E+01	2.040E-08	3.845E+04
1s6p $^3P_0^o$	1s6f $^3F_2^o$	6.1864E+02	2.732E-12	9.524E-03	6.1520E+02	4.924E-15	1.721E-05
1s6p $^3P_2^o$	1s6f $^3F_2^o$	2.1625E+03	7.609E-12	2.171E-03	2.1357E+03	7.272E-14	2.109E-05
1s6p $^1P_0^o$	1s6f $^3F_2^o$	2.7321E+03	7.961E-14	1.423E-05	2.6181E+03	5.329E-13	1.028E-04

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Table 5 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )	$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.3144E+05	9.863E-08	7.617E-03			
1s 2s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	1.3661E+00	5.469E-12	3.909E+03	1.3604E+00	9.449E-13	6.754E+02
1s 3s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	3.6690E+00	3.296E-12	3.266E+02			
1s 3d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	3.8335E+00	1.210E-09	1.098E+05	3.8174E+00	1.142E-09	1.037E+05
1s 3d <sup>3</sup> D <sub>1</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	3.8353E+00	9.479E-09	8.597E+05	3.8191E+00	9.644E-09	8.746E+05
1s 3d <sup>3</sup> D <sub>3</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	3.8770E+00	7.265E-09	6.447E+05	3.8606E+00	6.726E-09	5.969E+05
1s 3d <sup>1</sup> D <sub>2</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	3.8787E+00	8.796E-08	7.800E+06	3.8623E+00	8.773E-08	7.779E+06
1s 4s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	8.7865E+00	2.542E-12	4.392E+01			
1s 4d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	9.1814E+00	2.104E-09	3.330E+04	9.1435E+00	1.965E-09	3.109E+04
1s 4d <sup>3</sup> D <sub>1</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	9.1855E+00	1.712E-08	2.707E+05	9.1476E+00	1.742E-08	2.753E+05
1s 4d <sup>3</sup> D <sub>3</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	9.2868E+00	3.981E-09	6.158E+04	9.2482E+00	3.535E-09	5.468E+04
1s 4d <sup>1</sup> D <sub>2</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	9.2911E+00	4.489E-08	6.938E+05	9.2526E+00	4.466E-08	6.900E+05
1s 5s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	2.4357E+01	3.021E-12	6.793E+00			
1s 5d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	2.5931E+01	4.067E-09	8.068E+03	2.5828E+01	3.787E-09	7.509E+03
1s 5d <sup>3</sup> D <sub>1</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	2.5947E+01	3.338E-08	6.614E+04	2.5844E+01	3.395E-08	6.723E+04
1s 5d <sup>3</sup> D <sub>3</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	2.6363E+01	2.106E-09	4.043E+03	2.6257E+01	1.705E-09	3.271E+03
1s 5d <sup>1</sup> D <sub>2</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	2.6382E+01	2.022E-08	3.875E+04	2.6276E+01	2.001E-08	3.834E+04
1s 5g <sup>3</sup> G <sub>3</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	2.6597E+01	7.626E-14	1.438E-01			
1s 6s <sup>3</sup> S <sub>1</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	5.4990E+02	3.558E-11	1.570E-01			
1s 6d <sup>3</sup> D <sub>2</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	2.6222E+03	3.081E-07	5.978E+01	2.7042E+03	2.977E-07	5.385E+01
1s 6d <sup>3</sup> D <sub>1</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	2.7221E+03	2.629E-06	4.733E+02	2.6795E+03	2.626E-06	4.838E+02
1s 6d <sup>3</sup> D <sub>3</sub>	1s 6d <sup>1</sup> D <sub>2</sub>	6.4120E+04	8.705E-08	2.825E-02			
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.2736E+00	3.992E-09	3.440E+04	9.2341E+00	3.977E-09	3.427E+04
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	9.3265E+00	6.690E-08	5.701E+05	9.2866E+00	7.168E-08	6.107E+05
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	9.3281E+00	2.991E-09	2.548E+04	9.2883E+00	2.060E-09	1.755E+04
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	2.6252E+01	1.288E-08	1.385E+04	2.6139E+01	1.283E-08	1.380E+04
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	2.6469E+01	4.726E-08	4.999E+04	2.6355E+01	4.994E-08	5.283E+04
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	2.6476E+01	1.811E-09	1.915E+03	2.6362E+01	1.444E-09	1.527E+03
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	5.5078E+03	2.817E-06	6.883E+01	5.5226E+03	2.808E-06	6.766E+01
1s 3d <sup>3</sup> D <sub>3</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	3.8744E+00	5.198E-09	2.567E+05	3.8580E+00	5.256E-09	2.595E+05
1s 4d <sup>3</sup> D <sub>3</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	9.2719E+00	2.896E-10	2.497E+03	9.2332E+00	2.894E-10	2.494E+03
1s 5d <sup>3</sup> D <sub>3</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6244E+01	5.638E-10	6.067E+02	2.6137E+01	5.631E-10	6.057E+02
1s 5g <sup>3</sup> G <sub>4</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6470E+01	2.319E-08	2.453E+04	2.6356E+01	2.313E-08	2.447E+04
1s 5g <sup>3</sup> G <sub>3</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6475E+01	5.258E-10	5.560E+02	2.6361E+01	6.612E-10	6.992E+02
1s 5g <sup>3</sup> G <sub>5</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6601E+01	1.013E-08	1.061E+04	2.6487E+01	1.007E-08	1.054E+04
1s 5g <sup>1</sup> G <sub>4</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6605E+01	2.379E-10	2.491E+02	2.6491E+01	2.376E-10	2.489E+02
1s 6d <sup>3</sup> D <sub>3</sub>	1s 6g <sup>3</sup> G <sub>4</sub>	5.3075E+03	2.734E-13	7.194E-06	5.5194E+03	2.107E-13	5.082E-06
1s 3d <sup>3</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	3.8309E+00	3.305E-13	2.146E+01			
1s 3d <sup>3</sup> D <sub>3</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	3.8743E+00	2.294E-10	1.456E+04	3.8580E+00	1.946E-10	1.235E+04
1s 3d <sup>1</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	3.8760E+00	3.937E-09	2.497E+05	3.8597E+00	3.902E-09	2.474E+05
1s 4d <sup>3</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	9.1665E+00	1.291E-14	1.464E-01			
1s 4d <sup>3</sup> D <sub>3</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	9.2715E+00	1.119E-11	1.241E+02	9.2332E+00	1.071E-11	1.187E+02
1s 4d <sup>1</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	9.2759E+00	2.148E-10	2.379E+03	9.2375E+00	2.140E-10	2.370E+03
1s 5d <sup>3</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	2.5812E+01	5.221E-14	7.467E-02			
1s 5d <sup>3</sup> D <sub>3</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6241E+01	2.382E-11	3.297E+01	2.6137E+01	2.088E-11	2.888E+01
1s 5d <sup>1</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6259E+01	4.243E-10	5.863E+02	2.6155E+01	4.177E-10	5.769E+02
1s 5g <sup>3</sup> G <sub>4</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6467E+01	8.195E-10	1.115E+03	2.6356E+01	6.700E-10	9.112E+02
1s 5g <sup>3</sup> G <sub>3</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6472E+01	1.789E-08	2.432E+04	2.6361E+01	1.785E-08	2.427E+04
1s 5g <sup>1</sup> G <sub>4</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6602E+01	7.974E-09	1.074E+04	2.6491E+01	8.002E-09	1.077E+04
1s 6d <sup>3</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	1.7904E+03	5.103E-15	1.517E-06	1.8335E+03	6.550E-17	1.841E-08
1s 6d <sup>3</sup> D <sub>3</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	5.1873E+03	1.899E-15	6.726E-08	5.5194E+03	7.803E-15	2.420E-07
1s 6d <sup>1</sup> D <sub>2</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	5.6439E+03	1.309E-13	3.915E-06	5.6946E+03	1.512E-13	4.406E-06
1s 6g <sup>3</sup> G <sub>4</sub>	1s 6g <sup>3</sup> G <sub>3</sub>	2.2908E+05	6.999E-08	1.271E-03			
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.4397E+00	7.159E-13	3.291E+02	1.4336E+00	3.610E-15	1.659E+00
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	3.8210E+00	4.243E-14	2.769E+00	3.8051E+00	3.132E-16	2.044E-02
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	9.1428E+00	9.110E-14	1.038E+00			
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	9.2731E+00	1.854E-10	2.055E+03	9.2341E+00	1.626E-10	1.802E+03
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	9.2753E+00	2.969E-09	3.289E+04	9.2363E+00	2.951E-09	3.269E+04
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	9.3260E+00	3.495E-09	3.829E+04	9.2866E+00	2.054E-09	2.250E+04
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	9.3276E+00	5.878E-08	6.437E+05	9.2883E+00	5.528E-08	6.054E+05
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.5717E+01	9.470E-14	1.365E-01			
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.6248E+01	5.478E-10	7.577E+02	2.6139E+01	4.968E-10	6.870E+02
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.6257E+01	9.502E-09	1.313E+04	2.6148E+01	9.514E-09	1.314E+04
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.6465E+01	2.429E-09	3.305E+03	2.6355E+01	1.434E-09	1.950E+03
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.6472E+01	4.062E-08	5.523E+04	2.6362E+01	3.850E-08	5.234E+04
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.5574E+03	1.960E-12	6.799E-04			
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	5.3394E+03	1.078E-07	3.603E+00	5.5188E+03	1.040E-07	3.227E+00
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	5.5655E+03	2.080E-06	6.399E+01	5.5161E+03	2.078E-06	6.453E+01
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.7466E+05	5.173E-08	1.616E-03			
1s 5g <sup>3</sup> G <sub>4</sub>	1s 6g <sup>3</sup> G <sub>5</sub>	2.6394E+01	3.048E-09	2.653E+03	2.6281E+01	3.041E-09	2.647E+03
1s 5g <sup>3</sup> G <sub>5</sub>	1s 6g <sup>3</sup> G <sub>5</sub>	2.6525E+01	5.550E-08	4.783E+04	2.6411E+01	5.531E-08	4.767E+04

(continued on next page)



Table 5 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s 5g $^1G_4$	1s 6g $^3G_5$	2.6529E+01	9.023E-10	7.774E+02	2.6415E+01	1.031E-09	8.883E+02
1s 6g $^3G_4$	1s 6g $^3G_5$	9.2456E+03	2.127E-06	1.509E+01	9.2559E+03	2.122E-06	1.489E+01
1s 4f $^3F_4^o$	1s 6h $^3H_5^o$	9.3170E+00	2.422E-09	1.692E+04	9.2773E+00	2.373E-09	1.658E+04
1s 5f $^3F_4^o$	1s 6h $^3H_5^o$	2.6394E+01	7.696E-10	6.699E+02	2.6281E+01	7.530E-10	6.555E+02
1s 6f $^3F_4^o$	1s 6h $^3H_5^o$	9.2055E+03	4.621E-14	3.307E-07	9.2780E+03	4.284E-14	2.992E-07
1s 4f $^3F_3^o$	1s 6h $^3H_4^o$	9.2640E+00	8.889E-15	7.676E-02			
1s 4f $^3F_4^o$	1s 6h $^3H_4^o$	9.3168E+00	6.293E-11	5.373E+02	9.2773E+00	5.395E-11	4.606E+02
1s 4f $^1F_3^o$	1s 6h $^3H_4^o$	9.3184E+00	1.950E-09	1.664E+04	9.2790E+00	1.890E-09	1.613E+04
1s 5f $^3F_3^o$	1s 6h $^3H_4^o$	2.6175E+01	1.242E-15	1.343E-03			
1s 5f $^3F_4^o$	1s 6h $^3H_4^o$	2.6392E+01	2.026E-11	2.156E+01	2.6281E+01	1.711E-11	1.820E+01
1s 5f $^1F_3^o$	1s 6h $^3H_4^o$	2.6398E+01	6.215E-10	6.610E+02	2.6287E+01	5.992E-10	6.372E+02
1s 6f $^3F_3^o$	1s 6h $^3H_4^o$	3.4128E+03	1.701E-18	1.082E-10			
1s 6f $^3F_4^o$	1s 6h $^3H_4^o$	8.9725E+03	8.514E-16	7.838E-09	9.2780E+03	9.738E-16	8.313E-09
1s 6f $^1F_3^o$	1s 6h $^3H_4^o$	9.4584E+03	3.479E-14	2.882E-07	9.2889E+03	3.404E-14	2.899E-07
1s 6h $^3H_5^o$	1s 6h $^3H_4^o$	3.5443E+05	5.462E-08	3.222E-04			
1s 3d $^3D_3$	1s 6g $^1G_4$	3.8727E+00	9.494E-14	4.692E+00			
1s 4d $^3D_3$	1s 6g $^1G_4$	9.2623E+00	1.894E-17	1.636E-04			
1s 5d $^3D_3$	1s 6g $^1G_4$	2.6167E+01	4.856E-15	5.256E-03			
1s 5g $^3G_4$	1s 6g $^1G_4$	2.6392E+01	7.790E-11	8.290E+01	2.6281E+01	7.613E-11	8.100E+01
1s 5g $^3G_3$	1s 6g $^1G_4$	2.6397E+01	2.401E-09	2.553E+03	2.6286E+01	2.423E-09	2.577E+03
1s 5g $^3G_5$	1s 6g $^1G_4$	2.6522E+01	1.155E-09	1.217E+03	2.6411E+01	1.079E-09	1.079E+03
1s 5g $^1G_4$	1s 6g $^1G_4$	2.6527E+01	4.522E-08	4.763E+04	2.6415E+01	4.506E-08	4.745E+04
1s 6d $^3D_3$	1s 6g $^1G_4$	3.3331E+03	4.467E-15	2.980E-07			
1s 6g $^3G_4$	1s 6g $^1G_4$	8.9597E+03	4.990E-08	4.607E-01	9.2558E+03	4.823E-08	4.137E-01
1s 6g $^3G_3$	1s 6g $^1G_4$	9.3244E+03	1.689E-06	1.440E+01	9.2557E+03	1.688E-06	1.448E+01
1s 6g $^3G_5$	1s 6g $^1G_4$	2.8974E+05	4.257E-08	3.758E-04			
1s 6h $^3H_5^o$	1s 6h $^3H_6^o$	1.3919E+04	1.709E-06	4.525E+00	1.3932E+04	1.704E-06	4.466E+00
1s 4f $^3F_4^o$	1s 6h $^1H_5^o$	9.3106E+00	2.276E-14	1.592E-01			
1s 5f $^3F_4^o$	1s 6h $^1H_5^o$	2.6342E+01	3.217E-15	2.811E-03			
1s 6f $^3F_4^o$	1s 6h $^1H_5^o$	5.4702E+03	1.230E-18	2.493E-11			
1s 6h $^3H_5^o$	1s 6h $^1H_5^o$	1.3481E+04	2.713E-08	9.052E-02	1.3932E+04	2.621E-08	8.121E-02
1s 6h $^3H_4^o$	1s 6h $^1H_5^o$	1.4014E+04	1.418E-06	4.378E+00	1.3932E+04	1.415E-06	4.385E+00
1s 6h $^3H_6^o$	1s 6h $^1H_5^o$	4.2819E+05	3.644E-08	1.205E-04			
1s <sup>2</sup> $^1S_0$	1s 7s $^3S_1$	3.1410E-01	6.926E-07	1.561E+10	3.1278E-01	6.900E-07	1.554E+10
1s 2s $^3S_1$	1s 7s $^3S_1$	1.3268E+00	5.679E-08	7.173E+07	1.3212E+00	5.741E-08	7.251E+07
1s 2s $^1S_0$	1s 7s $^3S_1$	1.3390E+00	3.028E-08	3.755E+07	1.3335E+00	2.894E-08	3.588E+07
1s 3s $^3S_1$	1s 7s $^3S_1$	3.3983E+00	1.255E-08	2.417E+06	3.3842E+00	1.249E-08	2.405E+06
1s 3s $^1S_0$	1s 7s $^3S_1$	3.4193E+00	6.643E-09	1.263E+06	3.4054E+00	6.283E-09	1.194E+06
1s 3d $^3D_2$	1s 7s $^3S_1$	3.5389E+00	1.439E-13	2.554E+01			
1s 3d $^3D_1$	1s 7s $^3S_1$	3.5404E+00	4.644E-12	8.237E+02			
1s 3d $^1D_2$	1s 7s $^3S_1$	3.5774E+00	7.601E-13	1.321E+02			
1s 4s $^3S_1$	1s 7s $^3S_1$	7.3787E+00	4.062E-09	1.659E+05	7.3486E+00	4.055E-09	1.655E+05
1s 4s $^1S_0$	1s 7s $^3S_1$	7.4188E+00	2.370E-09	9.573E+04	7.3889E+00	2.038E-09	8.229E+04
1s 4d $^3D_2$	1s 7s $^3S_1$	7.6552E+00	5.626E-13	2.135E+01	7.6242E+00	2.363E-12	8.964E+01
1s 4d $^3D_1$	1s 7s $^3S_1$	7.6581E+00	6.580E-12	2.495E+02			
1s 4d $^1D_2$	1s 7s $^3S_1$	7.7314E+00	9.050E-13	3.366E+01			
1s 5s $^3S_1$	1s 7s $^3S_1$	1.5931E+01	1.585E-09	1.389E+04	1.5867E+01	1.594E-09	1.396E+04
1s 5s $^1S_0$	1s 7s $^3S_1$	1.6025E+01	1.087E-09	9.413E+03	1.5961E+01	8.018E-10	6.938E+03
1s 5d $^3D_2$	1s 7s $^3S_1$	1.6590E+01	5.370E-13	4.338E+00	1.6526E+01	2.554E-12	2.062E+01
1s 5d $^3D_1$	1s 7s $^3S_1$	1.6597E+01	8.216E-12	6.632E+01	1.6532E+01	6.071E-13	4.897E+00
1s 5d $^1D_2$	1s 7s $^3S_1$	1.6773E+01	1.120E-12	8.850E+00			
1s 6s $^3S_1$	1s 7s $^3S_1$	4.2495E+01	6.431E-10	7.918E+02	4.2299E+01	6.487E-10	7.993E+02
1s 6s $^1S_0$	1s 7s $^3S_1$	4.2877E+01	5.937E-10	7.180E+02	4.2623E+01	3.267E-10	3.965E+02
1s 6d $^3D_2$	1s 7s $^3S_1$	4.5259E+01	1.365E-13	1.482E-01	4.5119E+01	2.252E-12	2.439E+00
1s 6d $^3D_1$	1s 7s $^3S_1$	4.5288E+01	1.227E-11	1.330E+01	4.5112E+01	4.512E-13	4.887E-01
1s 6d $^1D_2$	1s 7s $^3S_1$	4.6054E+01	1.888E-12	1.980E+00			
1s 2p $^3P_0^o$	1s 7p $^3P_0^o$	1.3376E+00	1.508E-08	1.873E+07	1.3321E+00	1.333E-08	1.656E+07
1s 2p $^3P_1^o$	1s 7p $^3P_1^o$	1.3385E+00	4.191E-09	5.202E+06	1.3329E+00	8.068E-09	1.001E+07
1s 2p $^3P_2^o$	1s 7p $^3P_2^o$	1.3961E+00	2.546E-07	2.904E+08	1.3903E+00	2.530E-07	2.886E+08
1s 2p $^1P_1^o$	1s 7p $^3P_1^o$	1.4017E+00	5.769E-08	6.529E+07	1.3959E+00	5.678E-08	6.424E+07
1s 3p $^3P_0^o$	1s 7p $^3P_0^o$	3.4164E+00	5.090E-09	9.696E+05	3.4024E+00	3.619E-09	6.892E+05
1s 3p $^3P_1^o$	1s 7p $^3P_1^o$	3.4179E+00	9.304E-10	1.771E+05	3.4038E+00	2.752E-09	5.236E+05
1s 3p $^3P_2^o$	1s 7p $^3P_2^o$	3.5289E+00	1.888E-07	3.370E+07	3.5142E+00	1.914E-07	3.417E+07
1s 3p $^1P_1^o$	1s 7p $^3P_1^o$	3.5388E+00	4.200E-08	7.456E+06	3.5243E+00	4.122E-08	7.316E+06
1s 4p $^3P_0^o$	1s 7p $^3P_0^o$	7.4094E+00	2.361E-09	9.563E+04	7.3785E+00	1.251E-09	5.067E+04
1s 4p $^3P_1^o$	1s 7p $^3P_1^o$	7.4122E+00	1.525E-10	6.170E+03	7.3811E+00	1.273E-09	5.152E+04
1s 4p $^3P_2^o$	1s 7p $^3P_2^o$	7.6311E+00	1.667E-07	6.363E+06	7.5991E+00	1.690E-07	6.451E+06
1s 4p $^1P_1^o$	1s 7p $^3P_0^o$	7.6504E+00	3.684E-08	1.400E+06	7.6186E+00	3.546E-08	1.347E+06
1s 4f $^3F_2^o$	1s 7p $^3P_1^o$	7.7232E+00	3.851E-14	1.436E+00			
1s 5p $^3P_0^o$	1s 7p $^3P_0^o$	1.5987E+01	1.514E-09	1.317E+04	1.5920E+01	4.931E-10	4.289E+03
1s 5p $^3P_1^o$	1s 7p $^3P_1^o$	1.5993E+01	6.465E-13	5.620E+00	1.5926E+01	7.581E-10	6.589E+03

(continued on next page)

Table 5 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )	$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.6515E+01	1.788E-07	1.458E+06	1.6446E+01	1.815E-07	1.480E+06
1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.6561E+01	3.921E-08	3.179E+05	1.6492E+01	3.741E-08	3.033E+05
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.6736E+01	7.663E-14	6.083E-01			
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.2622E+01	1.096E-09	1.342E+03	4.2444E+01	2.699E-10	3.304E+02
1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.2648E+01	5.644E-11	6.899E+01	4.2376E+01	6.084E-10	7.470E+02
1s 6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4826E+01	2.721E-07	3.011E+05	4.4636E+01	2.777E-07	3.073E+05
1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.5021E+01	5.950E-08	6.527E+04	4.4809E+01	5.628E-08	6.180E+04
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	4.5775E+01	1.568E-13	1.663E-01			
1s 2s <sup>3</sup> S <sub>1</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	1.3266E+00	2.842E-08	1.077E+08	1.3210E+00	2.870E-08	1.087E+08
1s 3s <sup>3</sup> S <sub>1</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	3.3968E+00	5.855E-09	3.385E+06	3.3830E+00	6.245E-09	3.609E+06
1s 3d <sup>3</sup> D <sub>1</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	3.5388E+00	6.161E-13	3.281E+02			
1s 4s <sup>3</sup> S <sub>1</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	7.3716E+00	1.719E-09	2.110E+05	7.3425E+00	2.026E-09	2.485E+05
1s 4d <sup>3</sup> D <sub>1</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	7.6504E+00	8.796E-13	1.002E+02	7.6206E+00	8.205E-13	9.344E+01
1s 5s <sup>3</sup> S <sub>1</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	1.5898E+01	5.646E-10	1.490E+04	1.5839E+01	7.961E-10	2.098E+04
1s 5d <sup>3</sup> D <sub>1</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	1.6561E+01	9.135E-13	2.222E+01	1.6502E+01	9.451E-13	2.295E+01
1s 6s <sup>3</sup> S <sub>1</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	4.2259E+01	1.431E-10	5.345E+02	4.2100E+01	3.228E-10	1.204E+03
1s 6d <sup>3</sup> D <sub>1</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	4.5020E+01	8.016E-13	2.638E+00	4.4886E+01	9.411E-13	3.089E+00
1s 7s <sup>3</sup> S <sub>1</sub>	1s 7s <sup>1</sup> S <sub>0</sub>	7.6139E+03	4.456E-09	5.128E-01	8.9405E+03	3.689E-09	3.052E-01
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3376E+00	5.365E-09	2.000E+07	1.3321E+00	4.432E-09	1.652E+07
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.4016E+00	1.035E-07	3.514E+08	1.3959E+00	1.057E-07	3.589E+08
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.4163E+00	1.518E-09	8.674E+05	3.4026E+00	9.937E-10	5.676E+05
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	3.5387E+00	7.620E-08	4.059E+07	3.5246E+00	7.860E-08	4.184E+07
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.4089E+00	4.150E-10	5.042E+04	7.3797E+00	2.397E-10	2.912E+04
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	7.6499E+00	6.694E-08	7.630E+06	7.6199E+00	6.869E-08	7.824E+06
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.5984E+01	8.383E-11	2.189E+03	1.5926E+01	3.891E-11	1.014E+03
1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.6558E+01	7.163E-08	1.743E+06	1.6498E+01	7.327E-08	1.780E+06
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.2605E+01	7.779E-12	2.859E+01	4.2486E+01	2.961E-11	1.085E+02
1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.5003E+01	1.090E-07	3.590E+05	4.4856E+01	1.112E-07	3.657E+05
1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.1050E+05	4.339E-08	2.370E-02			
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3363E+00	1.183E-07	8.840E+07	1.3308E+00	1.215E-07	9.078E+07
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3947E+00	1.912E-07	1.311E+08	1.3889E+00	1.835E-07	1.258E+08
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.4002E+00	1.400E-08	9.523E+06	1.3944E+00	1.676E-08	1.140E+07
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.4080E+00	1.229E-07	1.412E+07	3.3940E+00	1.242E-07	1.427E+07
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.5199E+00	5.498E-08	5.921E+06	3.5053E+00	5.309E-08	5.715E+06
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	3.5298E+00	2.478E-09	2.654E+05	3.5153E+00	4.084E-09	4.372E+05
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.3699E+00	1.253E-07	3.077E+06	7.3391E+00	1.273E-07	3.128E+06
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.5892E+00	2.251E-08	5.215E+05	7.5574E+00	1.936E-08	4.484E+05
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	7.6083E+00	2.879E-10	6.635E+03	7.5766E+00	1.124E-09	2.590E+04
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.6787E+00	4.986E-18	1.128E-04			
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.6803E+00	4.502E-16	1.018E-02			
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.7161E+00	5.132E-15	1.150E-01			
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.5804E+01	1.465E-07	7.824E+05	1.5738E+01	1.489E-07	7.952E+05
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6320E+01	1.116E-08	5.589E+04	1.6251E+01	8.133E-09	4.073E+04
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6364E+01	2.116E-11	1.054E+02	1.6297E+01	2.649E-10	1.319E+03
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6532E+01	1.343E-13	6.555E-01			
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6535E+01	4.833E-14	2.358E-01			
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6621E+01	1.386E-14	6.691E-02			
1s 6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.1345E+01	2.311E-07	1.803E+05	4.1174E+01	2.351E-07	1.834E+05
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.3416E+01	5.959E-09	4.217E+03	4.3234E+01	3.466E-09	2.452E+03
1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.3599E+01	5.062E-10	3.553E+02			
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4291E+01	5.946E-13	4.044E-01			
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4306E+01	2.356E-13	1.601E-01			
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4661E+01	3.239E-14	2.166E-02			
1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3800E+03	5.054E-06	3.541E+03	1.3760E+03	5.105E-06	3.566E+03
1s 2s <sup>3</sup> S <sub>1</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	1.3252E+00	3.914E-09	2.974E+06	1.3196E+00	4.084E-09	3.102E+06
1s 3s <sup>3</sup> S <sub>1</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	3.3879E+00	7.078E-10	8.227E+04	3.3736E+00	7.633E-10	8.872E+04
1s 3d <sup>3</sup> D <sub>2</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	3.5276E+00	1.603E-08	1.718E+06	3.5127E+00	1.599E-08	1.714E+06
1s 3d <sup>3</sup> D <sub>1</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	3.5291E+00	1.400E-09	1.499E+05	3.5142E+00	1.857E-09	1.989E+05
1s 3d <sup>3</sup> D <sub>3</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	3.5644E+00	2.985E-08	3.134E+06	3.5492E+00	2.966E-08	3.115E+06
1s 3d <sup>1</sup> D <sub>2</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	3.5659E+00	2.352E-09	2.468E+05	3.5507E+00	2.360E-09	2.476E+05
1s 4s <sup>3</sup> S <sub>1</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	7.3299E+00	1.241E-10	3.081E+03	7.2988E+00	1.467E-10	3.644E+03
1s 4d <sup>3</sup> D <sub>2</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	7.6027E+00	8.357E-09	1.929E+05	7.5707E+00	8.334E-09	1.923E+05
1s 4d <sup>3</sup> D <sub>1</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	7.6055E+00	6.426E-10	1.482E+04	7.5734E+00	9.979E-10	2.301E+04
1s 4d <sup>3</sup> D <sub>3</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	7.6748E+00	3.028E-08	6.858E+05	7.6422E+00	3.021E-08	6.842E+05
1s 4d <sup>1</sup> D <sub>2</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	7.6778E+00	2.362E-09	5.346E+04	7.6453E+00	2.315E-09	5.239E+04
1s 5s <sup>3</sup> S <sub>1</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	1.5705E+01	1.638E-11	8.860E+01	1.5637E+01	2.578E-11	1.395E+02
1s 5d <sup>3</sup> D <sub>2</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	1.6345E+01	4.113E-09	2.054E+04	1.6276E+01	4.090E-09	2.042E+04
1s 5d <sup>3</sup> D <sub>1</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	1.6352E+01	2.503E-10	1.249E+03	1.6283E+01	5.152E-10	2.570E+03
1s 5d <sup>3</sup> D <sub>3</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	1.6516E+01	3.236E-08	1.583E+05	1.6446E+01	3.234E-08	1.582E+05
1s 5d <sup>1</sup> D <sub>2</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	1.6523E+01	2.512E-09	1.227E+04	1.6453E+01	2.418E-09	1.181E+04
1s 5g <sup>3</sup> G <sub>3</sub>	1s 7d <sup>3</sup> D <sub>2</sub>	1.6607E+01	9.716E-18	4.700E-05			

(continued on next page)

Table 5 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	$gf$	$A$ (s <sup>-1</sup> )
1s6s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>2</sub>	4.0924E+01	1.212E-14	9.653E-03			
1s6d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>2</sub>	4.3482E+01	1.940E-09	1.369E+03	4.3306E+01	1.938E-09	1.367E+03
1s6d <sup>3</sup> D <sub>1</sub>	1s7d <sup>3</sup> D <sub>2</sub>	4.3508E+01	5.943E-11	4.188E+01	4.3299E+01	2.702E-10	1.906E+02
1s6d <sup>3</sup> D <sub>3</sub>	1s7d <sup>3</sup> D <sub>2</sub>	4.4184E+01	4.703E-08	3.214E+04	4.4000E+01	4.706E-08	3.215E+04
1s6d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>2</sub>	4.4215E+01	3.640E-09	2.484E+03	4.4010E+01	3.423E-09	2.338E+03
1s6g <sup>3</sup> G <sub>3</sub>	1s7d <sup>3</sup> D <sub>2</sub>	4.4564E+01	1.069E-16	7.182E-05			
1s7s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>2</sub>	1.1072E+03	3.819E-11	4.155E-02	1.0773E+03	1.749E-12	1.994E-03
1s <sup>2</sup> <sup>1</sup> S <sub>0</sub>	1s7d <sup>3</sup> D <sub>1</sub>	3.1400E-01	1.149E-08	2.591E+08	3.1269E-01	1.185E-08	2.673E+08
1s2s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.3252E+00	1.091E-09	1.381E+06	1.3196E+00	8.170E-10	1.034E+06
1s2s <sup>1</sup> S <sub>0</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.3373E+00	1.626E-09	2.021E+06	1.3319E+00	1.633E-09	2.029E+06
1s3s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	3.3878E+00	2.425E-10	4.698E+04	3.3737E+00	1.564E-10	3.030E+04
1s3s <sup>1</sup> S <sub>0</sub>	1s7d <sup>3</sup> D <sub>1</sub>	3.4087E+00	2.964E-10	5.672E+04	3.3947E+00	3.091E-10	5.914E+04
1s3d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	3.5275E+00	2.219E-09	3.966E+05	3.5127E+00	1.737E-09	3.104E+05
1s3d <sup>3</sup> D <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	3.5290E+00	8.898E-09	1.589E+06	3.5142E+00	8.895E-09	1.587E+06
1s3d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	3.5657E+00	1.895E-08	3.314E+06	3.5507E+00	1.928E-08	3.371E+06
1s4s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	7.3294E+00	6.510E-11	2.694E+03	7.2989E+00	3.075E-11	1.272E+03
1s4s <sup>1</sup> S <sub>0</sub>	1s7d <sup>3</sup> D <sub>1</sub>	7.3689E+00	5.760E-11	2.358E+03	7.3387E+00	6.006E-11	2.458E+03
1s4d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	7.6021E+00	1.263E-09	4.859E+04	7.5708E+00	8.803E-10	3.385E+04
1s4d <sup>3</sup> D <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	7.6050E+00	4.648E-09	1.787E+05	7.5736E+00	4.638E-09	1.782E+05
1s4d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	7.6772E+00	1.930E-08	7.282E+05	7.6454E+00	1.958E-08	7.388E+05
1s5s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.5703E+01	2.284E-11	2.060E+02	1.5638E+01	1.5638E-12	5.049E+01
1s5s <sup>1</sup> S <sub>0</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.5794E+01	1.050E-11	9.360E+01	1.5729E+01	1.078E-11	9.608E+01
1s5d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.6343E+01	7.197E-10	5.991E+03	1.6277E+01	4.166E-10	3.466E+03
1s5d <sup>3</sup> D <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.6349E+01	2.289E-09	1.904E+04	1.6283E+01	2.280E-09	1.895E+04
1s5d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.6521E+01	2.062E-08	1.679E+05	1.6453E+01	2.091E-08	1.703E+05
1s6s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	4.0910E+01	1.214E-11	1.613E+01			
1s6s <sup>1</sup> S <sub>0</sub>	1s7d <sup>3</sup> D <sub>1</sub>	4.1264E+01	7.813E-13	1.020E+00			
1s6d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	4.3465E+01	4.636E-10	5.456E+02	4.3310E+01	1.580E-10	1.857E+02
1s6d <sup>3</sup> D <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	4.3492E+01	1.079E-09	1.268E+03	4.3303E+01	1.072E-09	1.260E+03
1s6d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	4.4198E+01	2.990E-08	3.404E+04	4.4015E+01	3.037E-08	3.456E+04
1s7s <sup>3</sup> S <sub>1</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.0966E+03	1.138E-10	2.103E-01	1.0799E+03	3.492E-13	6.601E-04
1s7s <sup>1</sup> S <sub>0</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.2811E+03	1.093E-12	1.480E-03	1.2282E+03	6.150E-13	8.988E-04
1s7d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>1</sub>	1.1420E+05	8.038E-08	1.370E-02			
1s2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.3362E+00	2.129E-08	2.651E+07	1.3307E+00	2.137E-08	2.661E+07
1s2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.3371E+00	4.382E-08	5.450E+07	1.3315E+00	4.537E-08	5.642E+07
1s2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>2</sub> <sup>o</sup>	1.3946E+00	2.779E-08	3.177E+07	1.3888E+00	2.769E-08	3.166E+07
1s2p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.4001E+00	9.952E-08	1.129E+08	1.3943E+00	9.895E-08	1.122E+08
1s3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	3.4073E+00	2.514E-08	4.814E+06	3.3933E+00	2.339E-08	4.479E+06
1s3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	3.4088E+00	4.744E-08	9.077E+06	3.3948E+00	4.799E-08	9.180E+06
1s3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>2</sub> <sup>o</sup>	3.5191E+00	8.199E-09	1.472E+06	3.5046E+00	9.472E-09	1.700E+06
1s3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	3.5290E+00	2.701E-08	4.823E+06	3.5146E+00	2.829E-08	5.050E+06
1s4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	7.3666E+00	2.634E-08	1.079E+06	7.3362E+00	2.462E-08	1.008E+06
1s4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	7.3693E+00	4.921E-08	2.015E+06	7.3389E+00	4.990E-08	2.042E+06
1s4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>2</sub> <sup>o</sup>	7.5857E+00	2.994E-09	1.157E+05	7.5543E+00	4.311E-09	1.665E+05
1s4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	7.6047E+00	9.460E-09	3.637E+05	7.5735E+00	1.015E-08	3.903E+05
1s4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	7.6767E+00	6.581E-16	2.483E-02			
1s5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.5788E+01	3.150E-08	2.810E+05	1.5725E+01	2.923E-08	2.606E+05
1s5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.5795E+01	5.816E-08	5.183E+05	1.5731E+01	5.883E-08	5.241E+05
1s5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>2</sub> <sup>o</sup>	1.6303E+01	1.149E-09	9.614E+03	1.6237E+01	2.508E-09	2.097E+04
1s5p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.6348E+01	3.464E-09	2.882E+04	1.6282E+01	4.145E-09	3.447E+04
1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.6519E+01	1.011E-13	8.235E-01			
1s6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	4.1241E+01	5.029E-08	6.574E+04	4.1082E+01	4.653E-08	6.078E+04
1s6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.1265E+01	9.222E-08	1.204E+05	4.1019E+01	9.378E-08	1.228E+05
1s6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>2</sub> <sup>o</sup>	4.3302E+01	5.836E-10	6.920E+02	4.3133E+01	1.991E-09	2.359E+03
1s6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.3483E+01	1.175E-09	1.382E+03	4.3294E+01	1.809E-09	2.128E+03
1s6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	4.4186E+01	4.893E-13	5.572E-01			
1s7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1.2731E+03	1.019E-06	1.398E+03	1.2808E+03	9.958E-07	1.338E+03
1s7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.2879E+03	1.886E-06	2.528E+03	1.2433E+03	1.886E-06	2.690E+03
1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7p <sup>1</sup> P <sub>2</sub> <sup>o</sup>	1.6436E+04	1.261E-07	1.038E+00	1.8507E+04	1.091E-07	7.026E-01
1s3d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>3</sub>	3.5248E+00	8.286E-09	6.355E+05	3.5099E+00	8.335E-09	6.392E+05
1s3d <sup>3</sup> D <sub>3</sub>	1s7d <sup>3</sup> D <sub>3</sub>	3.5615E+00	7.741E-08	5.816E+06	3.5464E+00	7.691E-08	5.777E+06
1s3d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>3</sub>	3.5629E+00	3.385E-09	2.541E+05	3.5478E+00	3.805E-09	2.856E+05
1s4d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>3</sub>	7.5894E+00	1.320E-08	2.183E+05	7.5575E+00	1.324E-08	2.190E+05
1s4d <sup>3</sup> D <sub>3</sub>	1s7d <sup>3</sup> D <sub>3</sub>	7.6613E+00	4.040E-08	6.558E+05	7.6289E+00	4.032E-08	6.546E+05
1s4d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>3</sub>	7.6642E+00	1.665E-09	2.702E+04	7.6319E+00	1.958E-09	3.177E+04
1s5d <sup>3</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>3</sub>	1.6284E+01	1.901E-08	6.830E+04	1.6216E+01	1.905E-08	6.847E+04
1s5d <sup>3</sup> D <sub>3</sub>	1s7d <sup>3</sup> D <sub>3</sub>	1.6453E+01	1.990E-08	7.005E+04	1.6384E+01	1.990E-08	7.005E+04
1s5d <sup>1</sup> D <sub>2</sub>	1s7d <sup>3</sup> D <sub>3</sub>	1.6460E+01	7.283E-10	2.561E+03	1.6391E+01	9.397E-10	3.304E+03
1s5g <sup>3</sup> G <sub>4</sub>	1s7d <sup>3</sup> D <sub>3</sub>	1.6542E+01	1.731E-16	6.029E-04			
1s5g <sup>3</sup> G <sub>3</sub>	1s7d <sup>3</sup> D <sub>3</sub>	1.6544E+01	3.024E-18	1.053E-05			
1s5g <sup>1</sup> G <sub>4</sub>	1s7d <sup>3</sup> D <sub>3</sub>	1.6595E+01	6.733E-20	2.330E-07			

