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RELATIVISTIC DISTORTED WAVE COLLISION STRENGTHS
FOR EXCITATION TO THE 88 N=3 AND N=4 LEVELS IN
ALL 71 NEON-LIKE IONS WITH $22 \leq Z \leq 92$

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Relativistic Distorted Wave Collision Strengths for
Excitation to the 88 $n = 3$ and $n = 4$ Levels in all 71 Neon-Like
Ions with $22 \leq Z \leq 92^*$

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Abstract

Relativistic distorted wave collision strengths are given for the 88 possible transitions between the ground level and the excited levels with $n = 3$ and $n = 4$ in the 71 neon-like ions with nuclear charge number Z in the range $22 \leq Z \leq 92$. The calculations are made for the six final, or scattered, electron energies $E' = 0.008, 0.04, 0.10, 0.21, 0.41$ and 0.75 , where E' is in units of Z_{eff}^2 Rydbergs with $Z_{\text{eff}} = Z - 7.5$. In addition, the transition energies and electric dipole oscillator strengths are given.

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INTRODUCTION

As is generally known, neon-like ions have been of particular interest in research to develop X-ray lasers and indeed the first successful experiment producing soft X-ray lasing¹ utilized neon-like selenium ions. Also due to the closed shell nature of the ground configuration of neon-like ions they tend to be the dominant stage of ionization over a wide range of temperatures and hence are of general interest in the study of high temperature plasmas.

In earlier work², we calculated the collision strengths for excitation to the $n = 3$ and $n = 4$ levels in 20 neon-like ions with nuclear charge number Z in the range $18 \leq Z \leq 74$ using an approximate treatment, which utilized non-relativistic hydrogenic basis states. In the present work, using the more accurate, but still very rapid, relativistic atomic structure and distorted wave collision strength programs described in Ref. 3 and 4, we have calculated the collision strengths for the 88 transitions from the ground level to the $n = 3$ and $n = 4$ levels in all 71 neon-like ions with Z on the range

$$22 \leq Z \leq 92 . \quad (1)$$

These calculations were made for the six scattered electron (final free electron) energies

$$E' = 0.008, 0.04, 0.10, 0.21, 0.41 \text{ and } 0.75 , \quad (2)$$

where E' is in units of Z_{eff}^2 Rydbergs with

$$Z_{\text{eff}} = Z - 7.5 . \quad (3)$$

This appears to span the range of energies needed to obtain collision rates for essentially all conditions for which neon-like ions are sufficiently abundant to be of interest.

The theory and procedures we use in the present calculations are described in detail in Ref. 3 and 4. Hence, we only summarize the salient features here. The same relativistic Hartree-Fock-Slater, or so-called Dirac-Fock-Slater, potential is used in determining the radial functions of all electrons, bound and free. Hence, all orbitals are automatically orthogonal and exchange can be handled in a simple, consistent manner. Specifically, this potential in Rydbergs is given by

$$V(r) = -\frac{2Z}{r} + V_c(r) - \left(\frac{24}{\pi} \rho\right)^{1/3}, \quad (4)$$

where the term $(-2Z/r)$ is the contribution due to the nuclear charge. The $V_c(r)$ term is the spherically averaged classical potential due to the bound electrons

$$V_c(r) = \sum_{n'\kappa'} w_{n'\kappa'} \int_0^\infty \frac{2}{r_>} [P_{n'\kappa'}^2(r_2) + Q_{n'\kappa'}^2(r_2)] dr_2, \quad (5)$$

in which $w_{n'\kappa'}$ is the occupation number of subshell $n'\kappa' = n'l'j$, the summation is over all occupied subshells, $r_>$ is the greater of r and r_2 , and $P_{n'\kappa'}$ and $Q_{n'\kappa'}$ are the so-called large and small components of the radial function of an electron in the $n'\kappa'$ subshell. The final term in Eq (4) is the exchange energy of an electron in a free-electron gas of density $\rho(r)$ averaged over all possible momenta of the electron and with the Kohn-Sham⁵ value for the numerical coefficient. Following Slater⁶ we use for $\rho(r)$ the number density of the bound electrons at distance r from the nucleus. The spherically averaged value for this is

$$\rho(r) = \frac{1}{4\pi r^2} \sum_{n'\kappa'} w_{n'\kappa'} [P_{n'\kappa'}^2(r) + Q_{n'\kappa'}^2(r)]. \quad (6)$$

We note that in applying Eqs (4)-(6) to determine the radial function for the bound electrons in a particular subshell $n\kappa$ the potential given by the first two terms on the right hand side of Eq (4) would be the relativistic Hartree potential, if in Eq (5) $w_{n'\kappa'}$ were replaced with $w_{n'\kappa'} - 1$ when $n'\kappa' = n\kappa$. The undesirable feature that $V_c(r)$ given by Eq (5) contains self-interaction is at least partially cancelled out by the fact that with the use of Eq (6) self-exchange energy is also included in Eq (4).

In determining the potential with Eqs (4)-(6) we use a single mean configuration with non-integer occupation numbers for some subshells. For example, in the present application to excitation to the $n = 3$ and $n = 4$ levels in neon-like ions we use the mean configuration

$$1s_{1/2}^2 2s_{1/2}^{1.9} 2p_{1/2}^{1.9} 2p_{3/2}^{3.7} 3s_{1/2}^{0.04} 3p_{1/2}^{0.04} 3p_{3/2}^{0.04} 3d_{3/2}^{0.04} 3d_{5/2}^{0.04} \\ \times 4s_{1/2}^{0.04} 4p_{1/2}^{0.04} 4p_{3/2}^{0.04} 4d_{3/2}^{0.04} 4d_{5/2}^{0.04} 4f_{5/2}^{0.05} 4f_{7/2}^{0.05}, \quad (7)$$

which corresponds to a total hole of 0.5 electrons in the $n = 2$ subshells and an occupation of 0.5 electrons in the $n = 3$ and 4 subshells. This can be regarded as equal splitting of the occupation of the active electron between initial and final subshells. Actually test cases^{3,4