(continued on next page)

Table 5 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )	$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )
1s 6d <sup>3</sup> D <sub>2</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.3051E+01	3.466E-08	1.782E+04	4.2880E+01	3.476E-08	1.786E+04
1s 6d <sup>3</sup> D <sub>3</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.3740E+01	9.385E-09	4.675E+03	4.3560E+01	9.372E-09	4.666E+03
1s 6d <sup>1</sup> D <sub>2</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.3770E+01	2.487E-10	1.237E+02	4.3571E+01	3.789E-10	1.886E+02
1s 6g <sup>3</sup> G <sub>4</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.4103E+01	1.879E-13	9.204E-02			
1s 6g <sup>3</sup> G <sub>3</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.4112E+01	7.209E-15	3.530E-03			
1s 6g <sup>1</sup> G <sub>4</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.4321E+01	6.432E-18	3.120E-06			
1s 7d <sup>3</sup> D <sub>2</sub>	1s 7d <sup>3</sup> D <sub>3</sub>	4.3459E+03	2.625E-06	1.324E+02	4.3620E+03	2.623E-06	1.302E+02
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.3942E+00	8.521E-09	4.177E+06	1.3883E+00	7.247E-09	3.552E+06
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.5164E+00	3.762E-10	2.899E+04	3.5016E+00	4.070E-10	3.136E+04
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	7.5729E+00	4.137E-10	6.874E+03	7.5406E+00	4.246E-10	7.056E+03
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	7.6621E+00	4.484E-08	7.279E+05	7.6295E+00	1.331E-08	2.161E+05
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	7.6636E+00	1.593E-07	2.584E+06	7.6310E+00	6.677E-10	1.083E+04
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	7.6982E+00	7.787E-09	1.252E+05	7.6653E+00	7.865E-09	1.264E+05
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	7.6993E+00	2.637E-10	4.239E+03	7.6665E+00	3.040E-10	4.887E+03
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6245E+01	1.679E-10	6.064E+02	1.6174E+01	1.729E-10	6.247E+02
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6455E+01	6.347E-08	2.234E+05	1.6385E+01	1.004E-08	3.533E+04
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6459E+01	1.769E-07	6.224E+05	1.6388E+01	5.043E-10	1.774E+03
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6540E+01	1.096E-08	3.816E+04	1.6469E+01	1.094E-08	3.811E+04
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6543E+01	3.832E-10	1.334E+03	1.6472E+01	4.176E-10	1.454E+03
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.2891E+01	4.093E-11	2.120E+01	4.2690E+01	4.269E-11	2.213E+01
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.3744E+01	4.845E-08	2.412E+04	4.3561E+01	2.889E-09	2.889E+03
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.3758E+01	1.217E-07	6.059E+04	4.3560E+01	2.919E-10	1.453E+02
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.4094E+01	1.673E-08	8.197E+03	4.3907E+01	1.663E-08	8.152E+03
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.4105E+01	6.132E-10	3.004E+02	4.3907E+01	6.178E-10	3.027E+02
1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.4312E+01	1.635E-17	7.936E-06			
1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.5436E+03	2.931E-12	2.224E-04	3.3920E+03	4.564E-13	3.748E-05
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.3358E+00	7.084E-12	5.296E+03	1.3303E+00	5.834E-12	4.360E+03
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.3942E+00	4.476E-10	3.072E+05	1.3883E+00	5.176E-10	3.552E+05
1s 2p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.3997E+00	4.948E-09	3.370E+06	1.3939E+00	4.754E-09	3.236E+06
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.4047E+00	9.120E-13	1.050E+02	3.3906E+00	4.222E-13	4.858E+01
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.5163E+00	4.173E-11	4.503E+03	3.5016E+00	2.907E-11	3.136E+03
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.5262E+00	2.694E-10	2.890E+04	3.5116E+00	2.584E-10	2.771E+04
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	7.3543E+00	9.639E-13	2.378E+01			
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	7.5727E+00	3.962E-11	9.216E+02	7.5406E+00	3.074E-11	7.151E+02
1s 4p <sup>1</sup> P <sub>0</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	7.5917E+00	2.769E-10	6.409E+03	7.5597E+00	2.729E-10	6.316E+03
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	7.6619E+00	1.605E-07	3.648E+06	7.6295E+00	6.748E-10	1.533E+04
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	7.6634E+00	8.990E-08	2.042E+06	7.6310E+00	9.326E-09	2.118E+05
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	7.6990E+00	5.551E-09	1.249E+05	7.6665E+00	5.820E-09	1.309E+05
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.5732E+01	5.384E-13	2.902E+00			
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.6243E+01	1.702E-11	8.607E+01	1.6174E+01	1.264E-11	6.394E+01
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.6288E+01	1.139E-10	5.729E+02	1.6219E+01	1.117E-10	5.618E+02
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.6454E+01	1.805E-07	8.896E+05	1.6385E+01	5.107E-10	2.516E+03
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.6457E+01	9.042E-08	4.454E+05	1.6388E+01	7.034E-09	3.464E+04
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1.6542E+01	7.829E-09	3.817E+04	1.6472E+01	8.100E-09	3.948E+04
1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.0860E+01	3.480E-13	2.781E-01			
1s 6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.2882E+01	5.412E-12	3.926E+00	4.2690E+01	3.049E-12	2.213E+00
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.3060E+01	2.950E-11	2.123E+01	4.2848E+01	2.777E-11	2.001E+01
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.3735E+01	1.272E-07	8.872E+04	4.3561E+01	2.879E-10	2.007E+02
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.3749E+01	6.015E-08	4.193E+04	4.3561E+01	4.062E-09	2.831E+03
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.4096E+01	1.205E-08	8.267E+03	4.3907E+01	1.232E-08	8.457E+03
1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	9.8851E+02	2.009E-12	2.742E-03	9.7899E+02	2.186E-15	3.018E-06
1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	3.4844E+03	5.719E-12	6.284E-04	3.3927E+03	3.259E-14	3.745E-06
1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	4.4219E+03	9.314E-15	6.355E-07	4.1543E+03	2.391E-13	1.833E-05
1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	2.0860E+05	6.413E-08	1.966E-03			
1s 2s <sup>3</sup> S <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.3248E+00	2.700E-12	2.052E+03	1.3192E+00	5.989E-13	4.552E+02
1s 3s <sup>3</sup> S <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	3.3851E+00	1.746E-12	2.033E+02			
1s 3d <sup>3</sup> D <sub>2</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	3.5247E+00	6.496E-10	6.976E+04	3.5098E+00	6.265E-10	6.727E+04
1s 3d <sup>3</sup> D <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	3.5261E+00	5.200E-09	5.579E+05	3.5113E+00	5.252E-09	5.634E+05
1s 3d <sup>3</sup> D <sub>3</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	3.5614E+00	4.462E-09	4.693E+05	3.5463E+00	4.109E-09	4.321E+05
1s 3d <sup>1</sup> D <sub>2</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	3.5628E+00	5.333E-08	5.604E+06	3.5477E+00	5.362E-08	5.635E+06
1s 4s <sup>3</sup> S <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	7.3170E+00	1.395E-12	3.475E+01			
1s 4d <sup>3</sup> D <sub>2</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	7.5888E+00	1.014E-09	2.350E+04	7.5573E+00	9.516E-10	2.204E+04
1s 4d <sup>3</sup> D <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	7.5916E+00	8.270E-09	1.914E+05	7.5601E+00	8.403E-09	1.944E+05
1s 4d <sup>3</sup> D <sub>3</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	7.6607E+00	2.469E-09	5.613E+04	7.6287E+00	2.210E-09	5.023E+04
1s 4d <sup>1</sup> D <sub>2</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	7.6636E+00	2.816E-08	6.396E+05	7.6317E+00	2.809E-08	6.380E+05
1s 5s <sup>3</sup> S <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.5646E+01	1.343E-12	7.317E+00			
1s 5d <sup>3</sup> D <sub>2</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.6281E+01	1.459E-09	7.342E+03	1.6215E+01	1.357E-09	6.831E+03
1s 5d <sup>3</sup> D <sub>1</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.6288E+01	1.195E-08	6.009E+04	1.6221E+01	1.215E-08	6.108E+04
1s 5d <sup>3</sup> D <sub>3</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.6451E+01	1.339E-09	6.601E+03	1.6383E+01	1.137E-09	5.606E+03
1s 5d <sup>1</sup> D <sub>2</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.6458E+01	1.394E-08	6.865E+04	1.6390E+01	1.385E-08	6.820E+04
1s 5g <sup>3</sup> G <sub>3</sub>	1s 7d <sup>1</sup> D <sub>2</sub>	1.6541E+01	8.041E-17	3.921E-04			

(continued on next page)

Table 5 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s6s $^3S_1$	1s7d $^1D_2$	4.0526E+01	1.824E-12	1.481E+00			
1s6d $^3D_2$	1s7d $^1D_2$	4.3033E+01	2.664E-09	1.919E+03	4.2873E+01	2.435E-09	1.752E+03
1s6d $^3D_1$	1s7d $^1D_2$	4.3059E+01	2.187E-08	1.574E+04	4.2867E+01	2.224E-08	1.601E+04
1s6d $^3D_3$	1s7d $^1D_2$	4.3721E+01	7.782E-10	5.431E+02	4.3553E+01	5.898E-10	4.112E+02
1s6d $^1D_2$	1s7d $^1D_2$	4.3751E+01	6.584E-09	4.589E+03	4.3564E+01	6.539E-09	4.558E+03
1s6g $^3G_3$	1s7d $^1D_2$	4.4092E+01	1.366E-13	9.376E-02			
1s7s $^3S_1$	1s7d $^1D_2$	8.7478E+02	2.312E-11	4.030E-02			
1s7d $^3D_2$	1s7d $^1D_2$	4.1666E+03	1.940E-07	1.491E+01	4.2946E+03	1.876E-07	1.345E+01
1s7d $^3D_1$	1s7d $^1D_2$	4.3244E+03	1.655E-06	1.180E+02	4.2545E+03	1.654E-06	1.208E+02
1s7d $^3D_3$	1s7d $^1D_2$	1.0098E+05	5.515E-08	7.215E-03			
1s4f $^3F_3^0$	1s7f $^3F_4^0$	7.6554E+00	1.719E-09	2.174E+04	7.6229E+00	1.729E-09	2.187E+04
1s4f $^3F_4^0$	1s7f $^3F_4^0$	7.6914E+00	3.672E-08	4.601E+05	7.6587E+00	4.082E-08	5.114E+05
1s4f $^1F_3^0$	1s7f $^3F_4^0$	7.6926E+00	2.148E-09	2.690E+04	7.6598E+00	1.172E-09	1.468E+04
1s5f $^3F_3^0$	1s7f $^3F_4^0$	1.6424E+01	4.060E-09	1.116E+04	1.6354E+01	4.039E-09	1.109E+04
1s5f $^3F_4^0$	1s7f $^3F_4^0$	1.6509E+01	2.875E-08	7.819E+04	1.6439E+01	3.085E-08	8.390E+04
1s5f $^1F_3^0$	1s7f $^3F_4^0$	1.6512E+01	1.249E-09	3.394E+03	1.6441E+01	8.891E-10	2.417E+03
1s6f $^3F_3^0$	1s7f $^3F_4^0$	4.3526E+01	9.513E-09	3.722E+03	4.3345E+01	9.476E-09	3.706E+03
1s6f $^3F_4^0$	1s7f $^3F_4^0$	4.3873E+01	1.853E-08	7.134E+03	4.3688E+01	1.782E-08	6.863E+03
1s6f $^1F_3^0$	1s7f $^3F_4^0$	4.3884E+01	2.962E-10	1.140E+02	4.3689E+01	5.068E-10	1.951E+02
1s6h $^3H_5^0$	1s7f $^3F_4^0$	4.4083E+01	8.911E-15	3.399E-03			
1s6h $^3H_4^0$	1s7f $^3F_4^0$	4.4089E+01	6.179E-16	2.356E-04			
1s6h $^1H_5^0$	1s7f $^3F_4^0$	4.4228E+01	2.315E-17	8.771E-06			
1s7f $^3F_3^0$	1s7f $^3F_4^0$	8.7508E+03	1.774E-06	1.717E+01	8.7713E+03	1.769E-06	1.690E+01
1s3d $^3D_3$	1s7g $^3G_4$	3.5600E+00	3.651E-09	2.135E+05	3.5449E+00	3.702E-09	2.164E+05
1s4d $^3D_3$	1s7g $^3G_4$	7.6543E+00	2.963E-11	3.748E+02	7.6223E+00	2.880E-11	3.642E+02
1s5d $^3D_3$	1s7g $^3G_4$	1.6421E+01	2.342E-10	6.438E+02	1.6353E+01	2.341E-10	6.434E+02
1s5g $^3G_4$	1s7g $^3G_4$	1.6509E+01	1.147E-08	3.119E+04	1.6439E+01	1.146E-08	3.116E+04
1s5g $^3G_3$	1s7g $^3G_4$	1.6511E+01	2.735E-10	7.434E+02	1.6441E+01	3.276E-10	8.906E+02
1s5g $^3G_5$	1s7g $^3G_4$	1.6560E+01	3.529E-09	9.536E+03	1.6490E+01	3.511E-09	9.489E+03
1s5g $^1G_4$	1s7g $^3G_4$	1.6562E+01	8.238E-11	2.226E+02	1.6491E+01	8.350E-11	2.256E+02
1s6d $^3D_3$	1s7g $^3G_4$	4.3514E+01	1.318E-10	5.160E+01	4.3345E+01	1.315E-10	5.144E+01
1s6g $^3G_4$	1s7g $^3G_4$	4.3873E+01	1.072E-08	4.127E+03	4.3688E+01	1.069E-08	4.117E+03
1s6g $^3G_3$	1s7g $^3G_4$	4.3882E+01	2.236E-10	8.608E+01	4.3688E+01	3.056E-10	1.176E+02
1s6g $^3G_5$	1s7g $^3G_4$	4.4082E+01	7.394E-09	2.820E+03	4.3896E+01	7.356E-09	2.805E+03
1s6g $^1G_4$	1s7g $^3G_4$	4.4089E+01	1.748E-10	6.664E+01	4.3896E+01	1.672E-10	6.377E+01
1s7d $^3D_3$	1s7g $^3G_4$	8.4183E+03	1.604E-13	1.677E-06	8.7854E+03	1.162E-13	1.106E-06
1s3d $^3D_2$	1s7g $^3G_3$	3.5233E+00	2.179E-13	1.673E+01			
1s3d $^3D_3$	1s7g $^3G_3$	3.5600E+00	1.630E-10	1.225E+04	3.5449E+00	1.371E-10	1.030E+04
1s3d $^1D_2$	1s7g $^3G_3$	3.5614E+00	2.777E-09	2.086E+05	3.5464E+00	2.747E-09	2.064E+05
1s4d $^3D_2$	1s7g $^3G_3$	7.5824E+00	3.207E-16	5.316E-03			
1s4d $^3D_3$	1s7g $^3G_3$	7.6541E+00	9.324E-13	1.517E+01	7.6223E+00	1.066E-12	1.734E+01
1s4d $^1D_2$	1s7g $^3G_3$	7.6571E+00	2.102E-11	3.417E+02	7.6253E+00	2.121E-11	3.447E+02
1s5d $^3D_2$	1s7g $^3G_3$	1.6252E+01	1.814E-14	6.543E-02			
1s5d $^3D_3$	1s7g $^3G_3$	1.6420E+01	9.558E-12	3.378E+01	1.6353E+01	8.684E-12	3.068E+01
1s5d $^1D_2$	1s7g $^3G_3$	1.6428E+01	1.752E-10	6.185E+02	1.6361E+01	1.734E-10	6.122E+02
1s5g $^3G_4$	1s7g $^3G_3$	1.6509E+01	3.892E-10	1.361E+03	1.6439E+01	3.312E-10	1.158E+03
1s5g $^3G_3$	1s7g $^3G_3$	1.6511E+01	8.849E-09	3.093E+04	1.6441E+01	8.844E-09	3.091E+04
1s5g $^1G_4$	1s7g $^3G_3$	1.6561E+01	2.778E-09	9.652E+03	1.6491E+01	2.789E-09	9.690E+03
1s6d $^3D_2$	1s7g $^3G_3$	4.2827E+01	1.476E-14	7.669E-03			
1s6d $^3D_3$	1s7g $^3G_3$	4.3508E+01	5.636E-12	2.837E+00	4.3345E+01	4.871E-12	2.449E+00
1s6d $^1D_2$	1s7g $^3G_3$	4.3538E+01	9.946E-11	5.000E+01	4.3356E+01	9.747E-11	4.899E+01
1s6g $^3G_4$	1s7g $^3G_3$	4.3868E+01	4.042E-10	2.002E+02	4.3688E+01	3.055E-10	1.512E+02
1s6g $^3G_3$	1s7g $^3G_3$	4.3876E+01	8.273E-09	4.095E+03	4.3688E+01	8.251E-09	4.084E+03
1s6g $^1G_4$	1s7g $^3G_3$	4.4084E+01	5.822E-09	2.855E+03	4.3896E+01	5.851E-09	2.869E+03
1s7d $^3D_2$	1s7g $^3G_3$	2.8438E+03	4.640E-15	5.467E-07	2.9148E+03	3.797E-17	4.222E-09
1s7d $^3D_3$	1s7g $^3G_3$	8.2277E+03	3.480E-15	4.899E-08	8.7854E+03	4.304E-15	5.269E-08
1s7d $^1D_2$	1s7g $^3G_3$	8.9575E+03	6.963E-14	8.269E-07	9.0724E+03	8.336E-14	9.568E-07
1s7g $^3G_4$	1s7g $^3G_3$	3.6344E+05	4.407E-08	3.179E-04			
1s2p $^3P_2^0$	1s7f $^1F_3^0$	1.3940E+00	4.032E-13	1.977E+02	1.3881E+00	2.999E-15	1.470E+00
1s3p $^3P_2^0$	1s7f $^1F_3^0$	3.5149E+00	1.959E-14	1.511E+00	3.5002E+00	1.688E-16	1.302E-02
1s4p $^3P_2^0$	1s7f $^1F_3^0$	7.5662E+00	4.169E-14	6.939E-01			
1s4f $^3F_3^0$	1s7f $^1F_3^0$	7.6552E+00	8.991E-11	1.462E+03	7.6229E+00	7.186E-11	1.168E+03
1s4f $^3F_2^0$	1s7f $^1F_3^0$	7.6567E+00	1.318E-09	2.141E+04	7.6244E+00	1.283E-09	2.086E+04
1s4f $^3F_4^0$	1s7f $^1F_3^0$	7.6912E+00	2.427E-09	3.910E+04	7.6586E+00	1.170E-09	1.884E+04
1s4f $^1F_3^0$	1s7f $^1F_3^0$	7.6923E+00	3.464E-08	5.579E+05	7.6598E+00	3.148E-08	5.069E+05
1s5p $^3P_2^0$	1s7f $^1F_3^0$	1.6214E+01	4.380E-14	1.588E-01			
1s5f $^3F_3^0$	1s7f $^1F_3^0$	1.6423E+01	1.913E-10	6.757E+02	1.6354E+01	1.592E-10	5.624E+02
1s5f $^3F_2^0$	1s7f $^1F_3^0$	1.6427E+01	3.067E-09	1.083E+04	1.6358E+01	2.994E-09	1.057E+04
1s5f $^3F_4^0$	1s7f $^1F_3^0$	1.6508E+01	1.547E-09	5.408E+03	1.6439E+01	8.855E-10	3.096E+03
1s5f $^1F_3^0$	1s7f $^1F_3^0$	1.6511E+01	2.526E-08	8.829E+04	1.6441E+01	2.379E-08	8.315E+04
1s6p $^3P_2^0$	1s7f $^1F_3^0$	4.2675E+01	5.245E-14	2.744E-02			

(continued on next page)

Table 5 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )	$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.3519E+01	4.115E-10	2.070E+02	4.3345E+01	3.501E-10	1.760E+02
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.3534E+01	7.076E-09	3.558E+03	4.3345E+01	7.015E-09	3.528E+03
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.3866E+01	5.137E-10	2.544E+02	4.3688E+01	5.131E-10	2.540E+02
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.3877E+01	1.345E-08	6.659E+03	4.3688E+01	1.375E-08	6.807E+03
1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.4082E+01	3.010E-15	1.476E-03			
1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.4995E+03	1.402E-12	2.139E-04			
1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	8.4824E+03	6.791E-08	8.993E-01	8.7645E+03	6.556E-08	8.063E-01
1s 7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	8.8420E+03	1.310E-06	1.597E+01	8.7598E+03	1.309E-06	1.612E+01
1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.7665E+05	3.244E-08	4.039E-04			
1s 5g <sup>3</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	1.6491E+01	7.591E-10	1.693E+03	1.6420E+01	7.556E-10	1.685E+03
1s 5g <sup>3</sup> G <sub>5</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	1.6542E+01	2.746E-08	6.085E+04	1.6471E+01	2.743E-08	6.079E+04
1s 5g <sup>1</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	1.6543E+01	4.584E-10	1.016E+03	1.6473E+01	5.103E-10	1.130E+03
1s 6g <sup>3</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	4.3743E+01	3.029E-09	9.600E+02	4.3559E+01	3.023E-09	9.580E+02
1s 6g <sup>3</sup> G <sub>5</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	4.3950E+01	2.568E-08	8.060E+03	4.3765E+01	2.559E-08	8.033E+03
1s 6g <sup>1</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	4.3957E+01	3.996E-10	1.254E+02	4.3765E+01	4.739E-10	1.487E+02
1s 7g <sup>3</sup> G <sub>4</sub>	1s 7g <sup>3</sup> G <sub>5</sub>	1.4677E+04	1.341E-06	3.774E+00	1.4692E+04	1.337E-06	3.726E+00
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	7.6874E+00	1.958E-09	2.009E+04	7.6547E+00	1.933E-09	1.984E+04
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1.6491E+01	2.258E-11	5.035E+01	1.6420E+01	2.098E-11	4.678E+01
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	4.3742E+01	2.390E-10	7.574E+01	4.3559E+01	2.347E-10	7.437E+01
1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	4.3951E+01	1.167E-08	3.663E+03	4.3765E+01	1.215E-08	3.814E+03
1s 6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	4.3956E+01	2.729E-10	8.564E+01	4.3765E+01	2.250E-10	7.063E+01
1s 6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	4.4090E+01	2.985E-09	9.311E+02	4.3903E+01	2.974E-09	9.277E+02
1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	4.4094E+01	4.732E-11	1.476E+01	4.3903E+01	4.575E-11	1.427E+01
1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1.4614E+04	3.511E-14	9.969E-08	1.4763E+04	3.624E-14	1.000E-07
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	7.6513E+00	4.508E-15	5.707E-02			
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	7.6873E+00	5.158E-11	6.470E+02	7.6547E+00	4.394E-11	5.511E+02
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	7.6884E+00	1.583E-09	1.985E+04	7.6558E+00	1.539E-09	1.929E+04
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.6405E+01	8.772E-18	2.416E-05			
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.6490E+01	5.160E-13	1.406E+00	1.6420E+01	4.768E-13	1.299E+00
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.6493E+01	1.767E-11	4.816E+01	1.6423E+01	1.666E-11	4.540E+01
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.3394E+01	6.981E-16	2.748E-04			
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.3738E+01	6.216E-12	2.408E+00	4.3559E+01	5.334E-12	2.065E+00
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.3749E+01	1.922E-10	7.442E+01	4.3560E+01	1.866E-10	7.230E+01
1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.3947E+01	3.798E-10	1.458E+02	4.3765E+01	2.250E-10	8.632E+01
1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.3953E+01	1.029E-08	3.949E+03	4.3765E+01	9.900E-09	3.798E+03
1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	4.4091E+01	2.459E-09	9.374E+02	4.3903E+01	2.470E-09	9.420E+02
1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	5.4206E+03	1.109E-18	2.798E-11			
1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.4244E+04	7.671E-16	2.802E-09	1.4763E+04	8.238E-16	2.777E-09
1s 7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1.5017E+04	2.719E-14	8.935E-08	1.4782E+04	2.879E-14	9.684E-08
1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	5.6215E+05	3.438E-08	8.064E-05			
1s 3d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>1</sup> G <sub>4</sub>	3.5591E+00	4.551E-14	2.663E+00	3.5441E+00	5.680E-19	3.323E-05
1s 4d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>1</sup> G <sub>4</sub>	7.6502E+00	1.289E-15	1.633E-02	7.6183E+00	4.456E-21	5.642E-08
1s 5d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>1</sup> G <sub>4</sub>	1.6402E+01	6.373E-16	1.756E-03			
1s 5g <sup>3</sup> G <sub>4</sub>	1s 7g <sup>1</sup> G <sub>4</sub>	1.6490E+01	1.984E-11	5.409E+01	1.6420E+01	1.967E-11	5.362E+01
1s 5g <sup>3</sup> G <sub>3</sub>	1s 7g <sup>1</sup> G <sub>4</sub>	1.6492E+01	5.980E-10	1.629E+03	1.6423E+01	6.027E-10	1.642E+03
1s 5g <sup>3</sup> G <sub>5</sub>	1s 7g <sup>1</sup> G <sub>4</sub>	1.6541E+01	5.583E-10	1.512E+03	1.6471E+01	5.080E-10	1.376E+03
1s 5g <sup>1</sup> G <sub>4</sub>	1s 7g <sup>1</sup> G <sub>4</sub>	1.6543E+01	2.237E-08	6.059E+04	1.6473E+01	2.234E-08	6.052E+04
1s 6d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>1</sup> G <sub>4</sub>	4.3381E+01	1.570E-15	6.182E-04			
1s 6g <sup>3</sup> G <sub>4</sub>	1s 7g <sup>1</sup> G <sub>4</sub>	4.3738E+01	7.608E-11	2.948E+01	4.3559E+01	6.873E-11	2.662E+01
1s 6g <sup>3</sup> G <sub>3</sub>	1s 7g <sup>1</sup> G <sub>4</sub>	4.3747E+01	2.385E-09	9.236E+02	4.3559E+01	2.405E-09	9.314E+02
1s 6g <sup>3</sup> G <sub>5</sub>	1s 7g <sup>1</sup> G <sub>4</sub>	4.3946E+01	5.553E-10	2.131E+02	4.3765E+01	4.739E-10	1.818E+02
1s 6g <sup>1</sup> G <sub>4</sub>	1s 7g <sup>1</sup> G <sub>4</sub>	4.3953E+01	2.093E-08	8.029E+03	4.3765E+01	2.085E-08	8.000E+03
1s 7d <sup>3</sup> D <sub>3</sub>	1s 7g <sup>1</sup> G <sub>4</sub>	5.2883E+03	3.941E-15	1.044E-07			
1s 7g <sup>3</sup> G <sub>4</sub>	1s 7g <sup>1</sup> G <sub>4</sub>	1.4223E+04	3.145E-08	1.152E-01	1.4691E+04	3.040E-08	1.035E-01
1s 7g <sup>3</sup> G <sub>3</sub>	1s 7g <sup>1</sup> G <sub>4</sub>	1.4802E+04	1.065E-06	3.602E+00	1.4691E+04	1.064E-06	3.623E+00
1s 7g <sup>3</sup> G <sub>5</sub>	1s 7g <sup>1</sup> G <sub>4</sub>	4.5954E+05	2.680E-08	9.406E-05			
1s 6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	4.3863E+01	8.357E-10	2.229E+02	4.3678E+01	8.370E-10	2.232E+02
1s 6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	4.4002E+01	2.409E-08	6.384E+03	4.3816E+01	2.482E-08	6.577E+03
1s 6h <sup>1</sup> H <sub>6</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	4.4006E+01	4.069E-10	1.078E+02	4.3816E+01	3.223E-10	8.541E+01
1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	2.2090E+04	1.077E-06	1.133E+00	2.2109E+04	1.074E-06	1.118E+00
1s 5g <sup>3</sup> G <sub>5</sub>	1s 7i <sup>3</sup> I <sub>6</sub>	1.6529E+01	9.680E-10	1.818E+03	1.6459E+01	9.718E-10	1.825E+03
1s 6g <sup>3</sup> G <sub>5</sub>	1s 7i <sup>3</sup> I <sub>6</sub>	4.3863E+01	2.601E-10	6.937E+01	4.3678E+01	2.590E-10	6.907E+01
1s 7g <sup>3</sup> G <sub>5</sub>	1s 7i <sup>3</sup> I <sub>6</sub>	2.2046E+04	8.252E-15	8.712E-09	2.2108E+04	8.218E-15	8.555E-09
1s 5g <sup>3</sup> G <sub>4</sub>	1s 7i <sup>3</sup> I <sub>5</sub>	1.6478E+01	2.959E-15	6.609E-03			
1s 5g <sup>3</sup> G <sub>5</sub>	1s 7i <sup>3</sup> I <sub>5</sub>	1.6529E+01	1.752E-11	3.888E+01	1.6459E+01	1.495E-11	3.318E+01
1s 5g <sup>1</sup> G <sub>4</sub>	1s 7i <sup>3</sup> I <sub>5</sub>	1.6531E+01	8.153E-10	1.809E+03	1.6460E+01	8.077E-10	1.792E+03
1s 6g <sup>3</sup> G <sub>4</sub>	1s 7i <sup>3</sup> I <sub>5</sub>	4.3654E+01	1.569E-16	4.993E-05			
1s 6g <sup>3</sup> G <sub>5</sub>	1s 7i <sup>3</sup> I <sub>5</sub>	4.3861E+01	4.500E-12	1.418E+00	4.3678E+01	3.985E-12	1.255E+00
1s 6g <sup>1</sup> G <sub>4</sub>	1s 7i <sup>3</sup> I <sub>5</sub>	4.3867E+01	2.181E-10	6.873E+01	4.3678E+01	2.152E-10	6.782E+01
1s 7g <sup>3</sup> G <sub>4</sub>	1s 7i <sup>3</sup> I <sub>5</sub>	8.7156E+03	3.038E-20	2.425E-13			
1s 7g <sup>3</sup> G <sub>5</sub>	1s 7i <sup>3</sup> I <sub>5</sub>	2.1457E+04	1.337E-16	1.761E-10	2.2108E+04	1.264E-16	1.555E-10

(continued on next page)

Table 5 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	$gf$	$A$ (s <sup>-1</sup> )
1s 7g <sup>1</sup> G <sub>4</sub>	1s 7i <sup>3</sup> I <sub>5</sub>	2.2508E+04	6.722E-15	8.045E-09	2.2108E+04	6.827E-15	8.399E-09
1s 7i <sup>3</sup> I <sub>6</sub>	1s 7i <sup>3</sup> I <sub>5</sub>	8.0263E+05	2.820E-08	2.655E-05			
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	7.6846E+00	1.967E-14	2.020E-01			
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1.6478E+01	2.893E-16	6.462E-04			
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3652E+01	9.188E-16	2.924E-04			
1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3860E+01	1.459E-11	4.600E+00	4.3678E+01	1.287E-11	4.058E+00
1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3866E+01	6.893E-10	2.172E+02	4.3678E+01	6.953E-10	2.191E+02
1s 6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3999E+01	5.006E-10	1.568E+02	4.3816E+01	3.223E-10	1.009E+02
1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.4004E+01	2.163E-08	6.773E+03	4.3816E+01	2.095E-08	6.561E+03
1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	8.6829E+03	2.049E-19	1.648E-12			
1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	2.1394E+04	1.710E-08	2.266E-02	2.2109E+04	1.653E-08	2.033E-02
1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	2.2240E+04	8.940E-07	1.096E+00	2.2109E+04	8.927E-07	1.098E+00
1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	6.7907E+05	2.293E-08	3.015E-05			
1s 7i <sup>3</sup> I <sub>6</sub>	1s 7i <sup>3</sup> I <sub>7</sub>	3.1014E+04	8.994E-07	4.158E-01	3.1015E+04	8.974E-07	4.113E-01
1s 5g <sup>3</sup> G <sub>5</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	1.6520E+01	6.150E-15	1.156E-02			
1s 6g <sup>3</sup> G <sub>5</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	4.3799E+01	5.374E-16	1.437E-04			
1s 7g <sup>3</sup> G <sub>5</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	1.2712E+04	7.915E-21	2.513E-14			
1s 7i <sup>3</sup> I <sub>6</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	3.0023E+04	1.031E-08	5.869E-03	3.1015E+04	9.971E-09	5.273E-03
1s 7i <sup>3</sup> I <sub>5</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	3.1190E+04	7.687E-07	4.055E-01	3.1015E+04	7.678E-07	4.060E-01
1s 7i <sup>3</sup> I <sub>7</sub>	1s 7i <sup>1</sup> I <sub>6</sub>	9.4020E+05	2.004E-08	1.163E-05			

**Table 6**

Magnetic quadrupole transitions  $M2$  calculated with GRASP2K and FAC for all  $n = 1-7$  configurations. For the GRASP2K calculation, the active set is expanded to  $n = 10$  (GRASP3) and only the length form is considered. A comparison between the wavelengths, weighted oscillator strengths and transition probabilities is given.

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s 2s <sup>3</sup> S <sub>1</sub>	1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.6053E+02	1.033E-13	8.911E-03	1.5824E+02	1.235E-13	1.087E-02
1s 2s <sup>1</sup> S <sub>0</sub>	1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.0520E-01	3.150E-04	2.559E+12	4.0356E-01	3.398E-04	2.760E+12
1s 2s <sup>3</sup> S <sub>1</sub>	1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	2.6617E+01	1.588E-08	2.990E+04	2.6489E+01	1.614E-08	3.043E+04
1s 2s <sup>1</sup> S <sub>0</sub>	1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.2564E+01	5.805E-09	7.303E+03	3.2508E+01	5.823E-09	7.289E+03
1s 2s <sup>3</sup> S <sub>1</sub>	1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	2.4759E+01	1.985E-08	7.200E+04	2.4615E+01	2.008E-08	7.308E+04
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 3s <sup>3</sup> S <sub>1</sub>	2.2065E+00	1.514E-09	6.915E+05	2.1974E+00	2.462E-09	1.124E+06
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 3s <sup>3</sup> S <sub>1</sub>	2.3705E+00	1.311E-06	5.189E+08	2.3604E+00	1.277E-06	5.054E+08
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 3s <sup>3</sup> S <sub>1</sub>	2.3864E+00	1.336E-06	5.217E+08	2.3765E+00	1.249E-06	4.877E+08
1s 2s <sup>3</sup> S <sub>1</sub>	1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	2.1686E+00	1.372E-08	6.484E+06	2.1593E+00	1.146E-08	5.418E+06
1s 3s <sup>3</sup> S <sub>1</sub>	1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	5.8954E+02	1.165E-14	7.452E-05	5.8484E+02	1.282E-14	8.264E-05
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 3s <sup>1</sup> S <sub>0</sub>	2.3603E+00	8.223E-07	9.845E+08	2.3502E+00	8.627E-07	1.032E+09
1s 2s <sup>1</sup> S <sub>0</sub>	1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.4470E-01	8.419E-05	9.448E+11	3.4333E-01	9.334E-05	1.047E+12
1s 2s <sup>3</sup> S <sub>1</sub>	1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	2.1256E+00	8.321E-06	2.457E+09	2.1165E+00	8.544E-06	2.522E+09
1s 2s <sup>1</sup> S <sub>0</sub>	1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	2.1571E+00	5.628E-06	1.614E+09	2.1483E+00	5.447E-06	1.561E+09
1s 3s <sup>3</sup> S <sub>1</sub>	1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	9.0741E+01	2.451E-09	3.972E+02	9.0375E+01	2.466E-09	3.995E+02
1s 3s <sup>1</sup> S <sub>0</sub>	1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.0861E+02	9.552E-10	1.080E+02	1.0840E+02	9.529E-10	1.072E+02
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>2</sub>	2.1510E+00	8.811E-07	2.541E+08	2.1422E+00	9.246E-07	2.665E+08
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>2</sub>	2.1533E+00	5.689E-07	1.637E+08	2.1443E+00	5.905E-07	1.698E+08
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>2</sub>	2.3065E+00	1.618E-10	4.057E+04	2.2968E+00	2.186E-10	5.482E+04
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>2</sub>	2.3216E+00	2.587E-10	6.403E+04			
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>2</sub>	1.0002E+02	4.701E-11	6.269E+00	9.9770E+01	4.770E-11	6.338E+00
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>2</sub>	1.0130E+02	2.911E-11	3.784E+00	1.0100E+02	2.943E-11	3.815E+00
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>2</sub>	1.4830E+03	2.920E-18	1.771E-09			
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>1</sub>	2.1505E+00	8.705E-07	4.185E+08	2.1416E+00	9.091E-07	4.370E+08
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>1</sub>	2.3059E+00	6.634E-13	2.774E+02			
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>1</sub>	2.3210E+00	1.204E-09	4.968E+05	2.3114E+00	1.079E-09	4.453E+05
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>1</sub>	9.8828E+01	4.804E-11	1.094E+01	9.8590E+01	4.859E-11	1.102E+01
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>1</sub>	1.2588E+03	1.549E-18	2.174E-09			
1s 2s <sup>3</sup> S <sub>1</sub>	1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	2.1220E+00	8.175E-06	4.037E+09	2.1129E+00	8.576E-06	4.234E+09
1s 3s <sup>3</sup> S <sub>1</sub>	1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	8.4608E+01	3.031E-09	9.414E+02	8.4198E+01	3.046E-09	9.473E+02
1s 3d <sup>3</sup> D <sub>2</sub>	1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	8.0349E+03	2.086E-20	7.185E-13			
1s 3d <sup>3</sup> D <sub>1</sub>	1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	2.2947E+05	3.151E-24	1.331E-19			
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>3</sub>	2.1376E+00	1.374E-05	2.865E+09	2.1288E+00	1.394E-05	2.907E+09
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>3</sub>	2.2910E+00	6.490E-05	1.178E+10	2.2814E+00	6.717E-05	1.219E+10
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>3</sub>	2.3059E+00	1.173E-05	2.101E+09	2.2965E+00	1.190E-05	2.133E+09
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>3</sub>	7.7367E+01	1.611E-09	2.565E+02	7.7185E+01	1.597E-09	2.533E+02
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>3</sub>	2.7769E+02	1.724E-10	2.130E+00	2.7772E+02	1.707E-10	2.091E+00
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 3d <sup>3</sup> D <sub>3</sub>	3.5684E+02	1.466E-11	1.097E-01	3.5856E+02	1.436E-11	1.055E-01
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 3d <sup>1</sup> D <sub>2</sub>	2.1371E+00	5.299E-06	1.548E+09	2.1283E+00	5.541E-06	1.618E+09
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 3d <sup>1</sup> D <sub>2</sub>	2.1393E+00	6.338E-06	1.847E+09	2.1304E+00	6.476E-06	1.887E+09
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 3d <sup>1</sup> D <sub>2</sub>	2.2905E+00	1.624E-05	4.129E+09	2.2809E+00	1.680E-05	4.273E+09
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 3d <sup>1</sup> D <sub>2</sub>	2.3053E+00	3.662E-05	9.192E+09	2.2959E+00	3.746E-05	9.401E+09
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 3d <sup>1</sup> D <sub>2</sub>	7.6708E+01	6.269E-10	1.421E+02	7.6517E+01	6.228E-10	1.407E+02
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 3d <sup>1</sup> D <sub>2</sub>	7.7462E+01	7.386E-10	1.642E+02	7.7242E+01	7.336E-10	1.626E+02
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 3d <sup>1</sup> D <sub>2</sub>	2.6938E+02	4.725E-11	8.687E-01	2.6926E+02	4.683E-11	8.544E-01
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 3d <sup>1</sup> D <sub>2</sub>	3.4323E+02	5.187E-11	5.874E-01	3.4458E+02	5.080E-11	5.659E-01
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 4s <sup>3</sup> S <sub>1</sub>	1.6341E+00	6.171E-10	5.138E+05	1.6274E+00	9.120E-10	7.592E+05
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4s <sup>3</sup> S <sub>1</sub>	1.7223E+00	5.190E-07	3.890E+08	1.7151E+00	5.041E-07	3.778E+08
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 4s <sup>3</sup> S <sub>1</sub>	1.7308E+00	5.278E-07	3.918E+08	1.7236E+00	4.959E-07	3.680E+08
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 4s <sup>3</sup> S <sub>1</sub>	6.3675E+00	3.701E-10	2.029E+04	6.3413E+00	5.844E-10	3.204E+04
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4s <sup>3</sup> S <sub>1</sub>	6.7695E+00	3.592E-07	1.743E+07	6.7412E+00	3.541E-07	1.718E+07
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 4s <sup>3</sup> S <sub>1</sub>	6.8063E+00	3.654E-07	1.754E+07	6.7783E+00	3.479E-07	1.669E+07
1s 2s <sup>3</sup> S <sub>1</sub>	1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.6159E+00	5.547E-09	4.724E+06	1.6090E+00	5.114E-09	4.355E+06
1s 3s <sup>3</sup> S <sub>1</sub>	1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	6.2721E+00	1.725E-09	9.747E+04	6.2463E+00	1.366E-09	7.720E+04
1s 3d <sup>3</sup> D <sub>2</sub>	1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	6.7686E+00	4.387E-09	2.129E+05	6.7403E+00	4.352E-09	2.111E+05
1s 3d <sup>3</sup> D <sub>1</sub>	1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	6.7741E+00	4.345E-09	2.105E+05	6.7458E+00	4.267E-09	2.067E+05
1s 3d <sup>3</sup> D <sub>3</sub>	1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	6.9054E+00	7.364E-08	3.434E+06	6.8762E+00	7.351E-08	3.427E+06
1s 3d <sup>1</sup> D <sub>2</sub>	1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	6.9107E+00	2.786E-08	1.297E+06	6.8816E+00	2.620E-08	1.219E+06
1s 4s <sup>3</sup> S <sub>1</sub>	1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.4439E+03	2.589E-15	2.761E-06	1.4544E+03	2.665E-15	2.778E-06
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4s <sup>1</sup> S <sub>0</sub>	1.7202E+00	3.276E-07	7.385E+08	1.7129E+00	3.373E-07	7.604E+08
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 4s <sup>1</sup> S <sub>0</sub>	6.7361E+00	2.278E-07	3.349E+07	6.7077E+00	2.396E-07	3.523E+07
1s 3d <sup>3</sup> D <sub>2</sub>	1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	6.7663E+00	2.811E-09	4.096E+05	6.7381E+00	2.782E-09	4.052E+05
1s 3d <sup>1</sup> D <sub>2</sub>	1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	6.9083E+00	3.383E-08	4.728E+06	6.8793E+00	3.327E-08	4.650E+06
1s 2s <sup>1</sup> S <sub>0</sub>	1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.2750E-01	3.417E-05	4.249E+11	3.2620E-01	3.824E-05	4.754E+11
1s 2s <sup>3</sup> S <sub>1</sub>	1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6057E+00	3.719E-06	1.924E+09	1.5989E+00	3.831E-06	1.982E+09
1s 2s <sup>1</sup> S <sub>0</sub>	1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6236E+00	2.491E-06	1.261E+09	1.6170E+00	2.469E-06	1.249E+09
1s 3s <sup>3</sup> S <sub>1</sub>	1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	6.1216E+00	1.070E-06	3.810E+07	6.0965E+00	1.086E-06	3.865E+07
1s 3s <sup>1</sup> S <sub>0</sub>	1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	6.1903E+00	7.330E-07	2.552E+07	6.1656E+00	6.999E-07	2.435E+07
1s 3d <sup>3</sup> D <sub>2</sub>	1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	6.5936E+00	2.191E-13	6.724E+00			

(continued on next page)



Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s 3d $^3D_1$	1s 4p $^3P_2^0$	6.5989E+00	1.089E-12	3.337E+01			
1s 3d $^3D_3$	1s 4p $^3P_2^0$	6.7234E+00	2.581E-07	7.616E+06	6.6951E+00	2.493E-07	7.359E+06
1s 3d $^1D_2$	1s 4p $^3P_2^0$	6.7284E+00	6.488E-08	1.912E+06	6.7001E+00	6.220E-08	1.832E+06
1s 4s $^3S_1$	1s 4p $^3P_2^0$	2.1675E+02	6.059E-10	1.720E+01	2.1631E+02	6.045E-10	1.709E+01
1s 4s $^1S_0$	1s 4p $^3P_2^0$	2.5764E+02	2.410E-10	4.843E+00	2.5767E+02	2.384E-10	4.750E+00
1s 2p $^3P_1^0$	1s 4d $^3D_2$	1.6212E+00	2.912E-07	1.478E+08	1.6144E+00	3.095E-07	1.571E+08
1s 2p $^3P_0^0$	1s 4d $^3D_2$	1.6224E+00	1.846E-07	9.355E+07	1.6156E+00	1.932E-07	9.790E+07
1s 2p $^3P_2^0$	1s 4d $^3D_2$	1.7079E+00	1.219E-10	5.573E+04	1.7007E+00	1.718E-10	7.857E+04
1s 2p $^1P_1^0$	1s 4d $^3D_2$	1.7162E+00	7.192E-12	3.257E+03			
1s 3p $^3P_1^0$	1s 4d $^3D_2$	6.1751E+00	9.219E-08	3.225E+06	6.1494E+00	9.398E-08	3.287E+06
1s 3p $^3P_0^0$	1s 4d $^3D_2$	6.1799E+00	5.803E-08	2.027E+06	6.1541E+00	5.875E-08	2.051E+06
1s 3p $^3P_2^0$	1s 4d $^3D_2$	6.5523E+00	4.903E-11	1.524E+03	6.5248E+00	5.664E-11	1.760E+03
1s 3p $^1P_1^0$	1s 4d $^3D_2$	6.5868E+00	6.167E-13	1.896E+01			
1s 4p $^3P_1^0$	1s 4d $^3D_2$	2.3795E+02	1.520E-11	3.582E-01	2.3625E+02	1.552E-11	3.679E-01
1s 4p $^3P_0^0$	1s 4d $^3D_2$	2.4086E+02	9.221E-12	2.120E-01	2.3903E+02	9.376E-12	2.170E-01
1s 4p $^3P_2^0$	1s 4d $^3D_2$	3.5515E+03	2.231E-18	2.359E-10			
1s 2p $^3P_1^0$	1s 4d $^3D_1$	1.6210E+00	2.862E-07	2.422E+08	1.6143E+00	3.012E-07	2.548E+08
1s 2p $^3P_2^0$	1s 4d $^3D_1$	1.7078E+00	3.653E-13	2.785E+02			
1s 2p $^1P_1^0$	1s 4d $^3D_1$	1.7161E+00	3.609E-10	2.724E+05	1.7090E+00	3.716E-10	2.805E+05
1s 3p $^3P_1^0$	1s 4d $^3D_1$	6.1732E+00	8.985E-08	5.242E+06	6.1476E+00	9.158E-08	5.342E+06
1s 3p $^3P_2^0$	1s 4d $^3D_1$	6.5502E+00	5.443E-13	2.821E+01			
1s 3p $^1P_1^0$	1s 4d $^3D_1$	6.5847E+00	1.129E-10	5.788E+03	6.5574E+00	8.882E-11	4.553E+03
1s 4p $^3P_1^0$	1s 4d $^3D_1$	2.3523E+02	1.537E-11	6.175E-01	2.3358E+02	1.564E-11	6.320E-01
1s 4p $^3P_2^0$	1s 4d $^3D_1$	3.0279E+03	4.275E-19	1.037E-10			
1s 2s $^3S_1$	1s 4p $^1P_1^0$	1.6048E+00	3.673E-06	3.171E+09	1.5980E+00	3.832E-06	3.308E+09
1s 3s $^3S_1$	1s 4p $^1P_1^0$	6.1092E+00	1.049E-06	6.249E+07	6.0840E+00	1.091E-06	6.499E+07
1s 3d $^3D_2$	1s 4p $^1P_1^0$	6.5793E+00	6.881E-13	3.535E+01			
1s 3d $^3D_1$	1s 4p $^1P_1^0$	6.5845E+00	2.464E-13	1.264E+01			
1s 3d $^3D_3$	1s 4p $^1P_1^0$	6.7085E+00	4.497E-08	2.222E+06	6.6801E+00	4.629E-08	2.286E+06
1s 3d $^1D_2$	1s 4p $^1P_1^0$	6.7135E+00	1.426E-07	7.036E+06	6.6851E+00	1.415E-07	6.984E+06
1s 4s $^3S_1$	1s 4p $^1P_1^0$	2.0225E+02	7.466E-10	4.058E+01	2.0166E+02	7.451E-10	4.039E+01
1s 4d $^3D_2$	1s 4p $^1P_1^0$	2.0339E+04	7.155E-23	3.846E-16			
1s 4d $^3D_1$	1s 4p $^1P_1^0$	2.1218E+06	1.608E-26	7.940E-24			
1s 2p $^3P_1^0$	1s 4d $^3D_3$	1.6179E+00	4.628E-06	1.685E+09	1.6112E+00	4.723E-06	1.719E+09
1s 2p $^3P_2^0$	1s 4d $^3D_3$	1.7043E+00	2.069E-05	6.788E+09	1.6972E+00	2.154E-05	7.068E+09
1s 2p $^1P_1^0$	1s 4d $^3D_3$	1.7126E+00	3.719E-06	1.208E+09	1.7055E+00	3.855E-06	1.252E+09
1s 3p $^3P_1^0$	1s 4d $^3D_3$	6.1283E+00	1.363E-06	3.459E+07	6.1030E+00	1.371E-06	3.478E+07
1s 3p $^3P_2^0$	1s 4d $^3D_3$	6.4997E+00	7.099E-06	1.601E+08	6.4725E+00	7.232E-06	1.631E+08
1s 3p $^1P_1^0$	1s 4d $^3D_3$	6.5336E+00	1.286E-06	2.871E+07	6.5067E+00	1.277E-06	2.850E+07
1s 4p $^3P_1^0$	1s 4d $^3D_3$	1.8386E+02	5.115E-10	1.442E+01	1.8281E+02	5.134E-10	1.451E+01
1s 4p $^3P_2^0$	1s 4d $^3D_3$	6.5884E+02	5.524E-11	1.213E-01	6.5162E+02	5.648E-11	1.256E-01
1s 4p $^1P_1^0$	1s 4d $^3D_3$	8.4240E+02	4.763E-12	6.396E-03	8.3413E+02	4.865E-12	6.606E-03
1s 2s $^3S_1$	1s 4f $^3F_3^0$	1.6017E+00	1.411E-10	5.242E+04			
1s 3s $^3S_1$	1s 4f $^3F_3^0$	6.0645E+00	6.814E-12	1.765E+02			
1s 3d $^3D_2$	1s 4f $^3F_3^0$	6.5275E+00	2.415E-06	5.402E+07	6.5002E+00	2.450E-06	5.479E+07
1s 3d $^3D_1$	1s 4f $^3F_3^0$	6.5326E+00	4.080E-07	9.111E+06	6.5052E+00	4.131E-07	9.224E+06
1s 3d $^3D_3$	1s 4f $^3F_3^0$	6.6546E+00	1.660E-11	3.572E+02			
1s 3d $^1D_2$	1s 4f $^3F_3^0$	6.6595E+00	2.267E-10	4.871E+03			
1s 4s $^3S_1$	1s 4f $^3F_3^0$	1.6258E+02	2.126E-19	7.665E-09	1.6211E+02	1.540E-16	5.538E-06
1s 4d $^3D_2$	1s 4f $^3F_3^0$	7.9649E+02	3.345E-12	5.024E-03	8.0096E+02	3.264E-12	4.808E-03
1s 4d $^3D_1$	1s 4f $^3F_3^0$	8.2863E+02	5.020E-13	6.967E-04	8.3335E+02	4.900E-13	6.666E-04
1s 4d $^3D_3$	1s 4f $^3F_3^0$	5.1914E+04	8.399E-23	2.970E-17			
1s $^2S_1$	1s 4f $^3F_2^0$	3.2740E-01	1.149E-10	1.430E+06	3.2603E-01	4.930E-12	6.135E+04
1s 2s $^3S_1$	1s 4f $^3F_2^0$	1.6017E+00	4.643E-11	2.414E+04	1.5949E+00	4.969E-13	2.583E+02
1s 2s $^1S_0$	1s 4f $^3F_2^0$	1.6195E+00	4.740E-11	2.411E+04	1.6129E+00	3.203E-13	1.628E+02
1s 3s $^3S_1$	1s 4f $^3F_2^0$	6.0636E+00	9.483E-12	3.441E+02			
1s 3s $^1S_0$	1s 4f $^3F_2^0$	6.1310E+00	6.089E-12	2.161E+02			
1s 3d $^3D_2$	1s 4f $^3F_2^0$	6.5264E+00	6.054E-07	1.896E+07	6.4991E+00	6.141E-07	1.923E+07
1s 3d $^3D_1$	1s 4f $^3F_2^0$	6.5315E+00	1.411E-06	4.412E+07	6.5041E+00	1.429E-06	4.469E+07
1s 3d $^3D_3$	1s 4f $^3F_2^0$	6.6535E+00	1.331E-14	4.010E-01			
1s 3d $^1D_2$	1s 4f $^3F_2^0$	6.6584E+00	6.185E-12	1.861E+02			
1s 4s $^3S_1$	1s 4f $^3F_2^0$	1.6191E+02	2.730E-16	1.389E-05	1.6143E+02	9.377E-17	4.760E-06
1s 4s $^1S_0$	1s 4f $^3F_2^0$	1.8368E+02	2.477E-16	9.794E-06	1.8340E+02	8.510E-17	3.346E-06
1s 4d $^3D_2$	1s 4f $^3F_2^0$	7.8052E+02	8.910E-13	1.951E-03	7.8473E+02	8.697E-13	1.868E-03
1s 4d $^3D_1$	1s 4f $^3F_2^0$	8.1135E+02	1.850E-12	3.749E-03	8.1580E+02	1.806E-12	3.590E-03
1s 4d $^3D_3$	1s 4f $^3F_2^0$	2.2242E+04	1.812E-22	4.886E-16			
1s 2p $^3P_1^0$	1s 4d $^1D_2$	1.6178E+00	1.786E-06	9.103E+08	1.6111E+00	1.843E-06	9.395E+08
1s 2p $^3P_0^0$	1s 4d $^1D_2$	1.6191E+00	2.139E-06	1.089E+09	1.6123E+00	2.188E-06	1.113E+09
1s 2p $^3P_2^0$	1s 4d $^1D_2$	1.7042E+00	5.187E-06	2.383E+09	1.6970E+00	5.388E-06	2.474E+09
1s 2p $^1P_1^0$	1s 4d $^1D_2$	1.7124E+00	1.163E-05	5.291E+09	1.7053E+00	1.7053E-05	5.484E+09
1s 3p $^3P_1^0$	1s 4d $^1D_2$	6.1264E+00	5.148E-07	1.830E+07	6.1011E+00	5.378E-07	1.911E+07

(continued on next page)

Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s 3p $^3P_0^o$	1s 4d $^1D_2$	6.1312E+00	6.270E-07	2.225E+07	6.1056E+00	6.363E-07	2.257E+07
1s 3p $^3P_1^o$	1s 4d $^1D_2$	6.4976E+00	1.773E-06	5.603E+07	6.4704E+00	1.809E-06	5.717E+07
1s 3p $^1P_1^o$	1s 4d $^1D_2$	6.5315E+00	4.042E-06	1.264E+08	6.5045E+00	4.060E-06	1.269E+08
1s 4p $^3P_0^o$	1s 4d $^1D_2$	1.8218E+02	1.978E-10	7.953E+00	1.8111E+02	1.990E-10	8.026E+00
1s 4p $^3P_1^o$	1s 4d $^1D_2$	1.8388E+02	2.351E-10	9.278E+00	1.8274E+02	2.365E-10	9.368E+00
1s 4p $^3P_2^o$	1s 4d $^1D_2$	6.3767E+02	1.524E-11	5.000E-02	6.3050E+02	1.558E-11	5.186E-02
1s 4p $^1P_1^o$	1s 4d $^1D_2$	8.0810E+02	1.703E-11	3.478E-02	7.9983E+02	1.737E-11	3.591E-02
1s 4f $^3F_3^o$	1s 4d $^1D_2$	3.2125E+04	6.900E-21	8.919E-15			
1s 4f $^3F_2^o$	1s 4d $^1D_2$	1.8409E+05	1.136E-24	4.473E-20			
1s 3d $^3D_2$	1s 4f $^3F_4^o$	6.5015E+00	4.667E-06	8.182E+07	6.4744E+00	4.702E-06	8.243E+07
1s 3d $^3D_3$	1s 4f $^3F_4^o$	6.6276E+00	2.919E-05	4.925E+08	6.5997E+00	2.959E-05	4.992E+08
1s 3d $^1D_2$	1s 4f $^3F_4^o$	6.6325E+00	2.355E-06	3.967E+07	6.6046E+00	2.385E-06	4.019E+07
1s 4d $^3D_2$	1s 4f $^3F_4^o$	5.3564E+02	2.134E-11	5.513E-02	5.3733E+02	2.081E-11	5.297E-02
1s 4d $^3D_3$	1s 4f $^3F_4^o$	1.5856E+03	5.232E-12	1.542E-03	1.6034E+03	5.007E-12	1.431E-03
1s 4d $^1D_2$	1s 4f $^3F_4^o$	1.7232E+03	3.306E-13	8.252E-05	1.7474E+03	3.143E-13	7.566E-05
1s 2s $^3S_1$	1s 4f $^1F_3^o$	1.6001E+00	2.058E-13	7.659E+01			
1s 3s $^3S_1$	1s 4f $^1F_3^o$	6.0414E+00	5.284E-12	1.380E+02			
1s 3d $^3D_2$	1s 4f $^1F_3^o$	6.5007E+00	5.480E-07	1.236E+07	6.4736E+00	5.559E-07	1.253E+07
1s 3d $^3D_1$	1s 4f $^1F_3^o$	6.5058E+00	3.118E-06	7.020E+07	6.4786E+00	3.140E-06	7.069E+07
1s 3d $^3D_3$	1s 4f $^1F_3^o$	6.6268E+00	3.503E-06	7.602E+07	6.5989E+00	3.552E-06	7.708E+07
1s 3d $^1D_2$	1s 4f $^1F_3^o$	6.6317E+00	2.098E-05	4.545E+08	6.6038E+00	2.124E-05	4.602E+08
1s 4s $^3S_1$	1s 4f $^1F_3^o$	1.4747E+02	1.639E-15	7.182E-05	1.4705E+02	1.598E-15	6.984E-05
1s 4d $^3D_2$	1s 4f $^1F_3^o$	5.3023E+02	2.655E-12	8.999E-03	5.3185E+02	2.605E-12	8.701E-03
1s 4d $^3D_1$	1s 4f $^1F_3^o$	5.4428E+02	1.364E-11	4.388E-02	5.4594E+02	1.331E-11	4.220E-02
1s 4d $^3D_3$	1s 4f $^1F_3^o$	1.5391E+03	6.867E-13	2.763E-04	1.5556E+03	6.579E-13	2.568E-04
1s 4d $^1D_2$	1s 4f $^1F_3^o$	1.6685E+03	3.227E-12	1.105E-03	1.6908E+03	3.068E-12	1.014E-03
1s 2p $^3P_0^o$	1s 5s $^3S_1$	1.4605E+00	3.050E-10	3.179E+05	1.4544E+00	4.408E-10	4.594E+05
1s 2p $^3P_1^o$	1s 5s $^3S_1$	1.5306E+00	2.559E-07	2.429E+08	1.5241E+00	2.484E-07	2.357E+08
1s 2p $^1P_1^o$	1s 5s $^3S_1$	1.5372E+00	2.603E-07	2.449E+08	1.5308E+00	2.448E-07	2.302E+08
1s 3p $^3P_0^o$	1s 5s $^3S_1$	4.3516E+00	1.805E-10	2.119E+04	4.3336E+00	2.612E-10	3.066E+04
1s 3p $^3P_1^o$	1s 5s $^3S_1$	4.5356E+00	1.712E-07	1.851E+07	4.5167E+00	1.689E-07	1.825E+07
1s 3p $^1P_1^o$	1s 5s $^3S_1$	4.5521E+00	1.739E-07	1.866E+07	4.5333E+00	1.668E-07	1.790E+07
1s 4p $^3P_0^o$	1s 5s $^3S_1$	1.3877E+01	1.225E-10	1.414E+03	1.3818E+01	1.886E-10	2.178E+03
1s 4p $^3P_1^o$	1s 5s $^3S_1$	1.4675E+01	1.220E-07	1.260E+06	1.4612E+01	1.208E-07	1.247E+06
1s 4p $^1P_1^o$	1s 5s $^3S_1$	1.4747E+01	1.241E-07	1.268E+06	1.4684E+01	1.189E-07	1.215E+06
1s 4f $^3F_3^o$	1s 5s $^3S_1$	1.5014E+01	7.117E-15	7.019E-02			
1s 4f $^3F_2^o$	1s 5s $^3S_1$	1.5020E+01	3.744E-18	3.690E-05			
1s 4f $^1F_3^o$	1s 5s $^3S_1$	1.5158E+01	4.158E-14	4.024E-01			
1s 2s $^3S_1$	1s 5p $^3P_0^o$	1.4466E+00	2.751E-09	2.923E+06	1.4405E+00	2.623E-09	2.787E+06
1s 3s $^3S_1$	1s 5p $^3P_0^o$	4.3132E+00	9.001E-10	1.076E+05	4.2953E+00	7.868E-10	9.401E+04
1s 3d $^3D_2$	1s 5p $^3P_0^o$	4.5423E+00	1.872E-09	2.018E+05	4.5233E+00	1.852E-09	1.996E+05
1s 3d $^3D_1$	1s 5p $^3P_0^o$	4.5448E+00	1.860E-09	2.002E+05	4.5258E+00	1.819E-09	1.957E+05
1s 3d $^3D_3$	1s 5p $^3P_0^o$	4.6035E+00	3.130E-08	3.284E+06	4.5841E+00	3.112E-08	3.264E+06
1s 3d $^1D_2$	1s 5p $^3P_0^o$	4.6059E+00	1.184E-08	1.241E+06	4.5865E+00	1.116E-08	1.169E+06
1s 4s $^3S_1$	1s 5p $^3P_0^o$	1.3679E+01	3.955E-10	4.699E+03	1.3623E+01	3.048E-10	3.621E+03
1s 4d $^3D_2$	1s 5p $^3P_0^o$	1.4661E+01	2.272E-09	2.350E+04	1.4602E+01	2.264E-09	2.341E+04
1s 4d $^3D_1$	1s 5p $^3P_0^o$	1.4671E+01	2.229E-09	2.302E+04	1.4612E+01	2.198E-09	2.269E+04
1s 4d $^3D_3$	1s 5p $^3P_0^o$	1.4932E+01	3.752E-08	3.742E+05	1.4871E+01	3.761E-08	3.749E+05
1s 4d $^1D_2$	1s 5p $^3P_0^o$	1.4943E+01	1.413E-08	1.408E+05	1.4882E+01	1.340E-08	1.334E+05
1s 5s $^3S_1$	1s 5p $^3P_0^o$	2.8648E+03	8.236E-16	2.231E-07	2.9004E+03	8.265E-16	2.165E-07
1s 2p $^3P_2^o$	1s 5s $^1S_0$	1.5297E+00	1.624E-07	4.628E+08	1.5233E+00	1.659E-07	4.728E+08
1s 3p $^3P_0^o$	1s 5s $^1S_0$	4.5281E+00	1.095E-07	3.561E+07	4.5091E+00	1.132E-07	3.682E+07
1s 4p $^3P_0^o$	1s 5s $^1S_0$	1.4597E+01	7.783E-08	2.437E+06	1.4533E+01	8.188E-08	2.563E+06
1s 4f $^3F_2^o$	1s 5s $^1S_0$	1.4938E+01	9.202E-15	2.751E-01			
1s 3d $^3D_2$	1s 5p $^3P_0^o$	4.5418E+00	1.202E-09	3.888E+05	4.5228E+00	1.184E-09	3.828E+05
1s 3d $^1D_2$	1s 5p $^3P_0^o$	4.6053E+00	1.441E-08	4.531E+06	4.5860E+00	1.410E-08	4.436E+06
1s 4d $^3D_2$	1s 5p $^3P_0^o$	1.4656E+01	1.425E-09	4.426E+04	1.4597E+01	1.412E-09	4.385E+04
1s 4d $^1D_2$	1s 5p $^3P_0^o$	1.4937E+01	1.725E-08	5.156E+05	1.4877E+01	1.705E-08	5.096E+05
1s $^2^1S_0$	1s 5p $^3P_0^o$	3.2010E-01	1.717E-05	2.234E+11	3.1883E-01	1.929E-05	2.510E+11
1s 2s $^3S_1$	1s 5p $^3P_0^o$	1.4424E+00	1.922E-06	1.232E+09	1.4363E+00	1.984E-06	1.272E+09
1s 2s $^1S_0$	1s 5p $^3P_0^o$	1.4568E+00	1.283E-06	8.066E+08	1.4509E+00	1.283E-06	8.066E+08
1s 3s $^3S_1$	1s 5p $^3P_0^o$	4.2763E+00	5.990E-07	4.370E+07	4.2586E+00	6.082E-07	4.435E+07
1s 3s $^1S_0$	1s 5p $^3P_0^o$	4.3097E+00	4.071E-07	2.924E+07	4.2923E+00	3.960E-07	2.843E+07
1s 3d $^3D_2$	1s 5p $^3P_0^o$	4.5014E+00	6.201E-14	4.082E+00			
1s 3d $^3D_1$	1s 5p $^3P_0^o$	4.5039E+00	5.894E-13	3.876E+01			
1s 3d $^3D_3$	1s 5p $^3P_0^o$	4.5615E+00	1.111E-07	7.123E+06	4.5423E+00	1.073E-07	6.882E+06
1s 3d $^1D_2$	1s 5p $^3P_0^o$	4.5638E+00	2.802E-08	1.794E+06	4.5447E+00	2.679E-08	1.716E+06
1s 4s $^3S_1$	1s 5p $^3P_0^o$	1.3315E+01	2.473E-07	1.861E+06	1.3261E+01	2.502E-07	1.882E+06
1s 4s $^1S_0$	1s 5p $^3P_0^o$	1.3446E+01	1.705E-07	1.258E+06	1.3392E+01	1.619E-07	1.194E+06
1s 4d $^3D_2$	1s 5p $^3P_0^o$	1.4243E+01	5.361E-13	3.525E+00			
1s 4d $^3D_1$	1s 5p $^3P_0^o$	1.4253E+01	3.646E-13	2.394E+00			

(continued on next page)

Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )	$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )
1s 4d <sup>3</sup> D <sub>3</sub>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.4499E+01	1.363E-07	8.649E+05	1.4440E+01	1.327E-07	8.420E+05
1s 4d <sup>1</sup> D <sub>2</sub>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.4509E+01	3.425E-08	2.170E+05	1.4450E+01	3.310E-08	2.097E+05
1s 5s <sup>3</sup> S <sub>1</sub>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.2565E+02	2.014E-10	1.483E+00	4.2515E+02	2.001E-10	1.464E+00
1s 5s <sup>1</sup> S <sub>0</sub>	1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	5.0438E+02	8.081E-11	4.238E-01	5.0484E+02	7.970E-11	4.136E-01
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	1.4552E+00	1.344E-07	8.464E+07	1.4491E+00	1.437E-07	9.054E+07
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	1.4562E+00	8.458E-08	5.321E+07	1.4501E+00	8.881E-08	5.586E+07
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	1.5247E+00	7.189E-11	4.125E+04	1.5183E+00	1.049E-10	6.019E+04
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	1.5313E+00	7.295E-15	4.150E+00			
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	4.3049E+00	4.655E-08	3.351E+06	4.2870E+00	4.769E-08	3.433E+06
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	4.3072E+00	2.903E-08	2.087E+06	4.2892E+00	2.951E-08	2.121E+06
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	4.4849E+00	3.092E-11	2.051E+03	4.4661E+00	3.730E-11	2.473E+03
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	4.5010E+00	3.286E-13	2.164E+01			
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	1.3413E+01	1.867E-08	1.385E+05	1.3354E+01	1.890E-08	1.401E+05
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	1.3422E+01	1.165E-08	8.628E+04	1.3363E+01	1.171E-08	8.675E+04
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	1.4158E+01	1.382E-11	9.197E+01	1.4095E+01	1.553E-11	1.034E+02
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	1.4224E+01	2.600E-13	1.714E+00			
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	1.4473E+01	7.457E-09	4.750E+04	1.4409E+01	7.405E-09	4.718E+04
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	1.4478E+01	1.873E-09	1.192E+04	1.4414E+01	1.853E-09	1.179E+04
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	1.4602E+01	1.516E-08	9.483E+04	1.4537E+01	1.503E-08	9.412E+04
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	1.4606E+01	1.852E-09	1.158E+04	1.4541E+01	1.832E-09	1.146E+04
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	4.6651E+02	5.572E-12	3.415E-02	4.6168E+02	5.725E-12	3.553E-02
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	4.7209E+02	3.350E-12	2.005E-02	4.6698E+02	3.426E-12	2.078E-02
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>2</sub>	6.9791E+03	1.076E-18	2.947E-11			
1s 2s <sup>3</sup> S <sub>1</sub>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.4421E+00	1.903E-06	2.034E+09	1.4360E+00	1.983E-06	2.120E+09
1s 3s <sup>3</sup> S <sub>1</sub>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.2732E+00	5.899E-07	7.183E+07	4.2555E+00	6.087E-07	7.410E+07
1s 3d <sup>3</sup> D <sub>2</sub>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.4980E+00	3.519E-13	3.867E+01			
1s 3d <sup>3</sup> D <sub>1</sub>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.5005E+00	4.503E-14	4.944E+00			
1s 3d <sup>3</sup> D <sub>3</sub>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.5580E+00	1.937E-08	2.073E+06	4.5388E+00	1.975E-08	2.113E+06
1s 3d <sup>1</sup> D <sub>2</sub>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.5603E+00	6.171E-08	6.598E+06	4.5411E+00	6.080E-08	6.500E+06
1s 4s <sup>3</sup> S <sub>1</sub>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.3285E+01	2.421E-07	3.050E+06	1.3231E+01	2.516E-07	3.168E+06
1s 4d <sup>3</sup> D <sub>2</sub>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.4209E+01	7.511E-15	8.271E-02			
1s 4d <sup>3</sup> D <sub>1</sub>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.4219E+01	3.306E-10	3.636E+00			
1s 4d <sup>3</sup> D <sub>3</sub>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.4463E+01	2.382E-08	2.532E+05	1.4404E+01	2.459E-08	2.612E+05
1s 4d <sup>1</sup> D <sub>2</sub>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.4474E+01	7.561E-08	8.025E+05	1.4415E+01	7.547E-08	8.007E+05
1s 5s <sup>3</sup> S <sub>1</sub>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	3.9729E+02	2.478E-10	3.491E+00	3.9647E+02	2.465E-10	3.457E+00
1s 5d <sup>3</sup> D <sub>2</sub>	1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.1006E+04	1.343E-22	1.776E-16			
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>1</sub>	1.4551E+00	1.319E-07	1.385E+08	1.4491E+00	1.392E-07	1.461E+08
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>1</sub>	1.5247E+00	2.190E-13	2.095E+02			
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>1</sub>	1.5313E+00	1.600E-10	1.517E+05	1.5249E+00	1.733E-10	1.643E+05
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>1</sub>	4.3044E+00	4.527E-08	5.432E+06	4.2865E+00	4.624E-08	5.548E+06
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>1</sub>	4.4844E+00	3.083E-13	3.408E+01			
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>1</sub>	4.5005E+00	5.280E-11	5.796E+03	4.4818E+00	4.790E-11	5.257E+03
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>1</sub>	1.3409E+01	1.812E-08	2.241E+05	1.3350E+01	1.835E-08	2.270E+05
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>1</sub>	1.4153E+01	2.043E-13	2.268E+00			
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>1</sub>	1.4219E+01	2.169E-11	2.385E+02	1.4157E+01	1.589E-11	1.748E+02
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>1</sub>	1.4467E+01	1.254E-09	1.332E+04	1.4404E+01	1.253E-09	1.332E+04
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>1</sub>	1.4473E+01	4.348E-09	4.616E+04	1.4409E+01	4.329E-09	4.596E+04
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>1</sub>	1.4601E+01	1.014E-08	1.058E+05	1.4536E+01	1.009E-08	1.053E+05
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>1</sub>	4.6125E+02	5.605E-12	5.858E-02	4.5655E+02	5.740E-12	6.071E-02
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>1</sub>	5.9615E+03	1.448E-19	9.058E-12			
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>1</sub>	1.4006E+07	1.496E-28	1.698E-27			
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>3</sub>	1.4539E+00	2.153E-06	9.704E+08	1.4478E+00	2.200E-06	9.919E+08
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>3</sub>	1.5233E+00	9.425E-06	3.871E+09	1.5168E+00	9.852E-06	4.045E+09
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>3</sub>	1.5298E+00	1.691E-06	6.884E+08	1.5235E+00	1.767E-06	7.196E+08
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>3</sub>	4.2932E+00	7.013E-07	3.626E+07	4.2754E+00	7.111E-07	3.676E+07
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>3</sub>	4.4722E+00	3.457E-06	1.647E+08	4.4535E+00	3.522E-06	1.678E+08
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>3</sub>	4.4883E+00	6.233E-07	2.948E+07	4.4696E+00	6.279E-07	2.969E+07
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>3</sub>	1.3300E+01	2.701E-07	1.455E+06	1.3242E+01	2.699E-07	1.454E+06
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>3</sub>	1.4032E+01	1.483E-06	7.178E+06	1.3970E+01	1.506E-06	7.291E+06
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>3</sub>	1.4097E+01	2.694E-07	1.292E+06	1.4036E+01	2.656E-07	1.274E+06
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>3</sub>	1.4341E+01	5.108E-14	2.367E-01			
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>3</sub>	1.4347E+01	1.695E-13	7.849E-01			
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>3</sub>	1.4468E+01	8.474E-08	3.857E+05	1.4405E+01	8.385E-08	3.818E+05
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>3</sub>	1.4472E+01	1.019E-08	4.636E+04	1.4409E+01	1.005E-08	4.575E+04
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>3</sub>	3.6020E+02	1.859E-10	1.366E+00	3.5728E+02	1.880E-10	1.392E+00
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>3</sub>	1.2888E+03	2.022E-11	1.160E-02	1.2633E+03	2.122E-11	1.256E-02
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>3</sup> D <sub>3</sub>	1.6441E+03	1.755E-12	6.188E-04	1.6091E+03	1.854E-12	6.766E-04
1s 2s <sup>3</sup> S <sub>1</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4408E+00	9.780E-11	4.489E+04			
1s 3s <sup>3</sup> S <sub>1</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.2620E+00	6.114E-13	3.207E+01			
1s 3d <sup>3</sup> D <sub>2</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.4855E+00	7.993E-07	3.786E+07	4.4667E+00	8.162E-07	3.865E+07
1s 3d <sup>3</sup> D <sub>1</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.4880E+00	1.349E-07	6.380E+06	4.4691E+00	1.376E-07	6.509E+06

(continued on next page)

Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	<i>gf</i>	<i>A</i> ( $s^{-1}$ )	$\lambda$ (Å)	<i>gf</i>	<i>A</i> ( $s^{-1}$ )
1s 3d <sup>3</sup> D <sub>3</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.5452E+00	4.800E−12	2.214E+02			
1s 3d <sup>1</sup> D <sub>2</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.5475E+00	6.705E−11	3.089E+03			
1s 4s <sup>3</sup> S <sub>1</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.3177E+01	2.554E−13	1.402E+00			
1s 4d <sup>3</sup> D <sub>2</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4085E+01	4.505E−07	2.164E+06	1.4028E+01	4.534E−07	2.177E+06
1s 4d <sup>3</sup> D <sub>1</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4095E+01	7.610E−08	3.650E+05	1.4038E+01	7.640E−08	3.663E+05
1s 4d <sup>3</sup> D <sub>3</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4335E+01	2.763E−12	1.281E+01			
1s 4d <sup>1</sup> D <sub>2</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4345E+01	5.743E−11	2.659E+02	1.4286E+01	5.957E−11	2.757E+02
1s 5s <sup>3</sup> S <sub>1</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.1888E+02	1.023E−17	9.585E−08	3.1776E+02	8.216E−17	7.688E−07
1s 5d <sup>3</sup> D <sub>2</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.5543E+03	1.612E−12	6.359E−04	1.5716E+03	1.545E−12	5.911E−04
1s 5d <sup>3</sup> D <sub>1</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6158E+03	2.424E−13	8.846E−05	1.6341E+03	2.321E−13	8.213E−05
1s 5d <sup>3</sup> D <sub>3</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	9.3195E+04	4.604E−23	5.051E−18			
1s <sup>2</sup> <sup>1</sup> S <sub>0</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.2000E−01	9.916E−11	1.291E+06	3.1875E−01	4.044E−12	5.265E+04
1s 2s <sup>3</sup> S <sub>1</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4408E+00	3.316E−11	2.131E+04	1.4347E+00	4.172E−13	2.681E+02
1s 2s <sup>1</sup> S <sub>0</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4551E+00	3.223E−11	2.030E+04	1.4492E+00	2.698E−13	1.699E+02
1s 3s <sup>3</sup> S <sub>1</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.2617E+00	1.699E−12	1.248E+02			
1s 3s <sup>1</sup> S <sub>0</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.2949E+00	1.182E−12	8.548E+01			
1s 3d <sup>3</sup> D <sub>2</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.4853E+00	2.005E−07	1.330E+07	4.4664E+00	2.044E−07	1.355E+07
1s 3d <sup>3</sup> D <sub>1</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.4877E+00	4.668E−07	3.092E+07	4.4688E+00	4.763E−07	3.155E+07
1s 3d <sup>3</sup> D <sub>3</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.5449E+00	4.501E−15	2.907E−01			
1s 3d <sup>1</sup> D <sub>2</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.5472E+00	1.914E−12	1.235E+02			
1s 4s <sup>3</sup> S <sub>1</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.3175E+01	1.082E−12	8.314E+00			
1s 4s <sup>1</sup> S <sub>0</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.3303E+01	5.809E−13	4.379E+00			
1s 4d <sup>3</sup> D <sub>2</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4083E+01	1.128E−07	7.589E+05	1.4025E+01	1.136E−07	7.641E+05
1s 4d <sup>3</sup> D <sub>1</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4092E+01	2.633E−07	1.768E+06	1.4035E+01	2.646E−07	1.776E+06
1s 4d <sup>3</sup> D <sub>3</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4332E+01	2.202E−14	1.430E−01			
1s 4d <sup>1</sup> D <sub>2</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.4343E+01	2.824E−12	1.832E+01			
1s 5s <sup>3</sup> S <sub>1</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.1755E+02	1.065E−16	1.409E−06	3.1643E+02	4.872E−17	6.436E−07
1s 5s <sup>1</sup> S <sub>0</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.5940E+02	1.023E−16	1.057E−06	3.5855E+02	4.660E−17	4.795E−07
1s 5d <sup>3</sup> D <sub>2</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.5232E+03	4.293E−13	2.469E−04	1.5396E+03	4.117E−13	2.297E−04
1s 5d <sup>3</sup> D <sub>1</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.5821E+03	8.937E−13	4.763E−04	1.5996E+03	8.566E−13	4.428E−04
1s 5d <sup>3</sup> D <sub>3</sub>	1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.1865E+04	1.183E−22	9.007E−17			
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	1.4538E+00	8.312E−07	5.247E+08	1.4478E+00	8.539E−07	5.388E+08
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	1.4548E+00	9.966E−07	6.282E+08	1.4487E+00	1.018E−06	6.420E+08
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	1.5232E+00	2.366E−06	1.360E+09	1.5168E+00	2.463E−06	1.416E+09
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	1.5298E+00	5.292E−06	3.017E+09	1.5234E+00	5.518E−06	3.145E+09
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	4.2927E+00	2.650E−07	1.918E+07	4.2749E+00	2.739E−07	1.982E+07
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	4.2951E+00	3.229E−07	2.335E+07	4.2771E+00	3.287E−07	2.377E+07
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	4.4717E+00	8.646E−07	5.768E+07	4.4529E+00	8.809E−07	5.876E+07
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	4.4877E+00	1.961E−06	1.299E+08	4.4691E+00	1.983E−06	1.313E+08
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	1.3295E+01	1.013E−07	7.645E+05	1.3238E+01	1.057E−07	7.981E+05
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	1.3304E+01	1.241E−07	9.356E+05	1.3246E+01	1.253E−07	9.450E+05
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	1.4027E+01	3.703E−07	2.511E+06	1.3965E+01	3.769E−07	2.556E+06
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	1.4092E+01	8.483E−07	5.699E+06	1.4031E+01	8.480E−07	5.698E+06
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	1.4336E+01	1.005E−12	6.522E+00			
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	1.4341E+01	4.083E−16	2.648E−03			
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	1.4463E+01	6.852E−09	4.371E+04	1.4399E+01	6.850E−09	4.370E+04
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	1.4467E+01	6.065E−08	3.866E+05	1.4403E+01	6.025E−08	3.842E+05
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	3.5679E+02	7.174E−11	7.518E−01	3.5385E+02	7.273E−11	7.683E−01
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	3.6004E+02	8.559E−11	8.808E−01	3.5695E+02	8.675E−11	9.006E−01
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	1.2461E+03	5.596E−12	4.807E−03	1.2214E+03	5.871E−12	5.205E−03
1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	1.5753E+03	6.301E−12	3.387E−03	1.5418E+03	6.642E−12	3.695E−03
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	6.3169E+04	3.487E−21	1.166E−15			
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5d <sup>1</sup> D <sub>2</sub>	3.7392E+05	6.620E−25	6.316E−21			
1s 3d <sup>3</sup> D <sub>2</sub>	1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.4792E+00	1.568E−06	5.791E+07	4.4604E+00	1.578E−06	5.829E+07
1s 3d <sup>3</sup> D <sub>3</sub>	1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.5387E+00	9.572E−06	3.444E+08	4.5196E+00	9.774E−06	3.516E+08
1s 3d <sup>1</sup> D <sub>2</sub>	1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	4.5410E+00	7.718E−07	2.774E+07	4.5219E+00	7.887E−07	2.834E+07
1s 4d <sup>3</sup> D <sub>2</sub>	1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.4024E+01	8.559E−07	3.226E+06	1.3967E+01	8.610E−07	3.243E+06
1s 4d <sup>3</sup> D <sub>3</sub>	1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.4271E+01	5.505E−06	2.003E+07	1.4212E+01	5.539E−06	2.015E+07
1s 4d <sup>1</sup> D <sub>2</sub>	1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.4281E+01	4.469E−07	1.624E+06	1.4223E+01	4.490E−07	1.631E+06
1s 5d <sup>3</sup> D <sub>2</sub>	1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.0450E+03	1.024E−11	6.949E−03	1.0522E+03	9.888E−12	6.563E−03
1s 5d <sup>3</sup> D <sub>3</sub>	1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	3.0834E+03	2.544E−12	1.984E−04	3.1501E+03	2.359E−12	1.747E−04
1s 5d <sup>1</sup> D <sub>2</sub>	1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	3.3584E+03	1.601E−13	1.052E−05	3.4443E+03	1.470E−13	9.108E−06
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5g <sup>3</sup> G <sub>4</sub>	1.5225E+00	2.015E−11	6.442E+03			
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5g <sup>3</sup> G <sub>4</sub>	4.4657E+00	2.464E−11	9.157E+02			
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5g <sup>3</sup> G <sub>4</sub>	1.3968E+01	1.156E−12	4.392E+00			
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5g <sup>3</sup> G <sub>4</sub>	1.4275E+01	2.706E−06	9.841E+06	1.4214E+01	2.727E−06	9.920E+06
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5g <sup>3</sup> G <sub>4</sub>	1.4280E+01	2.186E−07	7.945E+05	1.4219E+01	2.202E−07	8.004E+05
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 5g <sup>3</sup> G <sub>4</sub>	1.4400E+01	4.154E−12	1.485E+01			
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 5g <sup>3</sup> G <sub>4</sub>	1.4404E+01	1.035E−11	3.695E+01			
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 5g <sup>3</sup> G <sub>4</sub>	9.0842E+02	6.390E−20	5.739E−11			
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 5g <sup>3</sup> G <sub>4</sub>	3.1830E+03	4.013E−13	2.936E−05	3.1753E+03	4.002E−13	2.917E−05

(continued on next page)

Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>4</sub>	3.3221E+03	2.853E-14	1.916E-06	3.3144E+03	2.845E-14	1.903E-06
1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>4</sub>	1.7265E+06	3.911E-27	9.725E-25			
1s2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	1.4532E+00	1.974E-14	8.909E+00	1.4471E+00	1.086E-15	4.903E-01
1s2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	1.5225E+00	2.038E-12	8.377E+02	1.5161E+00	4.521E-15	1.858E+00
1s2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	1.5291E+00	1.334E-11	5.435E+03			
1s3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	4.2871E+00	4.526E-14	2.347E+00	4.2694E+00	3.515E-16	1.822E-02
1s3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	4.4656E+00	2.799E-12	1.337E+02	4.4470E+00	1.621E-15	7.745E-02
1s3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	4.4816E+00	1.566E-11	7.431E+02			
1s4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	1.3242E+01	1.450E-15	8.79E-03			
1s4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	1.3967E+01	7.954E-13	3.886E+00			
1s4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	1.4032E+01	1.012E-12	4.900E+00			
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	1.4273E+01	3.250E-07	1.520E+06	1.4213E+01	3.276E-07	1.532E+06
1s4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	1.4278E+01	1.949E-06	9.109E+06	1.4218E+01	1.963E-06	9.178E+06
1s4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	1.4399E+01	1.054E-18	4.843E-06			
1s4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	1.4403E+01	1.506E-12	6.918E+00			
1s5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	3.2168E+02	4.463E-20	4.110E-10			
1s5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	9.0225E+02	3.077E-18	3.602E-09			
1s5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	1.0631E+03	3.176E-19	2.678E-10			
1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	3.1085E+03	5.176E-14	5.104E-06	3.1008E+03	5.161E-14	5.071E-06
1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	3.2410E+03	2.739E-13	2.485E-05	3.2333E+03	2.731E-13	2.468E-05
1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>3</sub>	1.2333E+05	1.693E-26	1.061E-21			
1s2s <sup>3</sup> S <sub>1</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.4401E+00	1.285E-13	5.904E+01			
1s3s <sup>3</sup> S <sub>1</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.2561E+00	2.007E-12	1.056E+02			
1s3d <sup>3</sup> D <sub>2</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.4790E+00	1.841E-07	8.745E+06	4.4602E+00	1.862E-07	8.846E+06
1s3d <sup>3</sup> D <sub>1</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.4815E+00	1.047E-06	4.968E+07	4.4626E+00	1.054E-06	5.003E+07
1s3d <sup>3</sup> D <sub>3</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.5385E+00	1.150E-06	5.319E+07	4.5194E+00	1.173E-06	5.426E+07
1s3d <sup>1</sup> D <sub>2</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	4.5408E+00	6.878E-06	3.179E+08	4.5217E+00	7.019E-06	3.243E+08
1s4s <sup>3</sup> S <sub>1</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.3121E+01	1.246E-12	6.899E+00			
1s4d <sup>3</sup> D <sub>2</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.4022E+01	1.031E-07	4.999E+05	1.3965E+01	1.047E-07	5.074E+05
1s4d <sup>3</sup> D <sub>1</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.4031E+01	5.739E-07	2.778E+06	1.3974E+01	5.770E-07	2.791E+06
1s4d <sup>3</sup> D <sub>3</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.4269E+01	6.604E-07	3.091E+06	1.4210E+01	6.650E-07	3.111E+06
1s4d <sup>1</sup> D <sub>2</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.4279E+01	3.956E-06	1.849E+07	1.4221E+01	3.974E-06	1.856E+07
1s5s <sup>3</sup> S <sub>1</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.8907E+02	8.703E-16	9.925E-06	2.8810E+02	8.531E-16	9.711E-06
1s5d <sup>3</sup> D <sub>2</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.0343E+03	1.288E-12	1.147E-03	1.0413E+03	1.252E-12	1.091E-03
1s5d <sup>3</sup> D <sub>1</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.0612E+03	6.565E-12	5.555E-03	1.0684E+03	6.346E-12	5.252E-03
1s5d <sup>3</sup> D <sub>3</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	2.9925E+03	3.341E-13	3.555E-05	3.0547E+03	3.104E-13	3.143E-05
1s5d <sup>1</sup> D <sub>2</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	3.2509E+03	1.560E-12	1.406E-04	3.3306E+03	1.434E-12	1.221E-04
1s5g <sup>3</sup> G <sub>4</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1.0795E+05	4.552E-23	3.723E-18			
1s5g <sup>3</sup> G <sub>3</sub>	1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	5.7657E+05	3.514E-26	1.007E-22			
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>5</sub>	1.4237E+01	1.884E-06	5.637E+06	1.4177E+01	1.892E-06	5.660E+06
1s4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>5</sub>	1.4362E+01	1.643E-05	4.829E+07	1.4301E+01	1.656E-05	4.868E+07
1s4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>5</sub>	1.4366E+01	7.767E-07	2.282E+06	1.4305E+01	7.827E-07	2.300E+06
1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>5</sub>	1.9964E+03	1.136E-12	1.728E-04	1.9918E+03	1.127E-12	1.708E-04
1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>5</sub>	5.3388E+03	5.211E-13	1.109E-05	5.3203E+03	5.207E-13	1.106E-05
1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s5g <sup>3</sup> G <sub>5</sub>	5.6350E+03	2.097E-14	4.004E-07	5.6164E+03	2.094E-14	3.992E-07
1s2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5g <sup>1</sup> G <sub>4</sub>	1.5221E+00	4.230E-15	1.353E+00			
1s3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5g <sup>1</sup> G <sub>4</sub>	4.4619E+00	5.547E-15	2.065E-01			
1s4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5g <sup>1</sup> G <sub>4</sub>	1.3931E+01	1.748E-13	6.674E-01			
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s5g <sup>1</sup> G <sub>4</sub>	1.4236E+01	1.107E-07	4.048E+05	1.4175E+01	1.111E-07	4.065E+05
1s4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s5g <sup>1</sup> G <sub>4</sub>	1.4241E+01	1.421E-06	5.192E+06	1.4181E+01	1.426E-06	5.211E+06
1s4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s5g <sup>1</sup> G <sub>4</sub>	1.4361E+01	1.174E-06	4.218E+06	1.4299E+01	1.183E-06	4.252E+06
1s4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s5g <sup>1</sup> G <sub>4</sub>	1.4364E+01	1.291E-05	4.637E+07	1.4303E+01	1.301E-05	4.673E+07
1s5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s5g <sup>1</sup> G <sub>4</sub>	7.7310E+02	3.149E-18	3.904E-09			
1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s5g <sup>1</sup> G <sub>4</sub>	1.9730E+03	6.937E-14	1.321E-05	1.9684E+03	6.886E-14	1.306E-05
1s5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s5g <sup>1</sup> G <sub>4</sub>	2.0256E+03	8.205E-13	1.482E-04	2.0210E+03	8.142E-13	1.464E-04
1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s5g <sup>1</sup> G <sub>4</sub>	5.1744E+03	4.089E-14	1.132E-06	5.1563E+03	4.086E-14	1.129E-06
1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s5g <sup>1</sup> G <sub>4</sub>	5.4521E+03	3.846E-13	9.589E-06	5.4339E+03	3.841E-13	9.561E-06
1s2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s6s <sup>3</sup> S <sub>1</sub>	1.3813E+00	1.649E-10	1.922E+05	1.3756E+00	2.617E-10	3.049E+05
1s2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s6s <sup>3</sup> S <sub>1</sub>	1.4438E+00	1.444E-07	1.540E+08	1.4378E+00	1.405E-07	1.498E+08
1s2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s6s <sup>3</sup> S <sub>1</sub>	1.4497E+00	1.473E-07	1.558E+08	1.4438E+00	1.385E-07	1.465E+08
1s3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s6s <sup>3</sup> S <sub>1</sub>	3.7169E+00	1.013E-10	1.630E+04	3.7018E+00	1.480E-10	2.381E+04
1s3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s6s <sup>3</sup> S <sub>1</sub>	3.8504E+00	9.482E-08	1.422E+07	3.8346E+00	9.350E-08	1.401E+07
1s3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s6s <sup>3</sup> S <sub>1</sub>	3.8623E+00	9.621E-08	1.434E+07	3.8466E+00	9.250E-08	1.378E+07
1s4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s6s <sup>3</sup> S <sub>1</sub>	8.9847E+00	6.745E-11	1.858E+03	8.9484E+00	9.833E-11	2.707E+03
1s4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s6s <sup>3</sup> S <sub>1</sub>	9.3128E+00	6.550E-08	1.679E+06	9.2750E+00	6.491E-08	1.663E+06
1s4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s6s <sup>3</sup> S <sub>1</sub>	9.3416E+00	6.643E-08	1.693E+06	9.3040E+00	6.422E-08	1.635E+06
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s6s <sup>3</sup> S <sub>1</sub>	9.4480E+00	3.729E-15	9.287E-02			
1s4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s6s <sup>3</sup> S <sub>1</sub>	9.4503E+00	1.759E-16	4.380E-03			
1s4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s6s <sup>3</sup> S <sub>1</sub>	9.5047E+00	1.805E-14	4.441E-01			
1s5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s6s <sup>3</sup> S <sub>1</sub>	2.5714E+01	4.946E-11	1.663E+02	2.5617E+01	7.675E-11	2.578E+02
1s5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s6s <sup>3</sup> S <sub>1</sub>	2.7109E+01	4.962E-08	1.501E+05	2.7006E+01	4.914E-08	1.485E+05

(continued on next page)

Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s 5p $^1P_1^o$	1s 6s $^3S_1$	2.7232E+01	5.040E-08	1.511E+05	2.7131E+01	4.840E-08	1.449E+05
1s 5f $^3F_3^o$	1s 6s $^3S_1$	2.7699E+01	4.652E-15	1.348E-02			
1s 5f $^3F_2^o$	1s 6s $^3S_1$	2.7709E+01	7.330E-17	2.123E-04			
1s 5f $^1F_3^o$	1s 6s $^3S_1$	2.7950E+01	3.169E-14	9.021E-02			
1s 2s $^3S_1$	1s 6p $^3P_1^o$	1.3692E+00	1.564E-09	1.855E+06	1.3634E+00	2.513E-09	2.980E+06
1s 3s $^3S_1$	1s 6p $^3P_1^o$	3.6909E+00	5.170E-10	8.438E+04	3.6756E+00	7.777E-10	1.269E+05
1s 3d $^3D_2$	1s 6p $^3P_1^o$	3.8574E+00	9.776E-10	1.461E+05	3.8413E+00	9.678E-10	1.445E+05
1s 3d $^3D_1$	1s 6p $^3P_1^o$	3.8592E+00	9.778E-10	1.460E+05	3.8431E+00	9.506E-10	1.419E+05
1s 3d $^3D_3$	1s 6p $^3P_1^o$	3.9015E+00	1.634E-08	2.387E+06	3.8850E+00	1.597E-08	2.333E+06
1s 3d $^1D_2$	1s 6p $^3P_1^o$	3.9032E+00	6.202E-09	9.052E+05	3.8868E+00	6.120E-09	8.930E+05
1s 4s $^3S_1$	1s 6p $^3P_1^o$	8.9132E+00	2.368E-10	6.628E+03	8.8765E+00	3.358E-10	9.397E+03
1s 4d $^3D_2$	1s 6p $^3P_1^o$	9.3198E+00	1.118E-09	2.863E+04	9.2819E+00	1.114E-09	2.851E+04
1s 4d $^3D_1$	1s 6p $^3P_1^o$	9.3241E+00	1.101E-09	2.815E+04	9.2861E+00	1.082E-09	2.767E+04
1s 4d $^3D_3$	1s 6p $^3P_1^o$	9.4285E+00	1.839E-08	4.600E+05	9.3898E+00	1.808E-08	4.521E+05
1s 4d $^1D_2$	1s 6p $^3P_1^o$	9.4329E+00	6.934E-09	1.733E+05	9.3943E+00	6.934E-09	1.732E+05
1s 5s $^3S_1$	1s 6p $^3P_1^o$	2.5356E+01	1.264E-10	4.372E+02	2.5254E+01	1.596E-10	5.519E+02
1s 5d $^3D_2$	1s 6p $^3P_1^o$	2.7067E+01	1.122E-09	3.406E+03	2.6964E+01	1.119E-09	3.395E+03
1s 5d $^3D_1$	1s 6p $^3P_1^o$	2.7084E+01	1.096E-09	3.323E+03	2.6981E+01	1.082E-09	3.276E+03
1s 5d $^3D_3$	1s 6p $^3P_1^o$	2.7538E+01	1.837E-08	5.387E+04	2.7432E+01	1.814E-08	5.314E+04
1s 5d $^1D_2$	1s 6p $^3P_1^o$	2.7558E+01	6.906E-09	2.022E+04	2.7452E+01	6.892E-09	2.016E+04
1s 5g $^3G_3$	1s 6p $^3P_1^o$	2.7793E+01	9.899E-18	2.850E-05			
1s 6s $^3S_1$	1s 6p $^3P_1^o$	4.9854E+03	3.274E-16	2.929E-08	4.6146E+03	7.235E-16	7.490E-08
1s 2p $^3P_2^o$	1s 6s $^1S_0$	1.4434E+00	9.229E-08	2.955E+08	1.4374E+00	9.373E-08	3.000E+08
1s 3p $^3P_2^o$	1s 6s $^1S_0$	3.8473E+00	6.108E-08	2.753E+07	3.8320E+00	6.246E-08	2.813E+07
1s 4p $^3P_2^o$	1s 6s $^1S_0$	9.2946E+00	4.218E-08	3.257E+06	9.2596E+00	4.349E-08	3.354E+06
1s 4f $^3F_2^o$	1s 6s $^1S_0$	9.4316E+00	4.585E-15	3.438E-01			
1s 5p $^3P_2^o$	1s 6s $^1S_0$	2.6955E+01	3.177E-08	2.917E+05	2.6876E+01	3.323E-08	3.043E+05
1s 5f $^3F_2^o$	1s 6s $^1S_0$	2.7549E+01	6.717E-15	5.903E-02			
1s 3d $^3D_2$	1s 6p $^3P_0^o$	3.8572E+00	6.303E-10	2.826E+05	3.8418E+00	6.184E-10	2.771E+05
1s 3d $^1D_2$	1s 6p $^3P_0^o$	3.9029E+00	7.563E-09	3.312E+06	3.8873E+00	7.362E-09	3.222E+06
1s 4d $^3D_2$	1s 6p $^3P_0^o$	9.3186E+00	7.033E-10	5.403E+04	9.2852E+00	6.944E-10	5.327E+04
1s 4d $^1D_2$	1s 6p $^3P_0^o$	9.4317E+00	8.476E-09	6.355E+05	9.3976E+00	8.342E-09	6.247E+05
1s 5d $^3D_2$	1s 6p $^3P_0^o$	2.7056E+01	6.977E-10	6.357E+03	2.6991E+01	6.888E-10	6.253E+03
1s 5d $^1D_2$	1s 6p $^3P_0^o$	2.7547E+01	8.449E-09	7.426E+04	2.7481E+01	8.332E-09	7.297E+04
1s $^2^1S_0$	1s 6p $^3P_2^o$	3.1630E-01	9.827E-06	1.310E+11	3.1498E-01	1.106E-05	1.475E+11
1s 2s $^3S_1$	1s 6p $^3P_2^o$	1.3670E+00	1.115E-06	7.956E+08	1.3612E+00	1.152E-06	8.224E+08
1s 2s $^1S_0$	1s 6p $^3P_2^o$	1.3800E+00	7.427E-07	5.203E+08	1.3743E+00	7.463E-07	5.226E+08
1s 3s $^3S_1$	1s 6p $^3P_2^o$	3.6753E+00	3.545E-07	3.501E+07	3.6601E+00	3.604E-07	3.559E+07
1s 3s $^1S_0$	1s 6p $^3P_2^o$	3.6999E+00	2.408E-07	2.347E+07	3.6849E+00	2.354E-07	2.293E+07
1s 3d $^3D_2$	1s 6p $^3P_2^o$	3.8403E+00	1.356E-14	1.227E+00			
1s 3d $^3D_1$	1s 6p $^3P_2^o$	3.8421E+00	3.557E-13	3.214E+01			
1s 3d $^3D_3$	1s 6p $^3P_2^o$	3.8840E+00	5.812E-08	5.139E+06	3.8677E+00	5.623E-08	4.972E+06
1s 3d $^1D_2$	1s 6p $^3P_2^o$	3.8856E+00	1.476E-08	1.304E+06	3.8694E+00	1.403E-08	1.240E+06
1s 4s $^3S_1$	1s 6p $^3P_2^o$	8.8224E+00	1.571E-07	2.692E+06	8.7863E+00	1.589E-07	2.723E+06
1s 4s $^1S_0$	1s 6p $^3P_2^o$	8.8798E+00	1.078E-07	1.824E+06	8.8440E+00	1.038E-07	1.756E+06
1s 4d $^3D_2$	1s 6p $^3P_2^o$	9.2206E+00	2.240E-13	3.514E+00			
1s 4d $^3D_1$	1s 6p $^3P_2^o$	9.2248E+00	2.274E-13	3.564E+00			
1s 4d $^3D_3$	1s 6p $^3P_2^o$	9.3270E+00	6.780E-08	1.040E+06	9.2888E+00	6.619E-08	1.014E+06
1s 4d $^1D_2$	1s 6p $^3P_2^o$	9.3314E+00	1.709E-08	2.619E+05	9.2933E+00	1.652E-08	2.530E+05
1s 5s $^3S_1$	1s 6p $^3P_2^o$	2.4635E+01	7.930E-08	1.743E+05	2.4537E+01	8.016E-08	1.761E+05
1s 5s $^1S_0$	1s 6p $^3P_2^o$	2.4860E+01	5.498E-08	1.187E+05	2.4762E+01	5.199E-08	1.121E+05
1s 5d $^3D_2$	1s 6p $^3P_2^o$	2.6247E+01	4.110E-13	7.959E-01			
1s 5d $^3D_1$	1s 6p $^3P_2^o$	2.6264E+01	1.397E-13	2.703E-01			
1s 5d $^3D_3$	1s 6p $^3P_2^o$	2.6690E+01	6.829E-08	1.279E+05	2.6588E+01	6.672E-08	1.248E+05
1s 5d $^1D_2$	1s 6p $^3P_2^o$	2.6709E+01	1.716E-08	3.210E+04	2.6607E+01	1.664E-08	3.110E+04
1s 5g $^3G_4$	1s 6p $^3P_2^o$	2.6923E+01	3.604E-16	6.634E-04			
1s 5g $^3G_3$	1s 6p $^3P_2^o$	2.6929E+01	8.766E-16	1.613E-03			
1s 5g $^1G_4$	1s 6p $^3P_2^o$	2.7064E+01	1.057E-15	1.924E-03			
1s 6s $^3S_1$	1s 6p $^3P_2^o$	7.3822E+02	8.147E-11	1.994E-01	7.2782E+02	8.413E-11	2.100E-01
1s 6s $^1S_0$	1s 6p $^3P_2^o$	8.7342E+02	3.282E-11	5.739E-02	8.3711E+02	3.686E-11	6.958E-02
1s 2p $^3P_0^o$	1s 6d $^3D_2$	1.3786E+00	7.357E-08	5.164E+07	1.3729E+00	8.090E-08	5.677E+07
1s 2p $^3P_1^o$	1s 6d $^3D_2$	1.3795E+00	4.617E-08	3.237E+07	1.3737E+00	4.698E-08	3.293E+07
1s 2p $^3P_2^o$	1s 6d $^3D_2$	1.4409E+00	4.355E-11	2.798E+04	1.4348E+00	1.874E-10	1.204E+05
1s 2p $^1P_1^o$	1s 6d $^3D_2$	1.4467E+00	3.892E-13	2.481E+02	1.4407E+00	1.020E-10	6.504E+04
1s 3p $^3P_0^o$	1s 6d $^3D_2$	3.6972E+00	2.620E-08	2.557E+06	3.6817E+00	2.754E-08	2.688E+06
1s 3p $^3P_1^o$	1s 6d $^3D_2$	3.6989E+00	1.627E-08	1.586E+06	3.6834E+00	1.603E-08	1.563E+06
1s 3p $^3P_2^o$	1s 6d $^3D_2$	3.8292E+00	1.916E-11	1.744E+03	3.8130E+00	6.803E-11	6.189E+03
1s 3p $^1P_1^o$	1s 6d $^3D_2$	3.8409E+00	6.830E-13	6.176E+01	3.8249E+00	4.396E-11	3.974E+03
1s 4p $^3P_0^o$	1s 6d $^3D_2$	8.8702E+00	1.140E-08	1.933E+05	8.8316E+00	1.183E-08	2.006E+05
1s 4p $^3P_1^o$	1s 6d $^3D_2$	8.8742E+00	7.076E-09	1.199E+05	8.8354E+00	6.901E-09	1.169E+05
1s 4p $^3P_2^o$	1s 6d $^3D_2$	9.1898E+00	9.056E-12	1.431E+02	9.1496E+00	3.048E-11	4.816E+02

(continued on next page)

Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s 4p $^1P_1^0$	1s 6d $^3D_2$	9.2178E+00	4.459E-13	7.001E+00	9.1778E+00	2.140E-11	3.361E+02
1s 4f $^3F_3^0$	1s 6d $^3D_2$	9.3215E+00	3.189E-09	4.896E+04	9.2809E+00	3.158E-09	4.849E+04
1s 4f $^3F_2^0$	1s 6d $^3D_2$	9.3237E+00	8.011E-10	1.229E+04	9.2831E+00	7.907E-10	1.213E+04
1s 4f $^3F_4^0$	1s 6d $^3D_2$	9.3749E+00	6.477E-09	9.832E+04	9.3339E+00	6.370E-09	9.671E+04
1s 4f $^1F_3^0$	1s 6d $^3D_2$	9.3766E+00	7.961E-10	1.208E+04	9.3356E+00	8.302E-10	1.260E+04
1s 5p $^3P_0^0$	1s 6d $^3D_2$	2.4798E+01	5.473E-09	1.187E+04	2.4683E+01	5.652E-09	1.227E+04
1s 5p $^3P_1^0$	1s 6d $^3D_2$	2.4813E+01	3.400E-09	7.368E+03	2.4698E+01	3.305E-09	7.167E+03
1s 5p $^3P_2^0$	1s 6d $^3D_2$	2.6092E+01	4.739E-12	9.286E+00	2.5970E+01	1.516E-11	2.974E+01
1s 5p $^1P_1^0$	1s 6d $^3D_2$	2.6207E+01	2.750E-13	5.341E-01	2.6085E+01	1.163E-11	2.262E+01
1s 5f $^3F_3^0$	1s 6d $^3D_2$	2.6639E+01	5.658E-09	1.064E+04	2.6517E+01	5.635E-09	1.060E+04
1s 5f $^3F_2^0$	1s 6d $^3D_2$	2.6648E+01	1.421E-09	2.669E+03	2.6526E+01	1.410E-09	2.651E+03
1s 5f $^3F_4^0$	1s 6d $^3D_2$	2.6863E+01	1.142E-08	2.112E+04	2.6740E+01	1.129E-08	2.089E+04
1s 5f $^1F_3^0$	1s 6d $^3D_2$	2.6870E+01	1.403E-09	2.593E+03	2.6747E+01	1.470E-09	2.718E+03
1s 6p $^3P_0^0$	1s 6d $^3D_2$	8.0869E+02	2.361E-12	4.815E-03	7.9302E+02	2.548E-12	5.360E-03
1s 6p $^3P_1^0$	1s 6d $^3D_2$	8.1823E+02	1.413E-12	2.816E-03	7.6994E+02	1.621E-12	3.618E-03
1s 6p $^3P_2^0$	1s 6d $^3D_2$	1.2115E+04	5.193E-19	4.720E-12			
1s 2s $^3S_1$	1s 6p $^1P_1^0$	1.3668E+00	1.105E-06	1.315E+09	1.3611E+00	1.149E-06	1.368E+09
1s 3s $^3S_1$	1s 6p $^1P_1^0$	3.6740E+00	3.498E-07	5.762E+07	3.6589E+00	3.600E-07	5.928E+07
1s 3d $^3D_2$	1s 6p $^1P_1^0$	3.8389E+00	2.598E-13	3.919E+01			
1s 3d $^3D_1$	1s 6p $^1P_1^0$	3.8407E+00	1.055E-14	1.590E+00			
1s 3d $^3D_3$	1s 6p $^1P_1^0$	3.8825E+00	1.013E-08	1.494E+06	3.8664E+00	1.059E-08	1.562E+06
1s 3d $^1D_2$	1s 6p $^1P_1^0$	3.8842E+00	3.253E-08	4.794E+06	3.8681E+00	3.153E-08	4.646E+06
1s 4s $^3S_1$	1s 6p $^1P_1^0$	8.8149E+00	1.545E-07	4.420E+06	8.7796E+00	1.589E-07	4.545E+06
1s 4d $^3D_2$	1s 6p $^1P_1^0$	9.2125E+00	1.128E-14	2.955E-01			
1s 4d $^3D_1$	1s 6p $^1P_1^0$	9.2166E+00	1.136E-13	2.974E+00			
1s 4d $^3D_3$	1s 6p $^1P_1^0$	9.3186E+00	1.187E-08	3.038E+05	9.2814E+00	1.247E-08	3.192E+05
1s 4d $^1D_2$	1s 6p $^1P_1^0$	9.3230E+00	3.780E-08	9.670E+05	9.2858E+00	3.718E-08	9.507E+05
1s 5s $^3S_1$	1s 6p $^1P_1^0$	2.4577E+01	7.756E-08	2.855E+05	2.4485E+01	8.050E-08	2.960E+05
1s 5d $^3D_2$	1s 6p $^1P_1^0$	2.6180E+01	9.174E-15	2.976E-02			
1s 5d $^3D_1$	1s 6p $^1P_1^0$	2.6197E+01	2.364E-13	7.658E-01			
1s 5d $^3D_3$	1s 6p $^1P_1^0$	2.6621E+01	1.196E-08	3.753E+04	2.6527E+01	1.267E-08	3.970E+04
1s 5d $^1D_2$	1s 6p $^1P_1^0$	2.6640E+01	3.799E-08	1.190E+05	2.6546E+01	3.758E-08	1.175E+05
1s 5g $^3G_3$	1s 6p $^1P_1^0$	2.6859E+01	8.269E-18	2.548E-05			
1s 6s $^3S_1$	1s 6p $^1P_1^0$	6.8918E+02	1.001E-10	4.688E-01	6.8482E+02	1.007E-10	4.737E-01
1s 6d $^3D_2$	1s 6p $^1P_1^0$	7.2196E+04	1.674E-22	7.143E-17			
1s 2p $^3P_0^0$	1s 6d $^3D_1$	1.3786E+00	7.220E-08	8.447E+07	1.3729E+00	7.636E-08	8.932E+07
1s 2p $^3P_1^0$	1s 6d $^3D_1$	1.4408E+00	1.425E-13	1.527E+02			
1s 2p $^3P_2^0$	1s 6d $^3D_1$	1.4467E+00	8.401E-11	8.924E+04	1.4407E+00	1.079E-10	1.146E+05
1s 3p $^3P_0^0$	1s 6d $^3D_1$	3.6970E+00	2.546E-08	4.142E+06	3.6817E+00	2.602E-08	4.232E+06
1s 3p $^3P_1^0$	1s 6d $^3D_1$	3.8290E+00	1.910E-13	2.896E+01			
1s 3p $^3P_2^0$	1s 6d $^3D_1$	3.8407E+00	2.859E-11	4.309E+03	3.8249E+00	3.310E-11	4.989E+03
1s 4p $^3P_0^0$	1s 6d $^3D_1$	8.8691E+00	1.105E-08	3.125E+05	8.8318E+00	1.118E-08	3.161E+05
1s 4p $^3P_1^0$	1s 6d $^3D_1$	9.1886E+00	1.273E-13	3.352E+00			
1s 4p $^3P_2^0$	1s 6d $^3D_1$	9.2166E+00	1.238E-11	3.240E+02	9.1781E+00	1.357E-11	3.553E+02
1s 4f $^3F_3^0$	1s 6d $^3D_1$	9.3202E+00	5.366E-10	1.374E+04	9.2811E+00	5.341E-10	1.367E+04
1s 4f $^3F_2^0$	1s 6d $^3D_1$	9.3225E+00	1.860E-09	4.759E+04	9.2834E+00	1.845E-09	4.719E+04
1s 4f $^3F_4^0$	1s 6d $^3D_1$	9.3753E+00	4.340E-09	1.098E+05	9.3359E+00	4.305E-09	1.088E+05
1s 5p $^3P_1^0$	1s 6d $^3D_1$	2.4789E+01	5.299E-09	1.917E+04	2.4685E+01	5.349E-09	1.935E+04
1s 5p $^3P_2^0$	1s 6d $^3D_1$	2.6083E+01	8.543E-14	2.792E-01			
1s 5p $^1P_1^0$	1s 6d $^3D_1$	2.6197E+01	6.135E-12	1.988E+01	2.6087E+01	6.049E-12	1.959E+01
1s 5f $^3F_3^0$	1s 6d $^3D_1$	2.6629E+01	9.512E-10	2.983E+03	2.6519E+01	9.521E-10	2.984E+03
1s 5f $^3F_2^0$	1s 6d $^3D_1$	2.6638E+01	3.300E-09	1.034E+04	2.6529E+01	3.290E-09	1.030E+04
1s 5f $^3F_4^0$	1s 6d $^3D_1$	2.6860E+01	7.654E-09	2.359E+04	2.6749E+01	7.630E-09	2.351E+04
1s 6p $^3P_1^0$	1s 6d $^3D_1$	7.9964E+02	2.369E-12	8.238E-03	7.9517E+02	2.385E-12	8.315E-03
1s 6p $^3P_2^0$	1s 6d $^3D_1$	1.0358E+04	5.839E-20	1.210E-12			
1s 6p $^1P_1^0$	1s 6d $^3D_1$	6.7159E+06	2.936E-27	1.447E-25			
1s 2p $^3P_0^0$	1s 6d $^3D_3$	1.3779E+00	1.185E-06	5.945E+08	1.3722E+00		6.080E+08
1s 2p $^3P_1^0$	1s 6d $^3D_3$	1.4401E+00	5.129E-06	2.357E+09	1.4340E+00	5.376E-06	2.470E+09
1s 2p $^3P_2^0$	1s 6d $^3D_3$	1.4460E+00	9.200E-07	4.193E+08	1.4400E+00	9.661E-07	4.402E+08
1s 3p $^3P_0^0$	1s 6d $^3D_3$	3.6922E+00	3.978E-07	2.780E+07	3.6768E+00	4.047E-07	2.829E+07
1s 3p $^3P_1^0$	1s 6d $^3D_3$	3.8238E+00	1.918E-06	1.250E+08	3.8077E+00	1.956E-06	1.275E+08
1s 3p $^3P_2^0$	1s 6d $^3D_3$	3.8355E+00	3.451E-07	2.236E+07	3.8195E+00	3.499E-07	2.266E+07
1s 4p $^3P_0^0$	1s 6d $^3D_3$	8.8415E+00	1.680E-07	2.047E+06	8.8033E+00	1.690E-07	2.060E+06
1s 4p $^3P_1^0$	1s 6d $^3D_3$	9.1590E+00	8.734E-07	9.922E+06	9.1192E+00	8.851E-07	1.005E+07
1s 4p $^3P_2^0$	1s 6d $^3D_3$	9.1868E+00	1.579E-07	1.783E+06	9.1472E+00	1.575E-07	1.778E+06
1s 4f $^3F_3^0$	1s 6d $^3D_3$	9.2898E+00	2.242E-14	2.476E-01			
1s 4f $^3F_2^0$	1s 6d $^3D_3$	9.2920E+00	9.727E-14	1.074E+00			
1s 4f $^3F_4^0$	1s 6d $^3D_3$	9.3429E+00	3.624E-08	3.957E+05	9.3023E+00	3.574E-08	3.903E+05
1s 4f $^1F_3^0$	1s 6d $^3D_3$	9.3445E+00	4.358E-09	4.756E+04	9.3039E+00	4.287E-09	4.679E+04
1s 5p $^3P_1^0$	1s 6d $^3D_3$	2.4575E+01	7.820E-08	1.234E+05	2.4463E+01	7.792E-08	1.230E+05
1s 5p $^3P_2^0$	1s 6d $^3D_3$	2.5845E+01	4.441E-07	6.335E+05	2.5726E+01	4.508E-07	6.436E+05

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Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s 5p $^1P_1^o$	1s 6d $^3D_3$	2.5958E+01	8.083E-08	1.143E+05	2.5839E+01	7.947E-08	1.124E+05
1s 5f $^3F_2^o$	1s 6d $^3D_3$	2.6382E+01	3.376E-14	4.622E-02			
1s 5f $^3F_0^o$	1s 6d $^3D_3$	2.6391E+01	8.504E-14	1.163E-01			
1s 5f $^3F_4^o$	1s 6d $^3D_3$	2.6602E+01	6.478E-08	8.723E+04	2.6482E+01	6.437E-08	8.672E+04
1s 5f $^1F_3^o$	1s 6d $^3D_3$	2.6609E+01	7.788E-09	1.048E+04	2.6489E+01	7.718E-09	1.039E+04
1s 6p $^3P_0^o$	1s 6d $^3D_3$	6.2409E+02	7.844E-11	1.919E-01	6.1530E+02	7.917E-11	1.975E-01
1s 6p $^3P_2^o$	1s 6d $^3D_3$	2.2306E+03	8.574E-12	1.642E-03	2.1370E+03	9.635E-12	1.993E-03
1s 6p $^1P_1^o$	1s 6d $^3D_3$	2.8416E+03	7.471E-13	8.817E-05	2.6199E+03	9.643E-13	1.327E-04
1s 2s $^3S_1$	1s 6f $^3F_3^o$	1.3662E+00	6.354E-11	3.244E+04			
1s 3s $^3S_1$	1s 6f $^3F_3^o$	3.6691E+00	3.991E-14	2.825E+00			
1s 3d $^3D_2$	1s 6f $^3F_3^o$	3.8336E+00	3.774E-07	2.447E+07	3.8174E+00	3.877E-07	2.513E+07
1s 3d $^3D_1$	1s 6f $^3F_3^o$	3.8354E+00	6.366E-08	4.124E+06	3.8192E+00	6.429E-08	4.164E+06
1s 3d $^3D_3$	1s 6f $^3F_3^o$	3.8771E+00	2.152E-12	1.364E+02			
1s 3d $^1D_2$	1s 6f $^3F_3^o$	3.8788E+00	2.980E-11	1.887E+03			
1s 4s $^3S_1$	1s 6f $^3F_3^o$	8.7872E+00	1.208E-13	1.491E+00			
1s 4d $^3D_2$	1s 6f $^3F_3^o$	9.1821E+00	2.268E-07	2.563E+06	9.1440E+00	2.296E-07	2.595E+06
1s 4d $^3D_1$	1s 6f $^3F_3^o$	9.1863E+00	3.827E-08	4.321E+05	9.1480E+00	3.808E-08	4.299E+05
1s 4d $^3D_3$	1s 6f $^3F_3^o$	9.2876E+00	1.258E-12	1.390E+01			
1s 4d $^1D_2$	1s 6f $^3F_3^o$	9.2919E+00	2.710E-11	2.991E+02			
1s 5s $^3S_1$	1s 6f $^3F_3^o$	2.4362E+01	5.695E-15	9.143E-03			
1s 5d $^3D_2$	1s 6f $^3F_3^o$	2.5937E+01	1.250E-07	1.770E+05	2.5831E+01	1.257E-07	1.780E+05
1s 5d $^3D_1$	1s 6f $^3F_3^o$	2.5954E+01	2.111E-08	2.987E+04	2.5848E+01	2.083E-08	2.946E+04
1s 5d $^3D_3$	1s 6f $^3F_3^o$	2.6370E+01	7.159E-13	9.810E-01			
1s 5d $^1D_2$	1s 6f $^3F_3^o$	2.6388E+01	1.786E-11	2.444E+01			
1s 5g $^3G_4$	1s 6f $^3F_3^o$	2.6598E+01	6.169E-09	8.309E+03	2.6482E+01	6.138E-09	8.270E+03
1s 5g $^3G_3$	1s 6f $^3F_3^o$	2.6603E+01	7.426E-10	9.999E+02	2.6487E+01	7.367E-10	9.922E+02
1s 5g $^3G_5$	1s 6f $^3F_3^o$	2.6730E+01	4.453E-09	5.938E+03	2.6614E+01	4.418E-09	5.893E+03
1s 5g $^1G_4$	1s 6f $^3F_3^o$	2.6735E+01	2.634E-10	3.512E+02	2.6618E+01	2.759E-10	3.679E+02
1s 6s $^3S_1$	1s 6f $^3F_3^o$	5.5267E+02	1.173E-17	3.658E-08			
1s 6d $^3D_2$	1s 6f $^3F_3^o$	2.6863E+03	7.605E-13	1.004E-04	2.7429E+03	7.086E-13	8.898E-05
1s 6d $^3D_1$	1s 6f $^3F_3^o$	2.7912E+03	1.144E-13	1.399E-05	2.7175E+03	1.210E-13	1.548E-05
1s 6d $^3D_3$	1s 6f $^3F_3^o$	1.5394E+05	2.306E-23	9.272E-19			
1s $^2S_0$	1s 6f $^3F_2^o$	3.1620E-01	6.848E-11	9.134E+05			
1s 2s $^3S_1$	1s 6f $^3F_2^o$	1.3662E+00	2.222E-11	1.588E+04			
1s 2s $^1S_0$	1s 6f $^3F_2^o$	1.3791E+00	2.075E-11	1.456E+04			
1s 3s $^3S_1$	1s 6f $^3F_2^o$	3.6690E+00	4.287E-13	4.249E+01			
1s 3s $^1S_0$	1s 6f $^3F_2^o$	3.6936E+00	3.226E-13	3.155E+01			
1s 3d $^3D_2$	1s 6f $^3F_2^o$	3.8335E+00	9.471E-08	8.598E+06	3.8174E+00	9.688E-08	8.794E+06
1s 3d $^3D_1$	1s 6f $^3F_2^o$	3.8353E+00	2.205E-07	2.000E+07	3.8192E+00	2.257E-07	2.047E+07
1s 3d $^3D_3$	1s 6f $^3F_2^o$	3.8770E+00	1.142E-18	1.013E-04			
1s 3d $^1D_2$	1s 6f $^3F_2^o$	3.8787E+00	8.803E-13	7.806E+01			
1s 4s $^3S_1$	1s 6f $^3F_2^o$	8.7866E+00	5.076E-13	8.772E+00			
1s 4s $^1S_0$	1s 6f $^3F_2^o$	8.8435E+00	3.256E-13	5.554E+00			
1s 4d $^3D_2$	1s 6f $^3F_2^o$	9.1815E+00	5.683E-08	8.994E+05	9.1440E+00	5.738E-08	9.077E+05
1s 4d $^3D_1$	1s 6f $^3F_2^o$	9.1856E+00	1.325E-07	2.095E+06	9.1480E+00	1.337E-07	2.113E+06
1s 4d $^3D_3$	1s 6f $^3F_2^o$	9.2869E+00	1.242E-14	1.921E-01			
1s 4d $^1D_2$	1s 6f $^3F_2^o$	9.2913E+00	1.382E-12	2.135E+01			
1s 5s $^3S_1$	1s 6f $^3F_2^o$	2.4358E+01	1.928E-13	4.335E-01			
1s 5s $^1S_0$	1s 6f $^3F_2^o$	2.4577E+01	9.292E-14	2.052E-01			
1s 5d $^3D_2$	1s 6f $^3F_2^o$	2.5932E+01	3.129E-08	6.207E+04	2.5831E+01	3.141E-08	6.227E+04
1s 5d $^3D_1$	1s 6f $^3F_2^o$	2.5948E+01	7.306E-08	1.447E+05	2.5848E+01	7.316E-08	1.448E+05
1s 5d $^3D_3$	1s 6f $^3F_2^o$	2.6365E+01	1.482E-14	2.845E-02			
1s 5d $^1D_2$	1s 6f $^3F_2^o$	2.6383E+01	1.033E-12	1.979E+00			
1s 5g $^3G_4$	1s 6f $^3F_2^o$	2.6592E+01	4.970E-10	9.377E+02	2.6482E+01	4.963E-10	9.362E+02
1s 5g $^3G_3$	1s 6f $^3F_2^o$	2.6598E+01	4.442E-09	8.376E+03	2.6488E+01	4.420E-09	8.334E+03
1s 5g $^1G_4$	1s 6f $^3F_2^o$	2.6729E+01	3.356E-09	6.266E+03	2.6618E+01	3.343E-09	6.241E+03
1s 6s $^3S_1$	1s 6f $^3F_2^o$	5.5035E+02	4.304E-17	1.896E-07			
1s 6s $^1S_0$	1s 6f $^3F_2^o$	6.2215E+02	4.276E-17	1.474E-07			
1s 6d $^3D_2$	1s 6f $^3F_2^o$	2.6325E+03	2.025E-13	3.898E-05	2.7436E+03	1.769E-13	3.109E-05
1s 6d $^3D_1$	1s 6f $^3F_2^o$	2.7332E+03	4.220E-13	7.536E-05	2.7182E+03	4.245E-13	7.601E-05
1s 6d $^3D_3$	1s 6f $^3F_2^o$	7.0900E+04	6.510E-23	1.728E-17			
1s 2p $^3P_1^o$	1s 6d $^1D_2$	1.3779E+00	4.573E-07	3.213E+08	1.3722E+00	4.669E-07	3.280E+08
1s 2p $^3P_0^o$	1s 6d $^1D_2$	1.3788E+00	5.490E-07	3.852E+08	1.3730E+00	5.623E-07	3.945E+08
1s 2p $^3P_2^o$	1s 6d $^1D_2$	1.4401E+00	1.289E-06	8.293E+08	1.4340E+00	1.343E-06	8.644E+08
1s 2p $^1P_1^o$	1s 6d $^1D_2$	1.4459E+00	2.881E-06	1.839E+09	1.4399E+00	3.012E-06	1.921E+09
1s 3p $^3P_1^o$	1s 6d $^1D_2$	3.6920E+00	1.505E-07	1.472E+07	3.6767E+00	1.542E-07	1.509E+07
1s 3p $^3P_0^o$	1s 6d $^1D_2$	3.6937E+00	1.833E-07	1.793E+07	3.6783E+00	1.874E-07	1.832E+07
1s 3p $^3P_2^o$	1s 6d $^1D_2$	3.8236E+00	4.803E-07	4.383E+07	3.8077E+00	4.891E-07	4.462E+07
1s 3p $^1P_1^o$	1s 6d $^1D_2$	3.8353E+00	1.087E-06	9.861E+07	3.8195E+00	1.102E-06	9.999E+07
1s 4p $^3P_1^o$	1s 6d $^1D_2$	8.8403E+00	6.306E-08	1.076E+06	8.8028E+00	6.473E-08	1.104E+06
1s 4p $^3P_0^o$	1s 6d $^1D_2$	8.8442E+00	7.726E-08	1.318E+06	8.8066E+00	7.837E-08	1.336E+06

(continued on next page)



Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	$gf$	$A$ (s <sup>-1</sup> )
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	9.1577E+00	2.183E-07	3.473E+06	9.1187E+00	2.212E-07	3.520E+06
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6d <sup>3</sup> D <sub>2</sub>	9.1855E+00	4.979E-07	7.872E+06	9.1467E+00	4.996E-07	7.900E+06
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	9.2884E+00	4.634E-13	7.165E+00			
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	9.2907E+00	4.578E-18	7.075E-05			
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	9.3415E+00	2.936E-09	4.489E+04	9.3018E+00	2.962E-09	4.529E+04
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	9.3432E+00	2.595E-08	3.966E+05	9.3035E+00	2.562E-08	3.915E+05
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	2.4566E+01	2.924E-08	6.463E+04	2.4460E+01	3.038E-08	6.718E+04
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	2.4581E+01	3.593E-08	7.934E+04	2.4474E+01	3.629E-08	8.014E+04
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	2.5835E+01	1.108E-07	2.215E+05	2.5723E+01	1.127E-07	2.254E+05
1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	2.5947E+01	2.547E-07	5.046E+05	2.5836E+01	2.540E-07	5.034E+05
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	2.6371E+01	7.765E-13	1.490E+00			
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	2.6380E+01	5.047E-15	9.676E-03			
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	2.6591E+01	5.248E-09	9.902E+03	2.6478E+01	5.337E-09	1.006E+04
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	2.6598E+01	4.638E-08	8.747E+04	2.6485E+01	4.613E-08	8.700E+04
1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	6.1807E+02	3.022E-11	1.055E-01	6.1320E+02	3.228E-11	1.135E-01
1s 6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	6.2363E+02	3.613E-11	1.239E-01	5.9930E+02	4.033E-11	1.485E-01
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	2.1556E+03	2.376E-12	6.821E-04	2.1118E+03	2.495E-12	7.402E-04
1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	2.7210E+03	2.688E-12	4.843E-04	2.5822E+03	3.083E-12	6.116E-04
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	1.0989E+05	1.664E-21	1.838E-16			
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6d <sup>1</sup> D <sub>2</sub>	6.7056E+05	3.229E-25	9.582E-22			
1s 3d <sup>3</sup> D <sub>2</sub>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	3.8310E+00	7.454E-07	3.764E+07	3.8148E+00	7.494E-07	3.784E+07
1s 3d <sup>3</sup> D <sub>3</sub>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	3.8744E+00	4.504E-06	2.224E+08	3.8580E+00	4.617E-06	2.279E+08
1s 3d <sup>1</sup> D <sub>2</sub>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	3.8761E+00	3.632E-07	1.792E+07	3.8597E+00	3.727E-07	1.838E+07
1s 4d <sup>3</sup> D <sub>2</sub>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	9.1669E+00	4.363E-07	3.848E+06	9.1288E+00	4.400E-07	3.879E+06
1s 4d <sup>3</sup> D <sub>3</sub>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	9.2719E+00	2.746E-06	2.367E+07	9.2331E+00	2.774E-06	2.391E+07
1s 4d <sup>1</sup> D <sub>2</sub>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	9.2763E+00	2.228E-07	1.919E+06	9.2375E+00	2.251E-07	1.938E+06
1s 5d <sup>3</sup> D <sub>2</sub>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	2.5816E+01	2.354E-07	2.617E+05	2.5711E+01	2.362E-07	2.625E+05
1s 5d <sup>3</sup> D <sub>3</sub>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	2.6244E+01	1.538E-06	1.656E+06	2.6136E+01	1.544E-06	1.661E+06
1s 5d <sup>1</sup> D <sub>2</sub>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	2.6262E+01	1.253E-07	1.346E+05	2.6155E+01	1.254E-07	1.347E+05
1s 5g <sup>3</sup> G <sub>4</sub>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	2.6470E+01	8.803E-15	9.312E-03			
1s 5g <sup>3</sup> G <sub>3</sub>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	2.6475E+01	7.111E-16	7.519E-04			
1s 5g <sup>3</sup> G <sub>5</sub>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	2.6601E+01	3.646E-08	3.819E+04	2.6486E+01	3.625E-08	3.797E+04
1s 5g <sup>1</sup> G <sub>4</sub>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	2.6606E+01	2.610E-09	2.732E+03	2.6491E+01	2.588E-09	2.710E+03
1s 6d <sup>3</sup> D <sub>2</sub>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1.8056E+03	4.817E-12	1.095E-03	1.8327E+03	4.512E-12	9.871E-04
1s 6d <sup>3</sup> D <sub>3</sub>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	5.3175E+03	1.207E-12	3.163E-05	5.5117E+03	1.070E-12	2.590E-05
1s 6d <sup>1</sup> D <sub>2</sub>	1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	5.7984E+03	7.578E-14	1.670E-06	5.6864E+03	8.061E-14	1.832E-06
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	1.4397E+00	2.007E-11	7.176E+03			
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	3.8211E+00	1.773E-11	9.000E+02			
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	9.1432E+00	1.834E-14	1.626E-01			
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	9.2736E+00	8.732E-07	7.525E+06	9.2341E+00	8.851E-07	7.628E+06
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	9.2758E+00	7.052E-08	6.074E+05	9.2363E+00	7.076E-08	6.095E+05
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	9.3264E+00	1.314E-12	1.120E+01			
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	9.3281E+00	3.260E-12	2.776E+01			
1s 5p <sup>3</sup> P <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	2.5720E+01	1.495E-13	1.675E-01			
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6251E+01	7.032E-07	7.563E+05	2.6139E+01	7.069E-07	7.603E+05
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6260E+01	5.684E-08	6.109E+04	2.6148E+01	5.650E-08	6.072E+04
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6469E+01	1.089E-12	1.152E+00			
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	2.6476E+01	3.093E-12	3.270E+00			
1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	1.5705E+03	1.699E-21	5.106E-13			
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	5.4970E+03	2.497E-13	6.123E-06	5.5303E+03	2.427E-13	5.831E-06
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	5.7369E+03	1.775E-14	3.997E-07	5.5276E+03	1.944E-14	4.676E-07
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>4</sub>	2.7996E+06	2.940E-27	2.780E-25			
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	1.3775E+00	8.809E-15	4.423E+00			
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	1.4397E+00	2.018E-12	9.277E+02			
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	1.4456E+00	1.399E-11	6.382E+03			
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	3.6896E+00	3.546E-14	2.482E+00			
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	3.8210E+00	2.034E-12	1.327E+02			
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	3.8327E+00	1.119E-11	7.261E+02			
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	8.8264E+00	1.545E-16	1.889E-03			
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	9.1429E+00	6.432E-14	7.331E-01			
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	9.1706E+00	4.170E-16	4.725E-03			
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	9.2732E+00	1.050E-07	1.163E+06	9.2341E+00	1.062E-07	1.176E+06
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	9.2754E+00	6.289E-07	6.966E+06	9.2363E+00	6.368E-07	7.053E+06
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	9.3261E+00	1.641E-18	1.798E-05			
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	9.3277E+00	4.791E-13	5.247E+00			
1s 5p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	2.4459E+01	1.101E-16	1.754E-04			
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	2.5717E+01	2.230E-13	3.213E-01			
1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	2.5829E+01	1.653E-13	2.361E-01			
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6248E+01	8.445E-08	1.168E+05	2.6139E+01	8.483E-08	1.173E+05
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6257E+01	5.625E-07	7.003E+05	2.6148E+01	5.085E-07	7.026E+05
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 6g <sup>3</sup> G <sub>3</sub>	2.6466E+01	3.237E-17	4.403E-05			

(continued on next page)

Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s 5f $^1F_3^0$	1s 6g $^3G_3$	2.6473E+01	3.503E-13	4.762E-01			
1s 6p $^3P_1^0$	1s 6g $^3G_3$	5.5707E+02	5.442E-20	1.671E-10			
1s 6p $^3P_2^0$	1s 6g $^3G_3$	1.5598E+03	2.160E-18	8.458E-10			
1s 6p $^1P_1^0$	1s 6g $^3G_3$	1.8359E+03	1.466E-19	4.146E-11			
1s 6f $^3F_3^0$	1s 6g $^3G_3$	5.3682E+03	3.220E-14	1.065E-06	5.5303E+03	2.912E-14	8.997E-07
1s 6f $^3F_2^0$	1s 6g $^3G_3$	5.5968E+03	1.704E-13	5.185E-06	5.5277E+03	1.750E-13	5.411E-06
1s 6f $^3F_4^0$	1s 6g $^3G_3$	2.1175E+05	1.685E-26	3.580E-22			
1s 2s $^3S_1$	1s 6f $^1F_3^0$	1.3658E+00	9.089E-14	4.643E+01			
1s 3s $^3S_1$	1s 6f $^1F_3^0$	3.6666E+00	9.718E-13	6.888E+01			
1s 3d $^3D_2$	1s 6f $^1F_3^0$	3.8309E+00	8.752E-08	5.683E+06	3.8148E+00	8.744E-08	5.677E+06
1s 3d $^3D_1$	1s 6f $^1F_3^0$	3.8326E+00	4.980E-07	3.230E+07	3.8165E+00	5.017E-07	3.254E+07
1s 3d $^3D_3$	1s 6f $^1F_3^0$	3.8743E+00	5.411E-07	3.435E+07	3.8580E+00	5.541E-07	3.517E+07
1s 3d $^1D_2$	1s 6f $^1F_3^0$	3.8760E+00	3.237E-06	2.053E+08	3.8597E+00	3.316E-06	2.103E+08
1s 4s $^3S_1$	1s 6f $^1F_3^0$	8.7727E+00	6.785E-13	8.401E+00			
1s 4d $^3D_2$	1s 6f $^1F_3^0$	9.1664E+00	5.257E-08	5.962E+05	9.1288E+00	5.284E-08	5.991E+05
1s 4d $^3D_1$	1s 6f $^1F_3^0$	9.1705E+00	2.925E-07	3.314E+06	9.1329E+00	2.954E-07	3.347E+06
1s 4d $^3D_3$	1s 6f $^1F_3^0$	9.2714E+00	3.296E-07	3.654E+06	9.2331E+00	3.328E-07	3.689E+06
1s 4d $^1D_2$	1s 6f $^1F_3^0$	9.2758E+00	1.973E-06	2.185E+07	9.2375E+00	1.990E-06	2.204E+07
1s 5s $^3S_1$	1s 6f $^1F_3^0$	2.4251E+01	3.672E-13	5.949E-01			
1s 5d $^3D_2$	1s 6f $^1F_3^0$	2.5812E+01	2.867E-08	4.101E+04	2.5711E+01	2.878E-08	4.113E+04
1s 5d $^3D_1$	1s 6f $^1F_3^0$	2.5828E+01	1.581E-07	2.258E+05	2.5727E+01	1.587E-07	2.266E+05
1s 5d $^3D_3$	1s 6f $^1F_3^0$	2.6240E+01	1.845E-07	2.554E+05	2.6136E+01	1.853E-07	2.562E+05
1s 5d $^1D_2$	1s 6f $^1F_3^0$	2.6259E+01	1.106E-06	1.528E+06	2.6155E+01	1.107E-06	1.529E+06
1s 5g $^3G_4$	1s 6f $^1F_3^0$	2.6466E+01	2.632E-14	3.580E-02			
1s 5g $^3G_3$	1s 6f $^1F_3^0$	2.6471E+01	3.695E-15	5.025E-03			
1s 5g $^3G_5$	1s 6f $^1F_3^0$	2.6597E+01	1.722E-09	2.319E+03	2.6486E+01	1.729E-09	2.329E+03
1s 5g $^1G_4$	1s 6f $^1F_3^0$	2.6601E+01	2.865E-08	3.857E+04	2.6490E+01	2.846E-08	3.832E+04
1s 6s $^3S_1$	1s 6f $^1F_3^0$	5.0083E+02	4.301E-16	1.634E-06			
1s 6d $^3D_2$	1s 6f $^1F_3^0$	1.7871E+03	6.094E-13	1.818E-04	1.8323E+03	5.891E-13	1.658E-04
1s 6d $^3D_1$	1s 6f $^1F_3^0$	1.8330E+03	3.093E-12	8.773E-04	1.8209E+03	3.120E-12	8.892E-04
1s 6d $^3D_3$	1s 6f $^1F_3^0$	5.1604E+03	1.585E-13	5.671E-06	5.5079E+03	1.287E-13	4.010E-06
1s 6d $^1D_2$	1s 6f $^1F_3^0$	5.6121E+03	7.375E-13	2.231E-05	5.6823E+03	7.009E-13	2.051E-05
1s 6g $^3G_4$	1s 6f $^1F_3^0$	1.8628E+05	3.059E-23	8.401E-19			
1s 6g $^3G_3$	1s 6f $^1F_3^0$	9.9701E+05	2.038E-26	1.953E-23			
1s 4f $^3F_3^0$	1s 6g $^3G_5$	9.2643E+00	6.142E-07	4.339E+06	9.2249E+00	6.158E-07	4.350E+06
1s 4f $^3F_2^0$	1s 6g $^3G_5$	9.3170E+00	5.280E-06	3.688E+07	9.2773E+00	5.351E-06	3.738E+07
1s 4f $^3F_3^0$	1s 6g $^3G_5$	9.3187E+00	2.496E-07	1.743E+06	9.2790E+00	2.529E-07	1.766E+06
1s 5f $^3F_3^0$	1s 6g $^3G_5$	2.6177E+01	4.863E-07	4.304E+05	2.6065E+01	4.885E-07	4.323E+05
1s 5f $^3F_4^0$	1s 6g $^3G_5$	2.6394E+01	4.285E-06	3.730E+06	2.6281E+01	4.304E-06	3.747E+06
1s 5f $^3F_2^0$	1s 6g $^3G_5$	2.6400E+01	2.028E-07	1.764E+05	2.6287E+01	2.035E-07	1.771E+05
1s 6f $^3F_3^0$	1s 6g $^3G_5$	3.4474E+03	7.054E-13	3.599E-05	3.4619E+03	6.849E-13	3.436E-05
1s 6f $^3F_4^0$	1s 6g $^3G_5$	9.2152E+03	3.245E-13	2.317E-06	9.2775E+03	3.143E-13	2.195E-06
1s 6f $^1F_3^0$	1s 6g $^3G_5$	9.7284E+03	1.305E-14	8.363E-08	9.2884E+03	1.494E-14	1.041E-07
1s 3d $^3D_3$	1s 6h $^3H_5^0$	3.8728E+00	5.411E-12	2.188E+02			
1s 4d $^3D_3$	1s 6h $^3H_5^0$	9.2626E+00	5.290E-12	3.739E+01			
1s 5d $^3D_3$	1s 6h $^3H_5^0$	2.6170E+01	2.629E-13	2.328E-01			
1s 5g $^3G_4$	1s 6h $^3H_5^0$	2.6394E+01	2.528E-06	2.200E+06	2.6281E+01	2.542E-06	2.212E+06
1s 5g $^3G_3$	1s 6h $^3H_5^0$	2.6399E+01	1.213E-07	1.055E+05	2.6286E+01	1.209E-07	1.052E+05
1s 5g $^3G_5$	1s 6h $^3H_5^0$	2.6525E+01	1.198E-12	1.032E+00			
1s 5g $^1G_4$	1s 6h $^3H_5^0$	2.6529E+01	2.458E-12	2.118E+00			
1s 6d $^3D_3$	1s 6h $^3H_5^0$	3.3705E+03	7.804E-21	4.165E-13			
1s 6g $^3G_4$	1s 6h $^3H_5^0$	9.2359E+03	7.177E-14	5.102E-07	9.2564E+03	7.054E-14	4.950E-07
1s 6g $^3G_3$	1s 6h $^3H_5^0$	9.6239E+03	3.044E-15	1.993E-08	9.2564E+03	3.359E-15	2.357E-08
1s 6g $^3G_5$	1s 6h $^3H_5^0$	8.7873E+06	3.968E-29	3.115E-28			
1s 3d $^3D_2$	1s 6h $^3H_4^0$	3.8293E+00	6.327E-16	3.198E-02			
1s 3d $^3D_3$	1s 6h $^3H_4^0$	3.8727E+00	3.323E-13	1.642E+01			
1s 3d $^1D_2$	1s 6h $^3H_4^0$	3.8744E+00	4.003E-12	1.976E+02			
1s 4d $^3D_2$	1s 6h $^3H_4^0$	9.1575E+00	7.295E-16	6.448E-03			
1s 4d $^3D_3$	1s 6h $^3H_4^0$	9.2624E+00	3.180E-13	2.747E+00			
1s 4d $^1D_2$	1s 6h $^3H_4^0$	9.2667E+00	3.921E-12	3.384E+01			
1s 5d $^3D_2$	1s 6h $^3H_4^0$	2.5741E+01	3.296E-17	3.686E-05			
1s 5d $^3D_3$	1s 6h $^3H_4^0$	2.6168E+01	2.500E-14	2.706E-02			
1s 5d $^1D_2$	1s 6h $^3H_4^0$	2.6186E+01	2.013E-13	2.176E-01			
1s 5g $^3G_4$	1s 6h $^3H_4^0$	2.6392E+01	1.806E-07	1.922E+05	2.6281E+01	1.815E-07	1.931E+05
1s 5g $^3G_3$	1s 6h $^3H_4^0$	2.6397E+01	1.986E-06	2.113E+06	2.6286E+01	1.996E-06	2.123E+06
1s 5g $^3G_5$	1s 6h $^3H_4^0$	2.6523E+01	4.039E-17	4.255E-05			
1s 5g $^1G_4$	1s 6h $^3H_4^0$	2.6527E+01	6.353E-13	6.691E-01			
1s 6d $^3D_2$	1s 6h $^3H_4^0$	1.5031E+03	4.993E-24	1.638E-15			
1s 6d $^3D_3$	1s 6h $^3H_4^0$	3.3388E+03	3.254E-21	2.163E-13			
1s 6d $^1D_2$	1s 6h $^3H_4^0$	3.5222E+03	6.134E-21	3.664E-13			
1s 6g $^3G_4$	1s 6h $^3H_4^0$	9.0013E+03	5.541E-15	5.068E-08	9.2564E+03	5.038E-15	4.321E-08

(continued on next page)

Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	<i>gf</i>	<i>A</i> ( $s^{-1}$ )	$\lambda$ (Å)	<i>gf</i>	<i>A</i> ( $s^{-1}$ )
1s6g $^3G_3$	1s6h $^3H_4^0$	9.3695E+03	5.404E-14	4.562E-07	9.2564E+03	5.542E-14	4.753E-07
1s6g $^3G_5$	1s6h $^3H_4^0$	3.4069E+05	1.141E-30	7.288E-27			
1s2p $^3P_2^0$	1s6g $^1G_4$	1.4395E+00	5.680E-15	2.031E+00			
1s3p $^3P_2^0$	1s6g $^1G_4$	3.8194E+00	3.778E-15	1.919E-01			
1s4p $^3P_2^0$	1s6g $^1G_4$	9.1339E+00	6.563E-14	5.830E-01			
1s4f $^3F_2^0$	1s6g $^1G_4$	9.2640E+00	3.610E-08	3.117E+05	9.2249E+00	3.550E-08	3.065E+05
1s4f $^3F_2^0$	1s6g $^1G_4$	9.2662E+00	4.630E-07	3.997E+06	9.2271E+00	4.648E-07	4.012E+06
1s4f $^3F_3^0$	1s6g $^1G_4$	9.3167E+00	3.774E-07	3.222E+06	9.2773E+00	3.822E-07	3.263E+06
1s4f $^1F_3^0$	1s6g $^1G_4$	9.3184E+00	4.149E-06	3.541E+07	9.2790E+00	4.203E-06	3.587E+07
1s5p $^3P_2^0$	1s6g $^1G_4$	2.5647E+01	7.477E-14	8.425E-02			
1s5f $^3F_3^0$	1s6g $^1G_4$	2.6175E+01	2.866E-08	3.100E+04	2.6065E+01	2.825E-08	3.055E+04
1s5f $^3F_2^0$	1s6g $^1G_4$	2.6184E+01	3.669E-07	3.966E+05	2.6074E+01	3.687E-07	3.985E+05
1s5f $^3F_4^0$	1s6g $^1G_4$	2.6391E+01	3.061E-07	3.257E+05	2.6281E+01	3.074E-07	3.271E+05
1s5f $^1F_3^0$	1s6g $^1G_4$	2.6398E+01	3.368E-06	3.582E+06	2.6287E+01	3.380E-06	3.595E+06
1s6p $^3P_2^0$	1s6g $^1G_4$	1.3363E+03	2.421E-18	1.005E-09			
1s6f $^3F_3^0$	1s6g $^1G_4$	3.4068E+03	4.316E-14	2.756E-06	3.4619E+03	4.205E-14	2.578E-06
1s6f $^3F_2^0$	1s6g $^1G_4$	3.4975E+03	5.097E-13	3.088E-05	3.4608E+03	5.197E-13	3.188E-05
1s6f $^3F_4^0$	1s6g $^1G_4$	8.9311E+03	2.547E-14	2.366E-07	9.2773E+03	2.245E-14	1.917E-07
1s6f $^1F_3^0$	1s6g $^1G_4$	9.4124E+03	2.394E-13	2.002E-06	9.2882E+03	2.460E-13	2.096E-06
1s6h $^3H_5^0$	1s6g $^1G_4$	2.9962E+05	2.062E-24	1.703E-20			
1s6h $^3H_4^0$	1s6g $^1G_4$	1.9372E+06	1.973E-27	3.896E-25			
1s5g $^3G_4$	1s6h $^3H_6^0$	2.6344E+01	8.894E-07	6.576E+05	2.6232E+01	8.917E-07	6.593E+05
1s5g $^3G_5$	1s6h $^3H_6^0$	2.6474E+01	1.048E-05	7.674E+06	2.6361E+01	1.054E-05	7.716E+06
1s5g $^1G_4$	1s6h $^3H_6^0$	2.6478E+01	3.306E-07	2.420E+05	2.6365E+01	3.324E-07	2.432E+05
1s6g $^3G_4$	1s6h $^3H_6^0$	5.5520E+03	1.164E-13	1.938E-06	5.5614E+03	1.139E-13	1.874E-06
1s6g $^3G_5$	1s6h $^3H_6^0$	1.3897E+04	8.779E-14	2.332E-07	1.3933E+04	8.611E-14	2.256E-07
1s6g $^1G_4$	1s6h $^3H_6^0$	1.4598E+04	2.390E-15	5.755E-09	1.3934E+04	2.733E-15	7.163E-09
1s3d $^3D_3$	1s6h $^1H_5^0$	3.8717E+00	4.245E-16	1.717E-02			
1s4d $^3D_3$	1s6h $^1H_5^0$	9.2562E+00	4.469E-16	3.163E-03			
1s5d $^3D_3$	1s6h $^1H_5^0$	2.6119E+01	2.181E-16	1.939E-04			
1s5g $^3G_4$	1s6h $^1H_5^0$	2.6342E+01	3.299E-08	2.883E+04	2.6232E+01	3.216E-08	2.810E+04
1s5g $^3G_5$	1s6h $^1H_5^0$	2.6348E+01	7.157E-07	6.251E+05	2.6237E+01	7.181E-07	6.272E+05
1s5g $^1G_4$	1s6h $^1H_5^0$	2.6473E+01	4.992E-07	4.320E+05	2.6361E+01	5.019E-07	4.342E+05
1s5g $^1G_4$	1s6h $^1H_5^0$	2.6477E+01	8.653E-06	7.485E+06	2.6365E+01	8.697E-06	7.523E+06
1s6d $^3D_3$	1s6h $^1H_5^0$	2.6964E+03	7.459E-22	6.221E-14			
1s6g $^3G_4$	1s6h $^1H_5^0$	5.4809E+03	4.490E-15	9.064E-08	5.5614E+03	4.383E-15	8.520E-08
1s6g $^3G_5$	1s6h $^1H_5^0$	5.6153E+03	9.058E-14	1.742E-06	5.5614E+03	9.204E-14	1.789E-06
1s6g $^3G_5$	1s6h $^1H_5^0$	1.3461E+04	4.602E-15	1.540E-08	1.3933E+04	4.100E-15	1.269E-08
1s6g $^1G_4$	1s6h $^1H_5^0$	1.4116E+04	6.916E-14	2.105E-07	1.3934E+04	7.107E-14	2.201E-07
1s2p $^3P_1^0$	1s7s $^3S_1$	1.3378E+00	7.061E-11	8.772E+04	1.3323E+00	1.617E-10	2.008E+05
1s2p $^3P_2^0$	1s7s $^3S_1$	1.3964E+00	8.788E-08	1.002E+08	1.3905E+00	8.717E-08	9.938E+07
1s2p $^1P_1^0$	1s7s $^3S_1$	1.4019E+00	9.183E-08	1.039E+08	1.3961E+00	8.599E-08	9.725E+07
1s3p $^3P_1^0$	1s7s $^3S_1$	3.4180E+00	6.412E-11	1.220E+04	3.4039E+00	8.987E-11	1.710E+04
1s3p $^3P_2^0$	1s7s $^3S_1$	3.5305E+00	5.822E-08	1.038E+07	3.5159E+00	5.726E-08	1.021E+07
1s3p $^1P_1^0$	1s7s $^3S_1$	3.5405E+00	5.893E-08	1.045E+07	3.5260E+00	5.669E-08	1.005E+07
1s4p $^3P_1^0$	1s7s $^3S_1$	7.4166E+00	4.198E-11	1.697E+03	7.3859E+00	5.786E-11	2.338E+03
1s4p $^3P_2^0$	1s7s $^3S_1$	7.6388E+00	3.929E-08	1.497E+06	7.6070E+00	3.893E-08	1.483E+06
1s4p $^1P_1^0$	1s7s $^3S_1$	7.6581E+00	3.974E-08	1.507E+06	7.6265E+00	3.858E-08	1.462E+06
1s4f $^3F_3^0$	1s7s $^3S_1$	7.7295E+00	3.020E-15	1.124E-01			
1s4f $^3F_2^0$	1s7s $^3S_1$	7.7310E+00	4.463E-16	1.660E-02			
1s4f $^1F_3^0$	1s7s $^3S_1$	7.7674E+00	9.051E-15	3.336E-01			
1s5p $^3P_1^0$	1s7s $^3S_1$	1.6020E+01	2.993E-11	2.593E+02	1.5955E+01	4.220E-11	3.655E+02
1s5p $^3P_2^0$	1s7s $^3S_1$	1.6551E+01	2.882E-08	2.340E+05	1.6483E+01	2.871E-08	2.329E+05
1s5p $^1P_1^0$	1s7s $^3S_1$	1.6597E+01	2.919E-08	2.356E+05	1.6529E+01	2.843E-08	2.294E+05
1s5f $^3F_3^0$	1s7s $^3S_1$	1.6769E+01	2.832E-15	2.239E-02			
1s5f $^3F_2^0$	1s7s $^3S_1$	1.6773E+01	2.941E-17	2.324E-04			
1s5f $^1F_3^0$	1s7s $^3S_1$	1.6860E+01	1.476E-14	1.154E-01			
1s6p $^3P_1^0$	1s7s $^3S_1$	4.2860E+01	2.300E-11	2.784E+01	4.2690E+01	5.831E-11	7.054E+01
1s6p $^3P_2^0$	1s7s $^3S_1$	4.5091E+01	2.306E-08	2.522E+04	4.4909E+01	2.285E-08	2.498E+04
1s6p $^1P_1^0$	1s7s $^3S_1$	4.5287E+01	2.341E-08	2.537E+04	4.5084E+01	2.254E-08	2.444E+04
1s6f $^3F_3^0$	1s7s $^3S_1$	4.6035E+01	2.643E-15	2.773E-03			
1s6f $^3F_2^0$	1s7s $^3S_1$	4.6051E+01	1.251E-16	1.312E-04			
1s6f $^1F_3^0$	1s7s $^3S_1$	4.6435E+01	1.966E-14	2.027E-02			
1s2s $^3S_1$	1s7p $^3P_1^0$	1.3266E+00	9.923E-10	1.254E+06	1.3210E+00	1.573E-09	1.987E+06
1s3s $^3S_1$	1s7p $^3P_1^0$	3.3968E+00	3.292E-10	6.343E+04	3.3827E+00	4.928E-10	9.495E+04
1s3d $^3D_2$	1s7p $^3P_1^0$	3.5373E+00	5.806E-10	1.032E+05	3.5225E+00	5.732E-10	1.018E+05
1s3d $^3D_1$	1s7p $^3P_1^0$	3.5388E+00	5.924E-10	1.052E+05	3.5240E+00	5.632E-10	9.998E+04
1s3d $^3D_3$	1s7p $^3P_1^0$	3.5743E+00	9.720E-09	1.692E+06	3.5593E+00	9.462E-09	1.646E+06
1s3d $^1D_2$	1s7p $^3P_1^0$	3.5757E+00	3.723E-09	6.474E+05	3.5607E+00	3.624E-09	6.301E+05
1s4s $^3S_1$	1s7p $^3P_1^0$	7.3716E+00	1.514E-10	6.195E+03	7.3412E+00	1.184E-10	8.937E+03
1s4d $^3D_2$	1s7p $^3P_1^0$	7.6476E+00	6.420E-10	2.441E+04	7.6163E+00	6.362E-10	2.418E+04

(continued on next page)

Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )	$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )
1s 4d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	7.6504E+00	6.386E-10	2.426E+04	7.6191E+00	6.185E-10	2.348E+04
1s 4d <sup>3</sup> D <sub>3</sub>	1s 7p <sup>3</sup> P <sub>3</sub> <sup>o</sup>	7.7206E+00	1.056E-08	3.939E+05	7.6888E+00	1.031E-08	3.845E+05
1s 4d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	7.7236E+00	4.009E-09	1.494E+05	7.6918E+00	3.961E-09	1.476E+05
1s 5s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.5898E+01	8.382E-11	7.373E+02	1.5833E+01	1.150E-10	1.011E+03
1s 5d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.6554E+01	6.141E-10	4.983E+03	1.6489E+01	6.088E-10	4.936E+03
1s 5d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.6561E+01	6.033E-10	4.891E+03	1.6495E+01	5.889E-10	4.771E+03
1s 5d <sup>3</sup> D <sub>3</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.6729E+01	1.001E-08	7.953E+04	1.6663E+01	9.785E-09	7.770E+04
1s 5d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.6737E+01	3.776E-09	2.997E+04	1.6670E+01	3.758E-09	2.981E+04
1s 5g <sup>3</sup> G <sub>3</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1.6823E+01	5.398E-18	4.241E-05			
1s 6s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.2260E+01	5.061E-11	6.301E+01	4.2057E+01	6.306E-11	7.859E+01
1s 6d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.4993E+01	5.884E-10	6.463E+02	4.4844E+01	5.978E-10	6.553E+02
1s 6d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.5021E+01	5.741E-10	6.298E+02	4.4837E+01	5.631E-10	6.175E+02
1s 6d <sup>3</sup> D <sub>3</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.5746E+01	9.580E-09	1.018E+04	4.5589E+01	9.401E-09	9.972E+03
1s 6d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.5778E+01	3.602E-09	3.821E+03	4.5600E+01	3.564E-09	3.779E+03
1s 6g <sup>3</sup> G <sub>3</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.6153E+01	1.003E-17	1.047E-05			
1s 7s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	7.6504E+03	1.709E-16	6.493E-09	7.3461E+03	3.329E-16	1.360E-08
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	1.3961E+00	5.700E-08	1.951E+08	1.3903E+00	5.814E-08	1.989E+08
1s 3p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	3.5288E+00	3.806E-08	2.038E+07	3.5145E+00	3.822E-08	2.046E+07
1s 4p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	7.6311E+00	2.568E-08	2.941E+06	7.6005E+00	2.602E-08	2.979E+06
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	7.7232E+00	2.042E-15	2.284E-01			
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	1.6515E+01	1.876E-08	4.589E+05	1.6452E+01	1.924E-08	4.702E+05
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	1.6736E+01	3.426E-15	8.160E-02			
1s 6p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	4.4825E+01	1.486E-08	4.934E+04	4.4685E+01	1.546E-08	5.123E+04
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7s <sup>1</sup> S <sub>0</sub>	4.5774E+01	4.081E-15	1.299E-02			
1s 3d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	3.5372E+00	3.772E-10	2.011E+05	3.5228E+00	3.663E-10	1.952E+05
1s 3d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	3.5756E+00	4.547E-09	2.372E+06	3.5610E+00	4.361E-09	2.274E+06
1s 4d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	7.6470E+00	4.064E-10	4.636E+04	7.6177E+00	3.968E-10	4.522E+04
1s 4d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	7.7230E+00	4.905E-09	5.486E+05	7.6932E+00	4.762E-09	5.322E+05
1s 5d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.6552E+01	3.834E-10	9.335E+03	1.6495E+01	3.754E-10	9.126E+03
1s 5d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1.6734E+01	4.624E-09	1.101E+05	1.6677E+01	4.518E-09	1.074E+05
1s 6d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.4975E+01	3.644E-10	1.202E+03	4.4891E+01	3.446E-10	1.131E+03
1s 6d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	4.5759E+01	4.411E-09	1.405E+04	4.5649E+01	4.337E-09	1.376E+04
1s <sup>2</sup> <sup>1</sup> S <sub>0</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.1400E-01	6.200E-06	8.387E+10	3.1270E-01	6.930E-06	9.375E+10
1s 2s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3253E+00	7.079E-07	5.377E+08	1.3197E+00	7.260E-07	5.513E+08
1s 2s <sup>1</sup> S <sub>0</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3374E+00	4.714E-07	3.516E+08	1.3320E+00	4.707E-07	3.509E+08
1s 3s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.3884E+00	2.267E-07	2.634E+07	3.3744E+00	2.291E-07	2.661E+07
1s 3s <sup>1</sup> S <sub>0</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.4094E+00	1.548E-07	1.776E+07	3.3955E+00	1.499E-07	1.720E+07
1s 3d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.5282E+00	1.202E-17	1.288E-03			
1s 3d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.5297E+00	2.420E-13	2.591E+01			
1s 3d <sup>3</sup> D <sub>3</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.5650E+00	3.454E-08	3.626E+06	3.5501E+00	3.333E-08	3.499E+06
1s 3d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	3.5665E+00	8.900E-09	9.335E+05	3.5515E+00	8.324E-09	8.730E+05
1s 4s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.3324E+00	1.020E-07	2.530E+06	7.3023E+00	1.027E-07	2.547E+06
1s 4s <sup>1</sup> S <sub>0</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.3720E+00	7.087E-08	1.740E+06	7.3421E+00	6.736E-08	1.652E+06
1s 4d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.6054E+00	7.859E-14	1.813E+00			
1s 4d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.6082E+00	1.657E-13	3.818E+00			
1s 4d <sup>3</sup> D <sub>3</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.6776E+00	3.901E-08	8.828E+05	7.6461E+00	3.790E-08	8.575E+05
1s 4d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	7.6806E+00	9.934E-09	2.246E+05	7.6491E+00	9.464E-09	2.139E+05
1s 5s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.5717E+01	5.498E-08	2.969E+05	1.5653E+01	5.521E-08	2.980E+05
1s 5s <sup>1</sup> S <sub>0</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.5808E+01	3.839E-08	2.049E+05	1.5745E+01	3.617E-08	1.930E+05
1s 5d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6358E+01	1.841E-13	9.179E-01			
1s 5d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6364E+01	1.037E-13	5.164E-01			
1s 5d <sup>3</sup> D <sub>3</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6529E+01	3.782E-08	1.847E+05	1.6463E+01	3.680E-08	1.796E+05
1s 5d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6536E+01	9.557E-09	4.663E+04	1.6471E+01	9.189E-09	4.480E+04
1s 5g <sup>3</sup> G <sub>4</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6618E+01	1.900E-16	9.176E-04			
1s 5g <sup>3</sup> G <sub>3</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6620E+01	4.014E-16	1.939E-03			
1s 5g <sup>1</sup> G <sub>4</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.6671E+01	5.026E-16	2.413E-03			
1s 6s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.1005E+01	3.153E-08	2.501E+04	4.0810E+01	3.175E-08	2.522E+04
1s 6s <sup>1</sup> S <sub>0</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.1360E+01	2.208E-08	1.722E+04	4.1111E+01	2.071E-08	1.620E+04
1s 6d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.3572E+01	2.575E-13	1.809E-01			
1s 6d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.3599E+01	6.437E-14	4.518E-02			
1s 6d <sup>3</sup> D <sub>3</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4278E+01	3.619E-08	2.463E+04	4.4127E+01	3.518E-08	2.389E+04
1s 6d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4308E+01	9.105E-09	6.187E+03	4.4138E+01	8.787E-09	5.966E+03
1s 6g <sup>3</sup> G <sub>4</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4650E+01	3.033E-16	2.030E-04			
1s 6g <sup>3</sup> G <sub>3</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4659E+01	1.017E-15	6.805E-04			
1s 6g <sup>1</sup> G <sub>4</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	4.4874E+01	1.154E-15	7.646E-04			
1s 7s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.1691E+03	3.824E-11	3.733E-02	1.1590E+03	3.901E-11	3.842E-02
1s 7s <sup>1</sup> S <sub>0</sub>	1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1.3812E+03	1.542E-11	1.078E-02	1.3316E+03	1.714E-11	1.279E-02
1s 2p <sup>3</sup> P <sub>0</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>2</sub>	1.3362E+00	4.478E-08	3.345E+07	1.3307E+00	4.941E-08	3.691E+07
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>2</sub>	1.3371E+00	2.808E-08	2.095E+07	1.3315E+00	2.860E-08	2.133E+07
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>2</sub>	1.3946E+00	2.722E-11	1.867E+04	1.3888E+00	1.197E-10	8.211E+04
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>2</sub>	1.4001E+00	5.100E-13	3.471E+02	1.3943E+00	6.804E-11	4.629E+04

(continued on next page)

Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s 3p $^3P_1^0$	1s 7d $^3D_2$	3.4075E+00	1.627E-08	1.869E+06	3.3932E+00	1.702E-08	1.956E+06
1s 3p $^3P_0^0$	1s 7d $^3D_2$	3.4089E+00	1.009E-08	1.158E+06	3.3946E+00	9.875E-09	1.133E+06
1s 3p $^3P_2^0$	1s 7d $^3D_2$	3.5193E+00	1.222E-11	1.316E+03	3.5045E+00	4.385E-11	4.723E+03
1s 3p $^1P_1^0$	1s 7d $^3D_2$	3.5292E+00	7.061E-13	7.563E+01	3.5145E+00	2.920E-11	3.127E+03
1s 4p $^3P_1^0$	1s 7d $^3D_2$	7.3673E+00	7.197E-09	1.769E+05	7.3356E+00	7.478E-09	1.838E+05
1s 4p $^3P_0^0$	1s 7d $^3D_2$	7.3700E+00	4.458E-09	1.095E+05	7.3382E+00	4.345E-09	1.067E+05
1s 4p $^3P_2^0$	1s 7d $^3D_2$	7.5864E+00	5.874E-12	1.361E+02	7.5537E+00	2.000E-11	4.636E+02
1s 4p $^1P_1^0$	1s 7d $^3D_2$	7.6055E+00	4.053E-13	9.348E+00	7.5729E+00	1.427E-11	3.293E+02
1s 4f $^3F_3^0$	1s 7d $^3D_2$	7.6759E+00	1.692E-09	3.830E+04	7.6429E+00	1.661E-09	3.762E+04
1s 4f $^3F_2^0$	1s 7d $^3D_2$	7.6774E+00	4.251E-10	9.622E+03	7.6444E+00	4.160E-10	9.418E+03
1s 4f $^3F_4^0$	1s 7d $^3D_2$	7.7121E+00	3.413E-09	7.654E+04	7.6789E+00	3.354E-09	7.524E+04
1s 4f $^1F_3^0$	1s 7d $^3D_2$	7.7133E+00	4.204E-10	9.426E+03	7.6800E+00	4.388E-10	9.841E+03
1s 5p $^3P_0^0$	1s 7d $^3D_2$	1.5792E+01	3.717E-09	1.988E+04	1.5722E+01	3.848E-09	2.059E+04
1s 5p $^3P_1^0$	1s 7d $^3D_2$	1.5798E+01	2.303E-09	1.231E+04	1.5728E+01	2.239E-09	1.197E+04
1s 5p $^3P_2^0$	1s 7d $^3D_2$	1.6307E+01	3.226E-12	1.619E+01	1.6234E+01	1.060E-11	5.324E+01
1s 5p $^1P_1^0$	1s 7d $^3D_2$	1.6352E+01	2.514E-13	1.255E+00	1.6279E+01	7.983E-12	3.984E+01
1s 5f $^3F_3^0$	1s 7d $^3D_2$	1.6519E+01	2.775E-09	1.357E+04	1.6446E+01	2.756E-09	1.347E+04
1s 5f $^3F_2^0$	1s 7d $^3D_2$	1.6522E+01	6.968E-10	3.405E+03	1.6450E+01	6.900E-10	3.373E+03
1s 5f $^3F_4^0$	1s 7d $^3D_2$	1.6605E+01	5.591E-09	2.705E+04	1.6532E+01	5.516E-09	2.669E+04
1s 5f $^1F_3^0$	1s 7d $^3D_2$	1.6607E+01	6.887E-10	3.331E+03	1.6535E+01	7.220E-10	3.493E+03
1s 6p $^3P_0^0$	1s 7d $^3D_2$	4.1263E+01	2.028E-09	1.589E+03	4.1063E+01	2.093E-09	1.641E+03
1s 6p $^3P_1^0$	1s 7d $^3D_2$	4.1288E+01	1.257E-09	9.836E+02	4.1000E+01	1.227E-09	9.657E+02
1s 6p $^3P_2^0$	1s 7d $^3D_2$	4.3326E+01	1.907E-12	1.355E+00	4.3112E+01	6.034E-12	4.294E+00
1s 6p $^1P_1^0$	1s 7d $^3D_2$	4.3508E+01	1.635E-13	1.152E-01	4.3273E+01	3.074E-12	2.171E+00
1s 6f $^3F_3^0$	1s 7d $^3D_2$	4.4197E+01	3.605E-09	2.462E+03	4.4000E+01	3.604E-09	2.462E+03
1s 6f $^3F_2^0$	1s 7d $^3D_2$	4.4212E+01	9.051E-10	6.177E+02	4.4000E+01	9.006E-10	6.153E+02
1s 6f $^3F_4^0$	1s 7d $^3D_2$	4.4555E+01	7.249E-09	4.871E+03	4.4354E+01	7.175E-09	4.824E+03
1s 6f $^1F_3^0$	1s 7d $^3D_2$	4.4566E+01	8.930E-10	5.998E+02	4.4354E+01	9.294E-10	6.249E+02
1s 6h $^3H_4^0$	1s 7d $^3D_2$	4.4777E+01	1.788E-21	1.190E-09			
1s 7p $^3P_0^0$	1s 7d $^3D_2$	1.2946E+03	1.100E-12	8.757E-04	1.2624E+03	1.212E-12	1.006E-03
1s 7p $^3P_1^0$	1s 7d $^3D_2$	1.3100E+03	6.563E-13	5.102E-04	1.2259E+03	7.685E-13	6.764E-04
1s 7p $^3P_2^0$	1s 7d $^3D_2$	2.0924E+04	2.094E-19	6.381E-13			
1s 2p $^3P_1^0$	1s 7d $^3D_1$	1.3362E+00	4.400E-08	5.479E+07	1.3307E+00	4.658E-08	5.799E+07
1s 2p $^3P_2^0$	1s 7d $^3D_1$	1.3946E+00	9.500E-14	1.086E+02			
1s 2p $^1P_1^0$	1s 7d $^3D_1$	1.4001E+00	4.968E-11	5.634E+04	1.3943E+00	6.617E-11	7.503E+04
1s 3p $^3P_0^0$	1s 7d $^3D_1$	3.4074E+00	1.582E-08	3.030E+06	3.3932E+00	1.606E-08	3.075E+06
1s 3p $^3P_2^0$	1s 7d $^3D_1$	3.5192E+00	1.300E-13	2.334E+01			
1s 3p $^1P_1^0$	1s 7d $^3D_1$	3.5291E+00	1.664E-11	2.970E+03	3.5145E+00	2.062E-11	3.680E+03
1s 4p $^3P_0^0$	1s 7d $^3D_1$	7.3668E+00	6.984E-09	2.861E+05	7.3357E+00	7.059E-09	2.892E+05
1s 4p $^3P_2^0$	1s 7d $^3D_1$	7.5859E+00	8.791E-14	3.396E+00			
1s 4p $^1P_1^0$	1s 7d $^3D_1$	7.6050E+00	7.421E-12	2.853E+02	7.5730E+00	8.740E-12	3.359E+02
1s 4f $^3F_3^0$	1s 7d $^3D_1$	7.6754E+00	2.849E-10	1.075E+04	7.6430E+00	2.810E-10	1.060E+04
1s 4f $^3F_2^0$	1s 7d $^3D_1$	7.6769E+00	9.882E-10	3.728E+04	7.6445E+00	9.709E-10	3.662E+04
1s 4f $^3F_4^0$	1s 7d $^3D_1$	7.7127E+00	2.289E-09	8.555E+04	7.6801E+00	2.268E-09	8.477E+04
1s 5p $^3P_0^0$	1s 7d $^3D_1$	1.5790E+01	3.602E-09	3.212E+04	1.5722E+01	3.635E-09	3.241E+04
1s 5p $^3P_2^0$	1s 7d $^3D_1$	1.6305E+01	5.927E-14	4.957E-01			
1s 5p $^1P_1^0$	1s 7d $^3D_1$	1.6349E+01	3.876E-12	3.224E+01	1.6280E+01	4.371E-12	3.635E+01
1s 5f $^3F_3^0$	1s 7d $^3D_1$	1.6516E+01	4.669E-10	3.806E+03	1.6447E+01	4.657E-10	3.795E+03
1s 5f $^3F_2^0$	1s 7d $^3D_1$	1.6520E+01	1.620E-09	1.320E+04	1.6451E+01	1.610E-09	1.311E+04
1s 5f $^3F_4^0$	1s 7d $^3D_1$	1.6605E+01	3.751E-09	3.025E+04	1.6535E+01	3.730E-09	3.008E+04
1s 6p $^3P_0^0$	1s 7d $^3D_1$	4.1248E+01	1.961E-09	2.563E+03	4.1067E+01	1.974E-09	2.581E+03
1s 6p $^3P_2^0$	1s 7d $^3D_1$	4.3310E+01	4.142E-14	4.910E-02			
1s 6p $^1P_1^0$	1s 7d $^3D_1$	4.3491E+01	2.199E-12	2.585E+00	4.3277E+01	3.706E-12	4.363E+00
1s 6f $^3F_3^0$	1s 7d $^3D_1$	4.4180E+01	6.062E-10	6.905E+02	4.4005E+01	5.983E-10	6.812E+02
1s 6f $^3F_2^0$	1s 7d $^3D_1$	4.4195E+01	2.104E-09	2.395E+03	4.4004E+01	2.101E-09	2.392E+03
1s 6f $^3F_4^0$	1s 7d $^3D_1$	4.4549E+01	4.862E-09	5.447E+03	4.4358E+01	4.862E-09	5.447E+03
1s 7p $^3P_0^0$	1s 7d $^3D_1$	1.2801E+03	1.102E-12	1.496E-03	1.2659E+03	1.132E-12	1.558E-03
1s 7p $^3P_2^0$	1s 7d $^3D_1$	1.7684E+04	2.108E-20	1.499E-13			
1s 2s $^3S_1$	1s 7p $^1P_1^0$	1.3252E+00	7.024E-07	8.893E+08	1.3196E+00	7.245E-07	9.173E+08
1s 3s $^3S_1$	1s 7p $^1P_1^0$	3.3877E+00	2.240E-07	4.340E+07	3.3738E+00	2.287E-07	4.430E+07
1s 3d $^3D_2$	1s 7p $^1P_1^0$	3.5275E+00	2.870E-13	5.129E+01			
1s 3d $^3D_1$	1s 7p $^1P_1^0$	3.5290E+00	3.245E-15	5.794E-01			
1s 3d $^3D_3$	1s 7p $^1P_1^0$	3.5643E+00	6.031E-09	1.055E+06	3.5494E+00	6.273E-09	1.097E+06
1s 3d $^1D_2$	1s 7p $^1P_1^0$	3.5657E+00	1.963E-08	3.433E+06	3.5508E+00	1.869E-08	3.269E+06
1s 4s $^3S_1$	1s 7p $^1P_1^0$	7.3292E+00	1.005E-07	4.160E+06	7.2994E+00	1.026E-07	4.245E+06
1s 4d $^3D_2$	1s 7p $^1P_1^0$	7.6019E+00	3.982E-14	1.532E+00			
1s 4d $^3D_1$	1s 7p $^1P_1^0$	7.6047E+00	4.575E-14	1.759E+00			
1s 4d $^3D_3$	1s 7p $^1P_1^0$	7.6740E+00	6.836E-09	2.581E+05	7.6429E+00	7.123E-09	2.688E+05
1s 4d $^1D_2$	1s 7p $^1P_1^0$	7.6770E+00	2.199E-08	8.294E+05	7.6459E+00	2.128E-08	8.026E+05
1s 5s $^3S_1$	1s 7p $^1P_1^0$	1.5702E+01	5.403E-08	4.873E+05	1.5640E+01	5.523E-08	4.978E+05
1s 5d $^3D_2$	1s 7p $^1P_1^0$	1.6342E+01	9.126E-20	7.599E-07			

(continued on next page)

Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s 5d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.6348E+01	1.012E-13	8.420E-01			
1s 5d <sup>3</sup> D <sub>3</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.6512E+01	6.645E-09	5.418E+04	1.6449E+01	6.925E-09	5.643E+04
1s 5d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.6520E+01	2.120E-08	1.727E+05	1.6456E+01	2.069E-08	1.684E+05
1s 5g <sup>3</sup> G <sub>3</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.6603E+01	6.845E-18	5.521E-05			
1s 6s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.0902E+01	3.083E-08	4.097E+04	4.0720E+01	3.189E-08	4.241E+04
1s 6d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.3457E+01	1.217E-14	1.433E-02			
1s 6d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.3483E+01	1.543E-13	1.814E-01			
1s 6d <sup>3</sup> D <sub>3</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.4159E+01	6.358E-09	7.250E+03	4.4022E+01	6.675E-09	7.593E+03
1s 6d <sup>1</sup> D <sub>2</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.4189E+01	2.019E-08	2.299E+04	4.4032E+01	1.986E-08	2.258E+04
1s 6g <sup>3</sup> G <sub>3</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	4.4538E+01	9.976E-19	1.118E-06			
1s 7s <sup>3</sup> S <sub>1</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1.0915E+03	4.698E-11	8.768E-02	1.0907E+03	4.671E-11	8.656E-02
1s 7d <sup>3</sup> D <sub>2</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	7.6625E+04	4.221E-22	1.598E-16			
1s 7d <sup>3</sup> D <sub>1</sub>	1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	2.3287E+05	1.361E-22	5.579E-18			
1s 2p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	1.3358E+00	7.245E-07	3.869E+08	1.3303E+00	7.408E-07	3.955E+08
1s 2p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	1.3942E+00	3.102E-06	1.520E+09	1.3883E+00	3.269E-06	1.602E+09
1s 2p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	1.3997E+00	5.609E-07	2.728E+08	1.3939E+00	5.880E-07	2.859E+08
1s 3p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	3.4048E+00	2.467E-07	2.028E+07	3.3906E+00	2.512E-07	2.065E+07
1s 3p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	3.5164E+00	1.176E-06	9.066E+07	3.5016E+00	1.199E-06	9.241E+07
1s 3p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	3.5263E+00	2.112E-07	1.619E+07	3.5116E+00	2.148E-07	1.645E+07
1s 4p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	7.3548E+00	1.069E-07	1.882E+06	7.3233E+00	1.078E-07	1.899E+06
1s 4p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	7.5732E+00	5.437E-07	9.033E+06	7.5406E+00	5.503E-07	9.145E+06
1s 4p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	7.5922E+00	9.799E-08	1.620E+06	7.5597E+00	9.827E-08	1.624E+06
1s 4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	7.6624E+00	1.187E-14	1.927E-01			
1s 4f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	7.6639E+00	5.976E-14	9.696E-01			
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	7.6985E+00	1.906E-08	3.064E+05	7.6654E+00	1.878E-08	3.020E+05
1s 4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	7.6996E+00	2.291E-09	3.683E+04	7.6665E+00	2.252E-09	3.621E+04
1s 5p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	1.5735E+01	5.408E-08	2.082E+05	1.5665E+01	5.427E-08	2.089E+05
1s 5p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	1.6246E+01	2.913E-07	1.052E+06	1.6174E+01	2.949E-07	1.065E+06
1s 5p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	1.6290E+01	5.274E-08	1.894E+05	1.6219E+01	5.244E-08	1.883E+05
1s 5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	1.6456E+01	1.679E-14	5.907E-02			
1s 5f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	1.6460E+01	5.449E-14	1.917E-01			
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	1.6542E+01	3.177E-08	1.106E+05	1.6469E+01	3.151E-08	1.097E+05
1s 5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	1.6544E+01	3.820E-09	1.330E+04	1.6472E+01	3.779E-09	1.316E+04
1s 6p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	4.0875E+01	2.875E-08	1.639E+04	4.0680E+01	2.791E-08	1.593E+04
1s 6p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	4.2898E+01	1.671E-07	8.652E+04	4.2690E+01	1.695E-07	8.791E+04
1s 6p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	4.3077E+01	3.045E-08	1.563E+04	4.2848E+01	3.049E-08	1.569E+04
1s 6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	4.3752E+01	1.969E-14	9.804E-03			
1s 6f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	4.3767E+01	4.018E-14	1.999E-02			
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	4.4102E+01	4.150E-08	2.033E+04	4.3907E+01	4.131E-08	2.024E+04
1s 6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	4.4114E+01	4.989E-09	2.443E+03	4.3908E+01	4.957E-09	2.429E+03
1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	4.4315E+01	9.137E-18	4.434E-06			
1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	4.4320E+01	2.233E-18	1.083E-06			
1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	4.4461E+01	1.723E-18	8.305E-07			
1s 7p <sup>3</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	9.9748E+02	3.656E-11	3.502E-02	9.7908E+02	3.761E-11	3.707E-02
1s 7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	3.5985E+03	3.897E-12	2.868E-04	3.3938E+03	4.609E-12	3.780E-04
1s 7p <sup>1</sup> P <sub>1</sub> <sup>o</sup>	1s 7d <sup>3</sup> D <sub>3</sub>	4.6072E+03	3.345E-13	1.502E-05	4.1560E+03	4.627E-13	2.531E-05
1s 2s <sup>3</sup> S <sub>1</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.3248E+00	4.372E-11	2.374E+04			
1s 3s <sup>3</sup> S <sub>1</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.3852E+00	9.240E-15	7.683E-01			
1s 3d <sup>3</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.5247E+00	2.120E-07	1.626E+07	3.5099E+00	2.183E-07	1.674E+07
1s 3d <sup>3</sup> D <sub>1</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.5262E+00	3.577E-08	2.742E+06	3.5113E+00	3.619E-08	2.773E+06
1s 3d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.5615E+00	1.257E-12	9.441E+01			
1s 3d <sup>1</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	3.5629E+00	1.636E-11	1.228E+03			
1s 4s <sup>3</sup> S <sub>1</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	7.3173E+00	6.507E-14	1.158E+00			
1s 4d <sup>3</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	7.5891E+00	1.297E-07	2.146E+06	7.5575E+00	1.316E-07	2.177E+06
1s 4d <sup>3</sup> D <sub>1</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	7.5919E+00	2.189E-08	3.619E+05	7.5603E+00	2.182E-08	3.607E+05
1s 4d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	7.6610E+00	6.830E-13	1.109E+01			
1s 4d <sup>1</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	7.6640E+00	1.512E-11	2.452E+02			
1s 5s <sup>3</sup> S <sub>1</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.5648E+01	8.099E-15	3.152E-02			
1s 5d <sup>3</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6283E+01	7.588E-08	2.727E+05	1.6216E+01	7.648E-08	2.748E+05
1s 5d <sup>3</sup> D <sub>1</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6289E+01	1.281E-08	4.601E+04	1.6222E+01	1.268E-08	4.552E+04
1s 5d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6452E+01	4.024E-13	1.417E+00			
1s 5d <sup>1</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6459E+01	1.044E-11	3.671E+01			
1s 5g <sup>3</sup> G <sub>4</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6541E+01	2.537E-09	8.837E+03	1.6470E+01	2.522E-09	8.786E+03
1s 5g <sup>3</sup> G <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6543E+01	3.069E-10	1.069E+03	1.6472E+01	3.028E-10	1.054E+03
1s 5g <sup>3</sup> G <sub>5</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6592E+01	1.834E-09	6.348E+03	1.6521E+01	1.818E-09	6.295E+03
1s 5g <sup>1</sup> G <sub>4</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1.6593E+01	1.091E-10	3.777E+02	1.6522E+01	1.137E-10	3.937E+02
1s 6s <sup>3</sup> S <sub>1</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.0535E+01	3.060E-16	1.774E-04			
1s 6d <sup>3</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.3043E+01	4.447E-08	2.287E+04	4.2880E+01	4.463E-08	2.293E+04
1s 6d <sup>3</sup> D <sub>1</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.3069E+01	7.515E-09	3.860E+03	4.2873E+01	7.412E-09	3.810E+03
1s 6d <sup>3</sup> D <sub>3</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.3731E+01	2.440E-13	1.216E-01			
1s 6d <sup>1</sup> D <sub>2</sub>	1s 7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	4.3761E+01	6.745E-12	3.356E+00			

(continued on next page)

Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	<i>gf</i>	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	<i>gf</i>	$A$ ( $s^{-1}$ )
1s6g $^3G_4$	1s7f $^3F_3^0$	4.4095E+01	5.957E-09	2.919E+03	4.3907E+01	5.943E-09	2.912E+03
1s6g $^3G_3$	1s7f $^3F_2^0$	4.4103E+01	7.176E-10	3.515E+02	4.3907E+01	7.132E-10	3.495E+02
1s6g $^3G_5$	1s7f $^3F_3^0$	4.4306E+01	4.285E-09	2.080E+03	4.4116E+01	4.256E-09	2.066E+03
1s6g $^1G_4$	1s7f $^3F_3^0$	4.4313E+01	2.540E-10	1.233E+02	4.4116E+01	2.616E-10	1.270E+02
1s7s $^3S_1$	1s7f $^3F_3^0$	8.7909E+02	9.255E-18	1.141E-08			
1s7d $^3D_2$	1s7f $^3F_3^0$	4.2661E+03	3.833E-13	2.007E-05	4.3591E+03	3.562E-13	1.771E-05
1s7d $^3D_1$	1s7f $^3F_3^0$	4.4317E+03	5.768E-14	2.799E-06	4.3178E+03	6.085E-14	3.083E-06
1s7d $^3D_3$	1s7f $^3F_3^0$	2.3237E+05	1.291E-23	2.278E-19			
1s $^2$ $^1S_0$	1s7f $^3F_2^0$	3.1390E-01	4.947E-11	6.694E+05			
1s2s $^3S_1$	1s7f $^3F_2^0$	1.3248E+00	1.507E-11	1.146E+04			
1s2s $^1S_0$	1s7f $^3F_2^0$	1.3369E+00	1.400E-11	1.045E+04			
1s3s $^3S_1$	1s7f $^3F_2^0$	3.3851E+00	1.421E-13	1.654E+01			
1s3s $^1S_0$	1s7f $^3F_2^0$	3.4060E+00	5.718E-14	6.576E+00			
1s3d $^3D_2$	1s7f $^3F_2^0$	3.5247E+00	5.320E-08	5.713E+06	3.5099E+00	5.455E-08	5.857E+06
1s3d $^3D_1$	1s7f $^3F_2^0$	3.5262E+00	1.239E-07	1.330E+07	3.5113E+00	1.271E-07	1.363E+07
1s3d $^3D_3$	1s7f $^3F_2^0$	3.5614E+00	1.346E-14	1.416E+00			
1s3d $^1D_2$	1s7f $^3F_2^0$	3.5628E+00	5.049E-13	5.306E+01			
1s4s $^3S_1$	1s7f $^3F_2^0$	7.3170E+00	2.407E-13	5.998E+00			
1s4s $^1S_0$	1s7f $^3F_2^0$	7.3564E+00	1.604E-13	3.954E+00			
1s4d $^3D_2$	1s7f $^3F_2^0$	7.5889E+00	3.251E-08	7.530E+05	7.5575E+00	3.288E-08	7.616E+05
1s4d $^3D_1$	1s7f $^3F_2^0$	7.5917E+00	7.584E-08	1.755E+06	7.5603E+00	7.665E-08	1.773E+06
1s4d $^3D_3$	1s7f $^3F_2^0$	7.6607E+00	6.576E-15	1.495E-01			
1s4d $^1D_2$	1s7f $^3F_2^0$	7.6637E+00	7.964E-13	1.809E+01			
1s5s $^3S_1$	1s7f $^3F_2^0$	1.5646E+01	1.174E-13	6.400E-01			
1s5s $^1S_0$	1s7f $^3F_2^0$	1.5737E+01	7.104E-14	3.827E-01			
1s5d $^3D_2$	1s7f $^3F_2^0$	1.6281E+01	1.900E-08	9.564E+04	1.6216E+01	1.911E-08	9.613E+04
1s5d $^3D_1$	1s7f $^3F_2^0$	1.6288E+01	4.437E-08	2.231E+05	1.6222E+01	4.453E-08	2.238E+05
1s5d $^3D_3$	1s7f $^3F_2^0$	1.6451E+01	9.948E-15	4.904E-02			
1s5d $^1D_2$	1s7f $^3F_2^0$	1.6458E+01	6.222E-13	3.064E+00			
1s5g $^3G_4$	1s7f $^3F_2^0$	1.6539E+01	2.043E-10	9.963E+02	1.6470E+01	2.039E-10	9.947E+02
1s5g $^3G_3$	1s7f $^3F_2^0$	1.6541E+01	1.835E-09	8.949E+03	1.6472E+01	1.817E-09	8.858E+03
1s5g $^1G_4$	1s7f $^3F_2^0$	1.6592E+01	1.387E-09	6.722E+03	1.6522E+01	1.376E-09	6.669E+03
1s6s $^3S_1$	1s7f $^3F_2^0$	4.0528E+01	4.682E-14	3.803E-02			
1s6s $^1S_0$	1s7f $^3F_2^0$	4.0875E+01	2.291E-14	1.830E-02			
1s6d $^3D_2$	1s7f $^3F_2^0$	4.3034E+01	1.113E-08	8.018E+03	4.2880E+01	1.115E-08	8.022E+03
1s6d $^3D_1$	1s7f $^3F_2^0$	4.3060E+01	2.601E-08	1.871E+04	4.2874E+01	2.603E-08	1.873E+04
1s6d $^3D_3$	1s7f $^3F_2^0$	4.3722E+01	9.348E-15	6.523E-03			
1s6d $^1D_2$	1s7f $^3F_2^0$	4.3752E+01	4.162E-13	2.900E-01			
1s6g $^3G_4$	1s7f $^3F_2^0$	4.4085E+01	4.800E-10	3.295E+02	4.3907E+01	4.754E-10	3.262E+02
1s6g $^3G_3$	1s7f $^3F_2^0$	4.4094E+01	4.293E-09	2.946E+03	4.3907E+01	4.279E-09	2.936E+03
1s6g $^1G_4$	1s7f $^3F_2^0$	4.4303E+01	3.232E-09	2.197E+03	4.4116E+01	3.227E-09	2.193E+03
1s7s $^3S_1$	1s7f $^3F_2^0$	8.7540E+02	1.929E-17	3.359E-08			
1s7s $^1S_0$	1s7f $^3F_2^0$	9.8912E+02	1.980E-17	2.700E-08			
1s7d $^3D_2$	1s7f $^3F_2^0$	4.1806E+03	1.020E-13	7.789E-06	4.3602E+03	8.894E-14	6.188E-06
1s7d $^3D_1$	1s7f $^3F_2^0$	4.3395E+03	2.128E-13	1.508E-05	4.3189E+03	2.135E-13	1.514E-05
1s7d $^3D_3$	1s7f $^3F_2^0$	1.0992E+05	3.776E-23	4.169E-18			
1s2p $^3P_0^0$	1s7d $^1D_2$	1.3358E+00	2.774E-07	2.074E+08	1.3303E+00	2.850E-07	2.130E+08
1s2p $^3P_1^0$	1s7d $^1D_2$	1.3367E+00	3.356E-07	2.506E+08	1.3311E+00	3.437E-07	2.566E+08
1s2p $^3P_2^0$	1s7d $^1D_2$	1.3942E+00	7.807E-07	5.358E+08	1.3883E+00	8.173E-07	5.609E+08
1s2p $^1P_1^0$	1s7d $^1D_2$	1.3997E+00	1.753E-06	1.194E+09	1.3939E+00	1.832E-06	1.247E+09
1s3p $^3P_1^0$	1s7d $^1D_2$	3.4047E+00	9.352E-08	1.076E+07	3.3905E+00	9.546E-08	1.098E+07
1s3p $^3P_0^0$	1s7d $^1D_2$	3.4061E+00	1.139E-07	1.310E+07	3.3919E+00	1.162E-07	1.336E+07
1s3p $^3P_2^0$	1s7d $^1D_2$	3.5163E+00	2.950E-07	3.183E+07	3.5016E+00	2.998E-07	3.234E+07
1s3p $^1P_1^0$	1s7d $^1D_2$	3.5262E+00	6.667E-07	7.153E+07	3.5116E+00	6.762E-07	7.254E+07
1s4p $^3P_1^0$	1s7d $^1D_2$	7.3543E+00	4.023E-08	9.922E+05	7.3231E+00	4.103E-08	1.012E+06
1s4p $^3P_0^0$	1s7d $^1D_2$	7.3570E+00	4.925E-08	1.214E+06	7.3257E+00	4.994E-08	1.230E+06
1s4p $^3P_2^0$	1s7d $^1D_2$	7.5726E+00	1.361E-07	3.167E+06	7.5404E+00	1.375E-07	3.200E+06
1s4p $^1P_1^0$	1s7d $^1D_2$	7.5916E+00	3.096E-07	7.166E+06	7.5595E+00	3.110E-07	7.199E+06
1s4f $^3F_3^0$	1s7d $^1D_2$	7.6618E+00	2.579E-13	5.861E+00			
1s4f $^3F_2^0$	1s7d $^1D_2$	7.6633E+00	1.012E-18	2.299E-05			
1s4f $^3F_4^0$	1s7d $^1D_2$	7.6979E+00	1.547E-09	3.482E+04	7.6651E+00	1.558E-09	3.507E+04
1s4f $^1F_3^0$	1s7d $^1D_2$	7.6990E+00	1.365E-08	3.073E+05	7.6663E+00	1.346E-08	3.029E+05
1s5p $^3P_0^0$	1s7d $^1D_2$	1.5732E+01	2.027E-08	1.093E+05	1.5665E+01	2.079E-08	1.121E+05
1s5p $^3P_1^0$	1s7d $^1D_2$	1.5738E+01	2.489E-08	1.341E+05	1.5671E+01	2.518E-08	1.356E+05
1s5p $^3P_2^0$	1s7d $^1D_2$	1.6243E+01	7.285E-08	3.683E+05	1.6173E+01	7.372E-08	3.728E+05
1s5p $^1P_1^0$	1s7d $^1D_2$	1.6288E+01	1.665E-07	8.375E+05	1.6218E+01	1.667E-07	8.385E+05
1s5f $^3F_3^0$	1s7d $^1D_2$	1.6454E+01	4.024E-13	1.983E+00			
1s5f $^3F_2^0$	1s7d $^1D_2$	1.6457E+01	1.812E-15	8.923E-03			
1s5f $^3F_4^0$	1s7d $^1D_2$	1.6539E+01	2.579E-09	1.258E+04	1.6468E+01	2.613E-09	1.274E+04
1s5f $^1F_3^0$	1s7d $^1D_2$	1.6542E+01	2.277E-08	1.110E+05	1.6471E+01	2.258E-08	1.101E+05
1s6p $^3P_1^0$	1s7d $^1D_2$	4.0858E+01	1.073E-08	8.576E+03	4.0674E+01	1.190E-08	9.521E+03

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Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s 6p $^3P_0^o$	1s 7d $^1D_2$	4.0882E+01	1.321E-08	1.055E+04	4.0612E+01	1.340E-08	1.074E+04
1s 6p $^3P_2^o$	1s 7d $^1D_2$	4.2880E+01	4.171E-08	3.026E+04	4.2684E+01	4.240E-08	3.079E+04
1s 6p $^1P_1^o$	1s 7d $^1D_2$	4.3058E+01	9.601E-08	6.908E+04	4.2841E+01	9.514E-08	6.856E+04
1s 6f $^3F_3^o$	1s 7d $^1D_2$	4.3733E+01	5.031E-13	3.509E-01			
1s 6f $^3F_2^o$	1s 7d $^1D_2$	4.3748E+01	6.962E-15	4.853E-03			
1s 6f $^3F_4^o$	1s 7d $^1D_2$	4.4083E+01	3.368E-09	2.312E+03	4.3900E+01	3.427E-09	2.352E+03
1s 6f $^1F_3^o$	1s 7d $^1D_2$	4.4094E+01	2.973E-08	2.040E+04	4.3901E+01	2.963E-08	2.033E+04
1s 6h $^3H_4^o$	1s 7d $^1D_2$	4.4301E+01	4.583E-18	3.115E-06			
1s 7p $^3P_0^o$	1s 7d $^1D_2$	9.8772E+01	1.410E-11	1.928E-02	9.7564E+02	1.532E-11	2.128E-02
1s 7p $^3P_1^o$	1s 7d $^1D_2$	9.9663E+02	1.685E-11	2.263E-02	9.5369E+02	1.915E-11	2.785E-02
1s 7p $^3P_2^o$	1s 7d $^1D_2$	3.4747E+03	1.082E-12	1.196E-04	3.3529E+03	1.194E-12	1.405E-04
1s 7p $^1P_1^o$	1s 7d $^1D_2$	4.4062E+03	1.207E-12	8.296E-05	4.0947E+03	1.481E-12	1.169E-04
1s 7f $^3F_3^o$	1s 7d $^1D_2$	1.7858E+05	7.949E-22	3.325E-17			
1s 7f $^3F_2^o$	1s 7d $^1D_2$	1.2412E+06	1.105E-25	9.570E-23			
1s 3d $^3D_2$	1s 7f $^3F_4^o$	3.5233E+00	4.205E-07	2.510E+07	3.5085E+00	4.222E-07	2.520E+07
1s 3d $^3D_3$	1s 7f $^3F_4^o$	3.5600E+00	2.526E-06	1.477E+08	3.5449E+00	2.596E-06	1.518E+08
1s 3d $^1D_2$	1s 7f $^3F_4^o$	3.5614E+00	2.038E-07	1.191E+07	3.5463E+00	2.095E-07	1.224E+07
1s 4d $^3D_2$	1s 7f $^3F_4^o$	7.5826E+00	2.510E-07	3.235E+06	7.5510E+00	2.533E-07	3.265E+06
1s 4d $^3D_3$	1s 7f $^3F_4^o$	7.6543E+00	1.564E-06	1.979E+07	7.6222E+00	1.584E-06	2.003E+07
1s 4d $^1D_2$	1s 7f $^3F_4^o$	7.6573E+00	1.270E-07	1.605E+06	7.6252E+00	1.286E-07	1.625E+06
1s 5d $^3D_2$	1s 7f $^3F_4^o$	1.6252E+01	1.445E-07	4.054E+05	1.6186E+01	1.453E-07	4.077E+05
1s 5d $^3D_3$	1s 7f $^3F_4^o$	1.6421E+01	9.255E-07	2.544E+06	1.6353E+01	9.309E-07	2.558E+06
1s 5d $^1D_2$	1s 7f $^3F_4^o$	1.6428E+01	7.534E-08	2.069E+05	1.6360E+01	7.572E-08	2.078E+05
1s 5g $^3G_4$	1s 7f $^3F_4^o$	1.6509E+01	3.180E-15	8.647E-03			
1s 5g $^3G_3$	1s 7f $^3F_4^o$	1.6511E+01	4.291E-16	1.166E-03			
1s 5g $^3G_5$	1s 7f $^3F_4^o$	1.6560E+01	1.498E-08	4.050E+04	1.6489E+01	1.487E-08	4.021E+04
1s 5g $^1G_4$	1s 7f $^3F_4^o$	1.6562E+01	1.077E-09	2.909E+03	1.6491E+01	1.062E-09	2.871E+03
1s 6d $^3D_2$	1s 7f $^3F_4^o$	4.2832E+01	8.329E-08	3.365E+04	4.2671E+01	8.278E-08	3.340E+04
1s 6d $^3D_3$	1s 7f $^3F_4^o$	4.3514E+01	5.502E-07	2.154E+05	4.3345E+01	5.513E-07	2.156E+05
1s 6d $^1D_2$	1s 7f $^3F_4^o$	4.3544E+01	4.488E-08	1.754E+04	4.3355E+01	4.548E-08	1.778E+04
1s 6g $^3G_4$	1s 7f $^3F_4^o$	4.3874E+01	8.351E-15	3.215E-03			
1s 6g $^3G_3$	1s 7f $^3F_4^o$	4.3882E+01	5.086E-16	1.957E-04			
1s 6g $^3G_5$	1s 7f $^3F_4^o$	4.4083E+01	3.532E-08	1.347E+04	4.3895E+01	3.519E-08	1.342E+04
1s 6g $^1G_4$	1s 7f $^3F_4^o$	4.4090E+01	2.529E-09	9.643E+02	4.3895E+01	2.514E-09	9.588E+02
1s 7d $^3D_2$	1s 7f $^3F_4^o$	2.8680E+03	2.422E-12	2.182E-04	2.9119E+03	2.266E-12	1.964E-04
1s 7d $^3D_3$	1s 7f $^3F_4^o$	8.4332E+03	6.104E-13	6.362E-06	8.7593E+03	5.382E-13	5.155E-06
1s 7d $^1D_2$	1s 7f $^3F_4^o$	9.2016E+03	3.828E-14	3.351E-07	9.0446E+03	4.045E-14	3.633E-07
1s 2p $^3P_0^o$	1s 7g $^3G_4$	1.3940E+00	1.685E-11	6.427E+03			
1s 3p $^3P_2^o$	1s 7g $^3G_4$	3.5149E+00	1.323E-11	7.934E+02			
1s 4p $^3P_0^o$	1s 7g $^3G_4$	7.5664E+00	2.232E-13	2.889E+00			
1s 4f $^3F_3^o$	1s 7g $^3G_4$	7.6554E+00	4.102E-07	5.187E+06	7.6229E+00	4.168E-07	5.271E+06
1s 4f $^3F_2^o$	1s 7g $^3G_4$	7.6569E+00	3.311E-08	4.186E+05	7.6244E+00	3.332E-08	4.212E+05
1s 4f $^3F_4^o$	1s 7g $^3G_4$	7.6914E+00	6.083E-13	7.620E+00			
1s 4f $^1F_3^o$	1s 7g $^3G_4$	7.6926E+00	1.492E-12	1.869E+01			
1s 5p $^3P_0^o$	1s 7g $^3G_4$	1.6215E+01	2.286E-14	6.444E-02			
1s 5f $^3F_3^o$	1s 7g $^3G_4$	1.6424E+01	3.500E-07	9.616E+05	1.6354E+01	3.528E-07	9.693E+05
1s 5f $^3F_2^o$	1s 7g $^3G_4$	1.6428E+01	2.827E-08	7.765E+04	1.6358E+01	2.820E-08	7.745E+04
1s 5f $^3F_4^o$	1s 7g $^3G_4$	1.6509E+01	5.308E-13	1.443E+00			
1s 5f $^1F_3^o$	1s 7g $^3G_4$	1.6512E+01	1.496E-12	4.068E+00			
1s 6p $^3P_2^o$	1s 7g $^3G_4$	4.2681E+01	1.962E-14	7.981E-03			
1s 6f $^3F_3^o$	1s 7g $^3G_4$	4.3526E+01	2.388E-07	9.340E+04	4.3346E+01	2.395E-07	9.368E+04
1s 6f $^3F_2^o$	1s 7g $^3G_4$	4.3540E+01	1.930E-08	7.546E+03	4.3346E+01	1.916E-08	7.494E+03
1s 6f $^3F_4^o$	1s 7g $^3G_4$	4.3873E+01	3.710E-13	1.429E-01			
1s 6f $^1F_3^o$	1s 7g $^3G_4$	4.3884E+01	1.132E-12	4.356E-01			
1s 6h $^3H_5^o$	1s 7g $^3G_4$	4.4083E+01	4.476E-09	1.707E+03	4.3896E+01	4.459E-09	1.700E+03
1s 6h $^3H_4^o$	1s 7g $^3G_4$	4.4088E+01	3.202E-10	1.221E+02	4.3896E+01	3.185E-10	1.214E+02
1s 6h $^3H_6^o$	1s 7g $^3G_4$	4.4223E+01	1.616E-09	6.123E+02	4.4034E+01	1.606E-09	6.089E+02
1s 6h $^1H_5^o$	1s 7g $^3G_4$	4.4227E+01	6.000E-11	2.273E+01	4.4034E+01	6.182E-11	2.342E+01
1s 7p $^3P_0^o$	1s 7g $^3G_4$	2.5209E+03	4.451E-21	5.191E-13			
1s 7f $^3F_3^o$	1s 7g $^3G_4$	8.7347E+03	1.399E-13	1.359E-06	8.7974E+03	1.354E-13	1.286E-06
1s 7f $^3F_2^o$	1s 7g $^3G_4$	9.1165E+03	9.944E-15	8.867E-08	8.7927E+03	1.085E-14	1.031E-07
1s 7f $^3F_4^o$	1s 7g $^3G_4$	4.7642E+06	1.343E-27	4.385E-26			
1s 2p $^3P_1^o$	1s 7g $^3G_3$	1.3356E+00	3.671E-14	1.961E+01			
1s 2p $^3P_2^o$	1s 7g $^3G_3$	1.3940E+00	1.616E-12	7.925E+02			
1s 2p $^1P_1^o$	1s 7g $^3G_3$	1.3995E+00	1.116E-11	5.428E+03			
1s 3p $^3P_0^o$	1s 7g $^3G_3$	3.4034E+00	3.734E-14	3.072E+00			
1s 3p $^3P_1^o$	1s 7g $^3G_3$	3.5149E+00	1.511E-12	1.166E+02			
1s 3p $^3P_2^o$	1s 7g $^3G_3$	3.5248E+00	7.982E-12	6.122E+02			
1s 4p $^3P_1^o$	1s 7g $^3G_3$	7.3482E+00	8.284E-16	1.462E-02			
1s 4p $^3P_2^o$	1s 7g $^3G_3$	7.5662E+00	2.075E-15	3.453E-02			
1s 4p $^1P_1^o$	1s 7g $^3G_3$	7.5852E+00	9.542E-14	1.580E+00			

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Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	<i>gf</i>	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	<i>gf</i>	$A$ ( $s^{-1}$ )
1s4f $^3F_3^0$	1s7g $^3G_3$	7.6553E+00	4.932E-08	8.020E+05	7.6229E+00	5.002E-08	8.132E+05
1s4f $^3F_2^0$	1s7g $^3G_3$	7.6568E+00	2.955E-07	4.803E+06	7.6244E+00	2.999E-07	4.874E+06
1s4f $^3F_4^0$	1s7g $^3G_3$	7.6913E+00	1.523E-19	2.453E-06			
1s4f $^1F_3^0$	1s7g $^3G_3$	7.6924E+00	2.237E-13	3.603E+00			
1s5p $^3P_1^0$	1s7g $^3G_3$	1.5705E+01	1.628E-19	6.288E-07			
1s5p $^3P_2^0$	1s7g $^3G_3$	1.6214E+01	8.575E-14	3.108E-01			
1s5p $^1P_1^0$	1s7g $^3G_3$	1.6258E+01	3.715E-14	1.339E-01			
1s5f $^3F_3^0$	1s7g $^3G_3$	1.6423E+01	4.206E-08	1.486E+05	1.6354E+01	4.233E-08	1.495E+05
1s5f $^3F_2^0$	1s7g $^3G_3$	1.6427E+01	2.522E-07	8.905E+05	1.6358E+01	2.538E-07	8.963E+05
1s5f $^3F_4^0$	1s7g $^3G_3$	1.6508E+01	1.692E-17	5.915E-05			
1s5f $^1F_3^0$	1s7g $^3G_3$	1.6511E+01	1.720E-13	6.013E-01			
1s6p $^3P_1^0$	1s7g $^3G_3$	4.0673E+01	3.156E-18	1.818E-06			
1s6p $^3P_2^0$	1s7g $^3G_3$	4.2676E+01	7.118E-14	3.724E-02			
1s6p $^1P_1^0$	1s7g $^3G_3$	4.2852E+01	3.084E-14	1.601E-02			
1s6f $^3F_3^0$	1s7g $^3G_3$	4.3521E+01	2.867E-08	1.442E+04	4.3346E+01	2.874E-08	1.445E+04
1s6f $^3F_2^0$	1s7g $^3G_3$	4.3535E+01	1.721E-07	8.651E+04	4.3346E+01	1.724E-07	8.672E+04
1s6f $^3F_4^0$	1s7g $^3G_3$	4.3867E+01	3.588E-17	1.777E-05			
1s6f $^1F_3^0$	1s7g $^3G_3$	4.3878E+01	1.112E-13	5.505E-02			
1s6h $^3H_3^0$	1s7g $^3G_3$	4.4077E+01	2.145E-10	1.052E+02	4.3896E+01	2.123E-10	1.041E+02
1s6h $^3H_4^0$	1s7g $^3G_3$	4.4083E+01	3.516E-09	1.724E+03	4.3896E+01	3.503E-09	1.718E+03
1s6h $^1H_3^0$	1s7g $^3G_3$	4.4222E+01	1.299E-09	6.331E+02	4.4034E+01	1.297E-09	6.323E+02
1s7p $^3P_1^0$	1s7g $^3G_3$	8.8963E+02	4.277E-20	5.149E-11			
1s7p $^3P_2^0$	1s7g $^3G_3$	2.5035E+03	1.266E-18	1.925E-10			
1s7p $^1P_1^0$	1s7g $^3G_3$	2.9534E+03	5.714E-20	6.242E-12			
1s7f $^3F_3^0$	1s7g $^3G_3$	8.5297E+03	1.804E-14	2.362E-07	8.7975E+03	1.625E-14	1.984E-07
1s7f $^3F_2^0$	1s7g $^3G_3$	8.8934E+03	9.547E-14	1.150E-06	8.7928E+03	9.768E-14	1.193E-06
1s7f $^3F_4^0$	1s7g $^3G_3$	3.3768E+05	1.239E-26	1.035E-22			
1s2s $^3S_1$	1s7f $^1F_3^0$	1.3246E+00	2.065E-13	1.121E+02			
1s3s $^3S_1$	1s7f $^1F_3^0$	3.3838E+00	5.178E-13	4.309E+01			
1s3d $^3D_2$	1s7f $^1F_3^0$	3.5233E+00	4.933E-08	3.787E+06	3.5085E+00	4.924E-08	3.779E+06
1s3d $^3D_1$	1s7f $^1F_3^0$	3.5247E+00	2.810E-07	2.155E+07	3.5099E+00	2.827E-07	2.168E+07
1s3d $^3D_3$	1s7f $^1F_3^0$	3.5600E+00	3.035E-07	2.282E+07	3.5449E+00	3.115E-07	2.342E+07
1s3d $^1D_2$	1s7f $^1F_3^0$	3.5614E+00	1.816E-06	1.364E+08	3.5463E+00	1.864E-06	1.400E+08
1s4s $^3S_1$	1s7f $^1F_3^0$	7.3110E+00	3.646E-13	6.500E+00			
1s4d $^3D_2$	1s7f $^1F_3^0$	7.5823E+00	3.022E-08	5.008E+05	7.5510E+00	3.040E-08	5.038E+05
1s4d $^3D_1$	1s7f $^1F_3^0$	7.5851E+00	1.684E-07	2.788E+06	7.5538E+00	1.701E-07	2.817E+06
1s4d $^3D_3$	1s7f $^1F_3^0$	7.6541E+00	1.878E-07	3.055E+06	7.6222E+00	1.901E-07	3.091E+06
1s4d $^1D_2$	1s7f $^1F_3^0$	7.6570E+00	1.125E-06	1.828E+07	7.6252E+00	1.137E-06	1.848E+07
1s5s $^3S_1$	1s7f $^1F_3^0$	1.5619E+01	2.264E-13	8.845E-01			
1s5d $^3D_2$	1s7f $^1F_3^0$	1.6251E+01	1.759E-08	6.347E+04	1.6186E+01	1.767E-08	6.374E+04
1s5d $^3D_1$	1s7f $^1F_3^0$	1.6258E+01	9.706E-08	3.499E+05	1.6192E+01	9.776E-08	3.523E+05
1s5d $^3D_3$	1s7f $^1F_3^0$	1.6420E+01	1.111E-07	3.925E+05	1.6353E+01	1.117E-07	3.946E+05
1s5d $^1D_2$	1s7f $^1F_3^0$	1.6427E+01	6.654E-07	2.349E+06	1.6360E+01	6.680E-07	2.357E+06
1s5g $^3G_4$	1s7f $^1F_3^0$	1.6508E+01	8.835E-15	3.089E-02			
1s5g $^3G_3$	1s7f $^1F_3^0$	1.6510E+01	1.556E-15	5.439E-03			
1s5g $^3G_5$	1s7f $^1F_3^0$	1.6559E+01	7.076E-10	2.459E+03	1.6489E+01	7.100E-10	2.467E+03
1s5g $^1G_4$	1s7f $^1F_3^0$	1.6561E+01	1.182E-08	4.106E+04	1.6491E+01	1.168E-08	4.060E+04
1s6s $^3S_1$	1s7f $^1F_3^0$	4.0343E+01	1.294E-13	7.577E-02			
1s6d $^3D_2$	1s7f $^1F_3^0$	4.2826E+01	1.020E-08	5.300E+03	4.2671E+01	1.086E-08	5.638E+03
1s6d $^3D_1$	1s7f $^1F_3^0$	4.2851E+01	5.600E-08	2.906E+04	4.2665E+01	5.622E-08	2.918E+04
1s6d $^3D_3$	1s7f $^1F_3^0$	4.3507E+01	6.599E-08	3.322E+04	4.3345E+01	6.615E-08	3.327E+04
1s6d $^1D_2$	1s7f $^1F_3^0$	4.3537E+01	3.957E-07	1.989E+05	4.3355E+01	3.952E-07	1.986E+05
1s6g $^3G_4$	1s7f $^1F_3^0$	4.3867E+01	2.568E-14	1.272E-02			
1s6g $^3G_3$	1s7f $^1F_3^0$	4.3875E+01	3.279E-15	1.623E-03			
1s6g $^3G_5$	1s7f $^1F_3^0$	4.4076E+01	1.668E-09	8.183E+02	4.3895E+01	1.679E-09	8.235E+02
1s6g $^1G_4$	1s7f $^1F_3^0$	4.4083E+01	2.777E-08	1.362E+04	4.3895E+01	2.765E-08	1.355E+04
1s7s $^3S_1$	1s7f $^1F_3^0$	7.9654E+02	2.248E-16	3.376E-07			
1s7d $^3D_2$	1s7f $^1F_3^0$	2.8385E+03	3.075E-13	3.636E-05	2.9112E+03	2.970E-13	3.312E-05
1s7d $^3D_1$	1s7f $^1F_3^0$	2.9109E+03	1.557E-12	1.751E-04	2.8927E+03	1.569E-12	1.772E-04
1s7d $^3D_3$	1s7f $^1F_3^0$	8.1837E+03	8.017E-14	1.141E-06	8.7525E+03	6.474E-14	7.985E-07
1s7d $^1D_2$	1s7f $^1F_3^0$	8.9054E+03	3.724E-13	4.474E-06	9.0373E+03	3.515E-13	4.066E-06
1s7g $^3G_4$	1s7f $^1F_3^0$	2.9370E+05	1.846E-23	2.039E-19			
1s7g $^3G_3$	1s7f $^1F_3^0$	1.5307E+06	1.214E-26	4.936E-24			
1s4f $^3F_3^0$	1s7g $^3G_5$	7.6514E+00	2.899E-07	3.003E+06	7.6190E+00	2.900E-07	3.003E+06
1s4f $^3F_4^0$	1s7g $^3G_5$	7.6874E+00	2.475E-06	2.540E+07	7.6547E+00	2.516E-06	2.582E+07
1s4f $^1F_3^0$	1s7g $^3G_5$	7.6885E+00	1.170E-07	1.200E+06	7.6558E+00	1.189E-07	1.220E+06
1s5f $^3F_3^0$	1s7g $^3G_5$	1.6406E+01	2.441E-07	5.499E+05	1.6336E+01	2.453E-07	5.528E+05
1s5f $^3F_4^0$	1s7g $^3G_5$	1.6491E+01	2.124E-06	4.737E+06	1.6420E+01	2.140E-06	4.772E+06
1s5f $^1F_3^0$	1s7g $^3G_5$	1.6493E+01	1.005E-07	2.240E+05	1.6423E+01	1.012E-07	2.256E+05
1s6f $^3F_3^0$	1s7g $^3G_5$	4.3397E+01	1.644E-07	5.294E+04	4.3219E+01	1.643E-07	5.291E+04
1s6f $^3F_4^0$	1s7g $^3G_5$	4.3742E+01	1.459E-06	4.624E+05	4.3559E+01	1.462E-06	4.634E+05

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Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )	$\lambda$ (Å)	$gf$	$A$ ( $s^{-1}$ )
1s 6f $^1F_3^0$	1s 7g $^3G_5$	4.3753E+01	6.906E-08	2.188E+04	4.3560E+01	6.976E-08	2.210E+04
1s 6h $^3H_5^0$	1s 7g $^3G_5$	4.3951E+01	2.044E-15	6.415E-04			
1s 6h $^3H_4^0$	1s 7g $^3G_5$	4.3956E+01	4.299E-19	1.349E-07			
1s 6h $^3H_6^0$	1s 7g $^3G_5$	4.4090E+01	1.830E-08	5.710E+03	4.3903E+01	1.822E-08	5.684E+03
1s 6h $^1H_5^0$	1s 7g $^3G_5$	4.4094E+01	8.725E-10	2.721E+02	4.3903E+01	8.677E-10	2.706E+02
1s 7f $^3F_3^0$	1s 7g $^3G_5$	5.4759E+03	3.951E-13	7.989E-06	5.5025E+03	3.830E-13	7.606E-06
1s 7f $^3F_4^0$	1s 7g $^3G_5$	1.4632E+04	1.821E-13	5.159E-07	1.4765E+04	1.751E-13	4.831E-07
1s 7f $^1F_3^0$	1s 7g $^3G_5$	1.5450E+04	7.324E-15	1.861E-08	1.4784E+04	8.325E-15	2.290E-08
1s 3d $^3D_3$	1s 7h $^3H_5^0$	3.5591E+00	6.235E-12	2.985E+02			
1s 4d $^3D_3$	1s 7h $^3H_5^0$	7.6503E+00	3.513E-12	3.640E+01			
1s 5d $^3D_3$	1s 7h $^3H_5^0$	1.6403E+01	6.894E-14	1.554E-01			
1s 5g $^3G_4$	1s 7h $^3H_5^0$	1.6491E+01	7.809E-07	1.741E+06	1.6420E+01	7.881E-07	1.757E+06
1s 5g $^3G_3$	1s 7h $^3H_5^0$	1.6493E+01	3.746E-08	8.351E+04	1.6423E+01	3.751E-08	8.363E+04
1s 5g $^3G_5$	1s 7h $^3H_5^0$	1.6542E+01	3.738E-13	8.285E-01			
1s 5g $^1G_4$	1s 7h $^3H_5^0$	1.6543E+01	7.520E-13	1.666E+00			
1s 6d $^3D_3$	1s 7h $^3H_5^0$	4.3385E+01	6.788E-14	2.187E-02			
1s 6g $^3G_4$	1s 7h $^3H_5^0$	4.3742E+01	8.186E-07	2.594E+05	4.3559E+01	8.213E-07	2.602E+05
1s 6g $^3G_3$	1s 7h $^3H_5^0$	4.3751E+01	3.929E-08	1.245E+04	4.3559E+01	3.911E-08	1.239E+04
1s 6g $^3G_5$	1s 7h $^3H_5^0$	4.3950E+01	3.908E-13	1.227E-01			
1s 6g $^1G_4$	1s 7h $^3H_5^0$	4.3957E+01	8.040E-13	2.523E-01			
1s 7d $^3D_3$	1s 7h $^3H_5^0$	5.3474E+03	4.485E-21	9.510E-14			
1s 7g $^3G_4$	1s 7h $^3H_5^0$	1.4659E+04	5.334E-14	1.505E-07	1.4689E+04	5.242E-14	1.460E-07
1s 7g $^3G_3$	1s 7h $^3H_5^0$	1.5275E+04	2.262E-15	5.879E-09	1.4689E+04	2.496E-15	6.956E-09
1s 7g $^3G_5$	1s 7h $^3H_5^0$	1.1751E+07	4.945E-29	2.170E-28			
1s 3d $^3D_2$	1s 7h $^3H_4^0$	3.5224E+00	9.274E-16	5.539E-02			
1s 3d $^3D_3$	1s 7h $^3H_4^0$	3.5591E+00	4.087E-13	2.391E+01			
1s 3d $^1D_2$	1s 7h $^3H_4^0$	3.5605E+00	4.517E-12	2.641E+02			
1s 4d $^3D_2$	1s 7h $^3H_4^0$	7.5785E+00	4.314E-16	5.566E-03			
1s 4d $^3D_3$	1s 7h $^3H_4^0$	7.6502E+00	2.093E-13	2.650E+00			
1s 4d $^1D_2$	1s 7h $^3H_4^0$	7.6531E+00	2.617E-12	3.312E+01			
1s 5d $^3D_2$	1s 7h $^3H_4^0$	1.6234E+01	1.476E-17	4.152E-05			
1s 5d $^3D_3$	1s 7h $^3H_4^0$	1.6402E+01	2.182E-15	6.010E-03			
1s 5d $^1D_2$	1s 7h $^3H_4^0$	1.6409E+01	4.943E-14	1.361E-01			
1s 5g $^3G_4$	1s 7h $^3H_4^0$	1.6490E+01	5.583E-08	1.522E+05	1.6420E+01	5.629E-08	1.534E+05
1s 5g $^3G_3$	1s 7h $^3H_4^0$	1.6492E+01	6.137E-07	1.672E+06	1.6423E+01	6.190E-07	1.686E+06
1s 5g $^3G_5$	1s 7h $^3H_4^0$	1.6541E+01	8.746E-16	2.369E-03			
1s 5g $^1G_4$	1s 7h $^3H_4^0$	1.6543E+01	1.942E-13	5.259E-01			
1s 6d $^3D_2$	1s 7h $^3H_4^0$	4.2704E+01	9.336E-18	3.794E-06			
1s 6d $^3D_3$	1s 7h $^3H_4^0$	4.3381E+01	8.044E-15	3.168E-03			
1s 6d $^1D_2$	1s 7h $^3H_4^0$	4.3411E+01	5.285E-14	2.079E-02			
1s 6g $^3G_4$	1s 7h $^3H_4^0$	4.3739E+01	5.849E-08	2.266E+04	4.3559E+01	5.866E-08	2.272E+04
1s 6g $^3G_3$	1s 7h $^3H_4^0$	4.3747E+01	6.433E-07	2.491E+05	4.3559E+01	6.453E-07	2.499E+05
1s 6g $^3G_5$	1s 7h $^3H_4^0$	4.3947E+01	9.550E-18	3.665E-06			
1s 6g $^1G_4$	1s 7h $^3H_4^0$	4.3954E+01	2.072E-13	7.949E-02			
1s 7d $^3D_2$	1s 7h $^3H_4^0$	2.3873E+03	4.238E-24	5.512E-16			
1s 7d $^3D_3$	1s 7h $^3H_4^0$	5.2970E+03	2.811E-21	7.426E-14			
1s 7d $^1D_2$	1s 7h $^3H_4^0$	5.5903E+03	3.729E-21	8.844E-14			
1s 7g $^3G_4$	1s 7h $^3H_4^0$	1.4287E+04	4.118E-15	1.495E-08	1.4689E+04	3.744E-15	1.275E-08
1s 7g $^3G_3$	1s 7h $^3H_4^0$	1.4871E+04	4.016E-14	1.346E-07	1.4689E+04	4.119E-14	1.402E-07
1s 7g $^3G_5$	1s 7h $^3H_4^0$	5.3648E+05	2.939E-30	7.568E-27			
1s 2p $^3P_2^0$	1s 7g $^1G_4$	1.3938E+00	1.901E-14	7.251E+00			
1s 3p $^3P_2^0$	1s 7g $^1G_4$	3.5141E+00	2.638E-15	1.583E-01			
1s 4p $^3P_2^0$	1s 7g $^1G_4$	7.5624E+00	3.399E-14	4.405E-01			
1s 4f $^3F_3^0$	1s 7g $^1G_4$	7.6513E+00	1.704E-08	2.158E+05	7.6190E+00	1.671E-08	2.116E+05
1s 4f $^3F_2^0$	1s 7g $^1G_4$	7.6528E+00	2.186E-07	2.766E+06	7.6205E+00	2.189E-07	2.770E+06
1s 4f $^3F_4^0$	1s 7g $^1G_4$	7.6873E+00	1.770E-07	2.220E+06	7.6547E+00	1.797E-07	2.254E+06
1s 4f $^1F_3^0$	1s 7g $^1G_4$	7.6884E+00	1.945E-06	2.439E+07	7.6558E+00	1.977E-06	2.478E+07
1s 5p $^3P_2^0$	1s 7g $^1G_4$	1.6196E+01	4.008E-14	1.132E-01			
1s 5f $^3F_3^0$	1s 7g $^1G_4$	1.6405E+01	1.439E-08	3.963E+04	1.6336E+01	1.419E-08	3.908E+04
1s 5f $^3F_2^0$	1s 7g $^1G_4$	1.6409E+01	1.841E-07	5.068E+05	1.6340E+01	1.852E-07	5.100E+05
1s 5f $^3F_4^0$	1s 7g $^1G_4$	1.6490E+01	1.518E-07	4.138E+05	1.6420E+01	1.528E-07	4.166E+05
1s 5f $^1F_3^0$	1s 7g $^1G_4$	1.6493E+01	1.670E-06	4.549E+06	1.6423E+01	1.681E-06	4.581E+06
1s 6p $^3P_2^0$	1s 7g $^1G_4$	4.2553E+01	3.141E-14	1.286E-02			
1s 6f $^3F_3^0$	1s 7g $^1G_4$	4.3393E+01	9.707E-09	3.821E+03	4.3219E+01	1.009E-08	3.971E+03
1s 6f $^3F_2^0$	1s 7g $^1G_4$	4.3407E+01	1.241E-07	4.880E+04	4.3218E+01	1.246E-07	4.903E+04
1s 6f $^3F_4^0$	1s 7g $^1G_4$	4.3738E+01	1.042E-07	4.037E+04	4.3559E+01	1.044E-07	4.045E+04
1s 6f $^1F_3^0$	1s 7g $^1G_4$	4.3749E+01	1.147E-06	4.441E+05	4.3560E+01	1.148E-06	4.449E+05
1s 6h $^3H_5^0$	1s 7g $^1G_4$	4.3947E+01	4.178E-15	1.603E-03			
1s 6h $^3H_4^0$	1s 7g $^1G_4$	4.3952E+01	1.102E-15	4.227E-04			
1s 6h $^3H_6^0$	1s 7g $^1G_4$	4.4086E+01	5.767E-10	2.199E+02	4.3903E+01	5.785E-10	2.205E+02
1s 6h $^1H_5^0$	1s 7g $^1G_4$	4.4090E+01	1.511E-08	5.759E+03	4.3903E+01	1.504E-08	5.734E+03

(continued on next page)

Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )	$\lambda$ (Å)	<i>gf</i>	<i>A</i> (s <sup>-1</sup> )
1s7p <sup>3</sup> P <sub>2</sub> <sup>o</sup>	1s7g <sup>1</sup> G <sub>4</sub>	2.1414E+03	1.517E-18	2.452E-10			
1s7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7g <sup>3</sup> G <sub>4</sub>	5.4114E+03	2.420E-14	6.124E-07	5.5025E+03	2.355E-14	5.716E-07
1s7f <sup>3</sup> F <sub>2</sub> <sup>o</sup>	1s7g <sup>1</sup> G <sub>4</sub>	5.5556E+03	2.854E-13	6.854E-06	5.5006E+03	2.907E-13	7.060E-06
1s7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7g <sup>1</sup> G <sub>4</sub>	1.4181E+04	1.429E-14	5.268E-08	1.4765E+04	1.251E-14	4.217E-08
1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s7g <sup>1</sup> G <sub>4</sub>	1.4947E+04	1.343E-13	4.455E-07	1.4784E+04	1.370E-13	4.608E-07
1s7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s7g <sup>1</sup> G <sub>4</sub>	4.7824E+05	1.517E-24	4.917E-21			
1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s7g <sup>1</sup> G <sub>4</sub>	3.2051E+06	1.293E-27	9.331E-26			
1s5g <sup>3</sup> G <sub>4</sub>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1.6478E+01	2.768E-07	5.230E+05	1.6408E+01	2.770E-07	5.234E+05
1s5g <sup>3</sup> G <sub>5</sub>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1.6529E+01	3.232E-06	6.069E+06	1.6459E+01	3.261E-06	6.125E+06
1s5g <sup>1</sup> G <sub>4</sub>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1.6531E+01	1.019E-07	1.913E+05	1.6460E+01	1.028E-07	1.931E+05
1s6g <sup>3</sup> G <sub>4</sub>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	4.3656E+01	2.869E-07	7.725E+04	4.3473E+01	2.870E-07	7.727E+04
1s6g <sup>3</sup> G <sub>5</sub>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	4.3863E+01	3.400E-06	9.068E+05	4.3678E+01	3.410E-06	9.095E+05
1s6g <sup>1</sup> G <sub>4</sub>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	4.3870E+01	1.073E-07	2.860E+04	4.3678E+01	1.082E-07	2.887E+04
1s7g <sup>3</sup> G <sub>4</sub>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	8.8116E+03	8.646E-14	5.714E-07	8.8256E+03	8.470E-14	5.532E-07
1s7g <sup>3</sup> G <sub>5</sub>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	2.2048E+04	6.532E-14	6.895E-08	2.2104E+04	6.405E-14	6.670E-08
1s7g <sup>1</sup> G <sub>4</sub>	1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	2.3159E+04	1.778E-15	1.701E-09	2.2104E+04	2.033E-15	2.117E-09
1s4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>6</sub>	7.6847E+00	1.806E-12	1.569E+01			
1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>6</sub>	1.6478E+01	1.456E-12	2.751E+00			
1s6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>6</sub>	4.3655E+01	6.343E-14	1.708E-02			
1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>6</sub>	4.3863E+01	2.235E-06	5.960E+05	4.3678E+01	2.243E-06	5.983E+05
1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>6</sub>	4.3869E+01	7.139E-08	1.903E+04	4.3678E+01	7.123E-08	1.899E+04
1s6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>6</sub>	4.4002E+01	4.282E-13	1.135E-01			
1s6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>6</sub>	4.4006E+01	9.095E-13	2.410E-01			
1s7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>6</sub>	8.7950E+03	4.030E-22	2.673E-15			
1s7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>6</sub>	2.2088E+04	1.687E-14	1.774E-08	2.2113E+04	1.661E-14	1.728E-08
1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>6</sub>	2.2991E+04	4.777E-16	4.637E-10	2.2113E+04	5.275E-16	5.488E-10
1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>6</sub>	2.7778E+08	1.588E-33	1.036E-35			
1s4f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	7.6487E+00	4.069E-17	4.218E-04			
1s4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	7.6846E+00	6.867E-14	7.052E-01			
1s4f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	7.6858E+00	1.434E-12	1.472E+01			
1s5f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	1.6393E+01	2.438E-17	5.502E-05			
1s5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	1.6478E+01	5.569E-14	1.244E-01			
1s5f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	1.6481E+01	1.157E-12	2.584E+00			
1s6f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	4.3310E+01	6.496E-19	2.100E-07			
1s6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	4.3653E+01	2.487E-15	7.915E-04			
1s6f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	4.3664E+01	5.058E-14	1.609E-02			
1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	4.3861E+01	1.065E-07	3.356E+04	4.3678E+01	1.068E-07	3.367E+04
1s6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	4.3866E+01	1.845E-06	5.814E+05	4.3678E+01	1.851E-06	5.836E+05
1s6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	4.4000E+01	6.477E-17	2.029E-05			
1s6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	4.4004E+01	2.541E-13	7.958E-02			
1s7f <sup>3</sup> F <sub>3</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	4.3626E+03	1.645E-27	5.241E-20			
1s7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	8.6997E+03	1.609E-23	1.289E-16			
1s7f <sup>1</sup> F <sub>3</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	8.9822E+03	3.033E-22	2.280E-15			
1s7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	2.1496E+04	8.714E-16	1.144E-09	2.2113E+04	7.913E-16	9.729E-10
1s7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	2.2351E+04	1.344E-14	1.631E-08	2.2113E+04	1.371E-14	1.686E-08
1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>5</sub>	8.0038E+05	8.707E-31	8.242E-28			
1s3d <sup>3</sup> D <sub>3</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	3.5586E+00	2.702E-16	1.294E-02			
1s4d <sup>3</sup> D <sub>3</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	7.6476E+00	2.941E-16	3.049E-03			
1s5d <sup>3</sup> D <sub>3</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1.6390E+01	1.850E-16	4.176E-04			
1s5g <sup>3</sup> G <sub>4</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1.6478E+01	1.027E-08	2.293E+04	1.6408E+01	9.994E-09	2.231E+04
1s5g <sup>3</sup> G <sub>3</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1.6480E+01	2.227E-07	4.972E+05	1.6410E+01	2.231E-07	4.981E+05
1s5g <sup>3</sup> G <sub>5</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1.6529E+01	1.539E-07	3.417E+05	1.6459E+01	1.553E-07	3.447E+05
1s5g <sup>1</sup> G <sub>4</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1.6530E+01	2.668E-06	5.920E+06	1.6460E+01	2.692E-06	5.973E+06
1s6d <sup>3</sup> D <sub>3</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3297E+01	1.613E-16	5.219E-05			
1s6g <sup>3</sup> G <sub>4</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3653E+01	1.064E-08	3.387E+03	4.3473E+01	1.104E-08	3.512E+03
1s6g <sup>3</sup> G <sub>3</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3661E+01	2.309E-07	7.345E+04	4.3473E+01	2.318E-07	7.376E+04
1s6g <sup>3</sup> G <sub>5</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3860E+01	1.619E-07	5.104E+04	4.3678E+01	1.624E-07	5.118E+04
1s6g <sup>1</sup> G <sub>4</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.3867E+01	2.807E-06	8.845E+05	4.3678E+01	2.815E-06	8.872E+05
1s7d <sup>3</sup> D <sub>3</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.2781E+03	7.935E-22	2.629E-14			
1s7g <sup>3</sup> G <sub>4</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	8.6987E+03	3.334E-15	2.672E-08	8.8256E+03	3.259E-15	2.515E-08
1s7g <sup>3</sup> G <sub>3</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	8.9120E+03	6.726E-14	5.135E-07	8.8255E+03	6.841E-14	5.281E-07
1s7g <sup>3</sup> G <sub>5</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	2.1355E+04	3.424E-15	4.553E-09	2.2104E+04	3.050E-15	3.753E-09
1s7g <sup>1</sup> G <sub>4</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	2.2395E+04	5.146E-14	6.221E-08	2.2104E+04	5.287E-14	6.506E-08
1s7i <sup>3</sup> I <sub>6</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	6.8074E+05	2.383E-25	3.119E-22			
1s7i <sup>3</sup> I <sub>5</sub>	1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	4.4823E+06	2.314E-28	6.985E-27			
1s6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>7</sub>	4.3801E+01	4.717E-07	1.093E+05	4.3617E+01	4.715E-07	1.092E+05
1s6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>7</sub>	4.3940E+01	7.252E-06	1.670E+06	4.3754E+01	7.280E-06	1.676E+06
1s6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>7</sub>	4.3944E+01	1.639E-07	3.775E+04	4.3754E+01	1.654E-07	3.810E+04
1s7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>7</sub>	1.2900E+04	1.788E-14	4.778E-08	1.2909E+04	1.756E-14	4.647E-08
1s7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>7</sub>	3.1010E+04	1.983E-14	9.171E-09	3.1022E+04	1.957E-14	8.967E-09
1s7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s7i <sup>3</sup> I <sub>7</sub>	3.2494E+04	3.897E-16	1.641E-10	3.1022E+04	4.448E-16	2.038E-10

(continued on next page)

Table 6 (continued)

Lower	Upper	GRASP2K			FAC		
		$\lambda$ (Å)	$gf$	$A$ (s <sup>-1</sup> )	$\lambda$ (Å)	$gf$	$A$ (s <sup>-1</sup> )
1s 4f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	7.6827E+00	9.016E-17	7.837E-04			
1s 5f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	1.6469E+01	7.167E-17	1.356E-04			
1s 6f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	4.3592E+01	1.033E-18	2.790E-07			
1s 6h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	4.3799E+01	1.213E-08	3.246E+03	4.3617E+01	1.257E-08	3.362E+03
1s 6h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	4.3805E+01	3.950E-07	1.056E+05	4.3617E+01	3.961E-07	1.059E+05
1s 6h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	4.3938E+01	2.473E-07	6.572E+04	4.3754E+01	2.481E-07	6.595E+04
1s 6h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	4.3942E+01	6.182E-06	1.643E+06	4.3754E+01	6.204E-06	1.648E+06
1s 7f <sup>3</sup> F <sub>4</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	6.8024E+03	6.449E-27	7.151E-20			
1s 7h <sup>3</sup> H <sub>5</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	1.2726E+04	4.791E-16	1.518E-09	1.2909E+04	4.684E-16	1.430E-09
1s 7h <sup>3</sup> H <sub>4</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	1.3020E+04	1.456E-14	4.408E-08	1.2909E+04	1.475E-14	4.504E-08
1s 7h <sup>3</sup> H <sub>6</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	3.0020E+04	7.453E-16	4.243E-10	3.1022E+04	6.673E-16	3.527E-10
1s 7h <sup>1</sup> H <sub>5</sub> <sup>o</sup>	1s 7i <sup>1</sup> I <sub>6</sub>	3.1409E+04	1.627E-14	8.462E-09	3.1022E+04	1.668E-14	8.818E-09

**Table 7**

Calculated values using the GRASP2K code of the magnetic dipole  $A$ , electric quadrupole  $B$  and Landé  $g$ -factors for all levels of interest. For this calculation, the active set expanded to  $n = 10$  (GRASP3) has been considered.

Configuration	$A$ (MHz)	$B$ (MHz)	$g_j$
1s 2s $^3S_1$	1.329E+07	1.941E+00	1.935167E+00
1s 2p $^3P_1^0$	1.218E+07	4.527E+03	1.285193E+00
1s 2p $^3P_2^0$	5.965E+06	-6.466E+04	1.458966E+00
1s 2p $^1P_1^0$	-5.636E+06	-3.488E+04	1.150634E+00
1s 3s $^3S_1$	1.218E+07	1.709E+00	1.942586E+00
1s 3p $^3P_1^0$	1.184E+07	1.265E+03	1.291576E+00
1s 3p $^3P_2^0$	5.890E+06	-1.976E+04	1.467393E+00
1s 3d $^3D_2$	5.879E+06	-3.874E+03	1.067061E+00
1s 3d $^3D_1$	-5.824E+06	-1.941E+03	5.145892E-01
1s 3p $^1P_1^0$	-5.774E+06	-1.065E+04	1.165553E+00
1s 3d $^3D_3$	3.915E+06	-5.068E+03	1.308971E+00
1s 3d $^1D_2$	-3.892E+06	-4.040E+03	1.074253E+00
1s 4s $^3S_1$	1.191E+07	8.684E-01	1.945151E+00
1s 4p $^3P_1^0$	1.175E+07	5.208E+02	1.293822E+00
1s 4p $^3P_2^0$	5.871E+06	-8.406E+03	1.470347E+00
1s 4d $^3D_2$	5.867E+06	-1.672E+03	1.070326E+00
1s 4d $^3D_1$	-5.843E+06	-8.397E+02	5.195030E-01
1s 4p $^1P_1^0$	-5.809E+06	-4.532E+03	1.170777E+00
1s 4d $^3D_3$	3.909E+06	-2.169E+03	1.312098E+00
1s 4f $^3F_3^0$	3.908E+06	-7.731E+02	1.025485E+00
1s 4f $^3F_2^0$	-3.901E+06	-6.174E+02	6.782567E-01
1s 4d $^1D_2$	-3.900E+06	-1.729E+03	1.078311E+00
1s 4f $^3F_4^0$	2.930E+06	-8.773E+02	1.232907E+00
1s 4f $^1F_3^0$	-2.927E+06	-7.820E+02	1.044150E+00
1s 5s $^3S_1$	1.181E+07	4.676E-01	1.946327E+00
1s 5p $^3P_1^0$	1.172E+07	2.630E+02	1.294862E+00
1s 5p $^3P_2^0$	5.865E+06	-4.316E+03	1.471711E+00
1s 5d $^3D_2$	5.862E+06	-8.637E+02	1.071827E+00
1s 5p $^1P_1^0$	-5.822E+06	-2.327E+03	1.173184E+00
1s 5d $^3D_1$	-5.851E+06	-4.344E+02	5.217790E-01
1s 5d $^3D_3$	3.907E+06	-1.116E+03	1.313549E+00
1s 5f $^3F_3^0$	3.906E+06	-3.993E+02	1.026955E+00
1s 5f $^3F_2^0$	-3.903E+06	-3.188E+02	6.802985E-01
1s 5d $^1D_2$	-3.902E+06	-8.908E+02	1.080205E+00
1s 5f $^3F_4^0$	2.930E+06	-4.520E+02	1.234400E+00
1s 5g $^3G_4$	2.930E+06	-2.098E+02	1.011596E+00
1s 5g $^3G_3$	-2.928E+06	-1.874E+02	7.594756E-01
1s 5f $^1F_3^0$	-2.928E+06	-4.029E+02	1.046058E+00
1s 5g $^3G_5$	2.344E+06	-2.262E+02	1.186952E+00
1s 5g $^1G_4$	-2.343E+06	-2.112E+02	1.029827E+00
1s 6s $^3S_1$	1.177E+07	2.710E-01	1.946963E+00
1s 6p $^3P_1^0$	1.171E+07	1.507E+02	1.295417E+00
1s 6p $^3P_2^0$	5.862E+06	-2.497E+03	1.472450E+00
1s 6d $^3D_2$	5.860E+06	-5.019E+02	1.072640E+00
1s 6p $^1P_1^0$	-5.828E+06	-1.346E+03	1.174496E+00
1s 6d $^3D_1$	-5.854E+06	-2.527E+02	5.230139E-01
1s 6d $^3D_3$	3.907E+06	-6.475E+02	1.314338E+00
1s 6f $^3F_3^0$	3.906E+06	-2.320E+02	1.027753E+00
1s 6f $^3F_2^0$	-3.904E+06	-1.853E+02	6.814050E-01
1s 6d $^1D_2$	-3.903E+06	-5.171E+02	1.081237E+00
1s 6f $^3F_4^0$	2.929E+06	-2.624E+02	1.235214E+00
1s 6g $^3G_4$	2.929E+06	-1.220E+02	1.012411E+00
1s 6g $^3G_3$	-2.929E+06	-1.090E+02	7.605229E-01
1s 6f $^1F_3^0$	-2.928E+06	-2.339E+02	1.047097E+00
1s 6g $^3G_5$	2.344E+06	-1.314E+02	1.187784E+00
1s 6h $^3H_5^0$	2.343E+06	-7.193E+01	1.005467E+00
1s 6h $^3H_4^0$	-2.343E+06	-6.707E+01	8.080359E-01
1s 6g $^1G_4$	-2.343E+06	-1.227E+02	1.030843E+00
1s 6h $^3H_6^0$	1.953E+06	-7.560E+01	1.156123E+00
1s 6h $^1H_5^0$	-1.952E+06	-7.210E+01	1.021980E+00
1s 7s $^3S_1$	1.175E+07	1.638E-01	1.947346E+00
1s 7p $^3P_1^0$	1.170E+07	9.511E+01	1.295852E+00
1s 7p $^3P_2^0$	5.860E+06	-1.576E+03	1.472878E+00
1s 7d $^3D_2$	5.859E+06	-3.166E+02	1.073129E+00
1s 7d $^3D_1$	-5.855E+06	-1.596E+02	5.237575E-01
1s 7p $^1P_1^0$	-5.830E+06	-8.507E+02	1.175151E+00
1s 7d $^3D_3$	3.906E+06	-4.081E+02	1.314814E+00
1s 7f $^3F_3^0$	3.906E+06	-1.466E+02	1.028235E+00
1s 7f $^3F_2^0$	-3.904E+06	-1.171E+02	6.820742E-01
1s 7d $^1D_2$	-3.904E+06	-3.263E+02	1.081860E+00

(continued on next page)

Table 7 (continued)

Configuration	A (MHz)	B (MHz)	$g_j$
1s 7f $^3F_4^o$	2.929E+06	-1.654E+02	1.235703E+00
1s 7g $^3G_4$	2.929E+06	-7.700E+01	1.012903E+00
1s 7g $^3G_3$	-2.929E+06	-6.881E+01	7.611546E-01
1s 7f $^1F_3^o$	-2.928E+06	-1.475E+02	1.047721E+00
1s 7g $^3G_5$	2.343E+06	-8.289E+01	1.188286E+00
1s 7h $^3H_5^o$	2.343E+06	-4.542E+01	1.005969E+00
1s 7h $^3H_4^o$	-2.343E+06	-4.235E+01	8.086497E-01
1s 7g $^1G_4$	-2.343E+06	-7.742E+01	1.031456E+00
1s 7h $^3H_6^o$	1.953E+06	-4.771E+01	1.156632E+00
1s 7i $^3I_6$	1.953E+06	-2.870E+01	1.002418E+00
1s 7i $^3I_5$	-1.953E+06	-2.743E+01	8.402692E-01
1s 7h $^1H_5^o$	-1.952E+06	-4.550E+01	1.022582E+00
1s 7i $^3I_7$	1.674E+06	-2.974E+01	1.134057E+00
1s 7i $^1I_6$	-1.674E+06	-2.879E+01	1.017106E+00

**Table 8**

Calculated values using the GRASP2K code of normal, specific mass shifts and electron densities at the nucleus for the all singly excited levels up to  $n = 7$  with increasing the active set to  $n = 10$  (GRASP3).

Index	Configuration	$K_{NMS}$	$K_{SMS}$	Electron densities at the nucleus
1	$1s^2 1S_0$	2.862115E+03	8.372810E+00	2.355815E+05
2	$1s 2s 3S_1$	1.819580E+03	6.544528E-01	1.364262E+05
3	$1s 2p 3P_1^0$	1.817000E+03	-8.021940E+01	1.201622E+05
4	$1s 2p 3P_0^0$	1.815498E+03	-1.953285E+02	1.201173E+05
5	$1s 2s 1S_0$	1.815192E+03	1.618605E+00	1.360149E+05
6	$1s 2p 3P_2^0$	1.803659E+03	-2.058238E+02	1.196642E+05
7	$1s 2p 1P_1^0$	1.802099E+03	8.321168E+01	1.198328E+05
8	$1s 3s 3S_1$	1.613866E+03	2.454228E-01	1.247247E+05
9	$1s 3p 3P_1^0$	1.613208E+03	-1.706693E+01	1.199436E+05
10	$1s 3s 1S_0$	1.612703E+03	5.420968E-01	1.246202E+05
11	$1s 3p 3P_0^0$	1.612808E+03	-4.218003E+01	1.199297E+05
12	$1s 3p 3P_2^0$	1.609187E+03	-4.894801E+01	1.197682E+05
13	$1s 3d 3D_2$	1.608843E+03	3.867396E-02	1.197815E+05
14	$1s 3d 3D_1$	1.608690E+03	1.545303E-01	1.197794E+05
15	$1s 3p 1P_1^0$	1.608726E+03	1.988737E+01	1.198104E+05
16	$1s 3d 3D_3$	1.607560E+03	6.261143E-02	1.197794E+05
17	$1s 3d 1D_2$	1.607466E+03	2.896360E-03	1.197827E+05
18	$1s 4s 3S_1$	1.542191E+03	1.159027E-01	1.218552E+05
19	$1s 4p 3P_1^0$	1.541967E+03	-6.423856E+00	1.198675E+05
20	$1s 4s 1S_0$	1.541823E+03	2.449015E-01	1.218158E+05
21	$1s 4p 3P_0^0$	1.541804E+03	-1.595949E+01	1.198612E+05
22	$1s 4p 3P_2^0$	1.540267E+03	-1.916717E+01	1.197893E+05
23	$1s 4d 3D_2$	1.540095E+03	2.748062E-02	1.197824E+05
24	$1s 4d 3D_1$	1.540053E+03	8.509648E-02	1.197813E+05
25	$1s 4p 1P_1^0$	1.540076E+03	7.809108E+00	1.198064E+05
26	$1s 4d 3D_3$	1.539548E+03	4.557849E-02	1.197813E+05
27	$1s 4f 3F_3^0$	1.539594E+03	1.470809E-02	1.198033E+05
28	$1s 4f 3F_2^0$	1.539566E+03	2.242135E-02	1.198053E+05
29	$1s 4d 1D_2$	1.539534E+03	8.086057E-03	1.197830E+05
30	$1s 4f 3F_4^0$	1.539324E+03	6.452494E-03	1.198035E+05
31	$1s 4f 1F_3^0$	1.539303E+03	1.282208E-02	1.198050E+05
32	$1s 5s 3S_1$	1.509220E+03	6.414105E-02	1.208374E+05
33	$1s 5p 3P_1^0$	1.509162E+03	-3.114675E+00	1.198376E+05
34	$1s 5s 1S_0$	1.509195E+03	1.322070E-01	1.208210E+05
35	$1s 5p 3P_0^0$	1.509081E+03	-7.758204E+00	1.198342E+05
36	$1s 5p 3P_2^0$	1.508292E+03	-9.475364E+00	1.197965E+05
37	$1s 5d 3D_2$	1.508180E+03	1.819042E-02	1.197829E+05
38	$1s 5p 1P_1^0$	1.508197E+03	3.868506E+00	1.198052E+05
39	$1s 5d 3D_1$	1.508177E+03	4.981599E-02	1.197822E+05
40	$1s 5d 3D_3$	1.507896E+03	2.909923E-02	1.197823E+05
41	$1s 5f 3F_3^0$	1.507945E+03	9.888449E-03	1.198037E+05
42	$1s 5f 3F_2^0$	1.507930E+03	1.398999E-02	1.198047E+05
43	$1s 5d 1D_2$	1.507911E+03	7.316622E-03	1.197832E+05
44	$1s 5f 3F_4^0$	1.507807E+03	5.878058E-03	1.198038E+05
45	$1s 5g 3G_4$	1.507772E+03	6.925163E-03	1.197834E+05
46	$1s 5g 3G_3$	1.507765E+03	9.936995E-03	1.197835E+05
47	$1s 5f 1F_3^0$	1.507796E+03	8.879435E-03	1.198046E+05
48	$1s 5g 3G_5$	1.507690E+03	3.848136E-03	1.197834E+05
49	$1s 5g 1G_4$	1.507684E+03	6.841721E-03	1.197835E+05
50	$1s 6s 3S_1$	1.491393E+03	3.966973E-02	1.203896E+05
51	$1s 6p 3P_1^0$	1.491425E+03	-1.747137E+00	1.198237E+05
52	$1s 6s 1S_0$	1.491595E+03	8.044927E-02	1.203841E+05
53	$1s 6p 3P_0^0$	1.491378E+03	-4.358955E+00	1.198217E+05
54	$1s 6p 3P_2^0$	1.490923E+03	-5.374441E+00	1.197997E+05
55	$1s 6d 3D_2$	1.490835E+03	1.260114E-02	1.197831E+05
56	$1s 6p 1P_1^0$	1.490867E+03	2.197926E+00	1.198047E+05
57	$1s 6d 3D_1$	1.490852E+03	3.168686E-02	1.197827E+05
58	$1s 6d 3D_3$	1.490668E+03	1.933123E-02	1.197827E+05
59	$1s 6f 3F_3^0$	1.490720E+03	6.648316E-03	1.198039E+05
60	$1s 6f 3F_2^0$	1.490711E+03	9.068110E-03	1.198045E+05
61	$1s 6d 1D_2$	1.490698E+03	6.001879E-03	1.197833E+05
62	$1s 6f 3F_4^0$	1.490640E+03	4.399590E-03	1.198040E+05
63	$1s 6g 3G_4$	1.490603E+03	4.841594E-03	1.197834E+05
64	$1s 6g 3G_3$	1.490603E+03	6.624087E-03	1.197835E+05
65	$1s 6f 1F_3^0$	1.490634E+03	6.033506E-03	1.198044E+05
66	$1s 6g 3G_5$	1.490556E+03	2.987498E-03	1.197834E+05
67	$1s 6h 3H_3^0$	1.490594E+03	2.961360E-03	1.198041E+05
68	$1s 6h 3H_4^0$	1.490591E+03	3.804622E-03	1.198043E+05
69	$1s 6g 1G_4$	1.490556E+03	4.747536E-03	1.197835E+05
70	$1s 6h 3H_6^0$	1.490562E+03	1.899926E-03	1.198041E+05
71	$1s 6h 1H_5^0$	1.490560E+03	2.752518E-03	1.198043E+05

(continued on next page)

Table 8 (continued)

Index	Configuration	$K_{NMS}$	$K_{SMS}$	Electron densities at the nucleus
72	1s 7s $^3S_1$	1.480650E+03	2.694334E-02	1.201626E+05
73	1s 7p $^3P_0^o$	1.481084E+03	-1.087763E+00	1.198166E+05
74	1s 7s $^1S_0$	1.481167E+03	5.410009E-02	1.201644E+05
75	1s 7p $^3P_0^o$	1.481058E+03	-2.715643E+00	1.198153E+05
76	1s 7p $^3P_2^o$	1.480758E+03	-3.364477E+00	1.198013E+05
77	1s 7d $^3D_2$	1.480376E+03	9.571873E-03	1.197832E+05
78	1s 7d $^3D_1$	1.480415E+03	2.200799E-02	1.197830E+05
79	1s 7p $^1P_1^o$	1.480741E+03	1.381522E+00	1.198045E+05
80	1s 7d $^3D_3$	1.480267E+03	1.390302E-02	1.197830E+05
81	1s 7f $^3F_3^o$	1.480333E+03	4.632020E-03	1.198040E+05
82	1s 7f $^3F_2^o$	1.480328E+03	6.156500E-03	1.198044E+05
83	1s 7d $^1D_2$	1.480318E+03	5.311102E-03	1.197834E+05
84	1s 7f $^3F_4^o$	1.480278E+03	3.356779E-03	1.198040E+05
85	1s 7g $^3G_4$	1.480235E+03	3.714721E-03	1.197834E+05
86	1s 7g $^3G_3$	1.480243E+03	4.889674E-03	1.197835E+05
87	1s 7f $^1F_3^o$	1.480274E+03	4.340171E-03	1.198043E+05
88	1s 7g $^3G_5$	1.480206E+03	2.491921E-03	1.197834E+05
89	1s 7h $^3H_5^o$	1.480247E+03	2.300436E-03	1.198041E+05
90	1s 7h $^3H_4^o$	1.480245E+03	2.822402E-03	1.198042E+05
91	1s 7g $^1G_4$	1.480212E+03	3.650499E-03	1.197835E+05
92	1s 7h $^3H_6^o$	1.480226E+03	1.590809E-03	1.198041E+05
93	1s 7i $^3I_6$	1.480190E+03	1.649752E-03	1.197834E+05
94	1s 7i $^3I_5$	1.480190E+03	2.164438E-03	1.197835E+05
95	1s 7h $^1H_5^o$	1.480225E+03	2.112037E-03	1.198042E+05
96	1s 7i $^3I_7$	1.480176E+03	1.080355E-03	1.197834E+05
97	1s 7i $^1I_6$	1.480176E+03	1.594008E-03	1.197835E+05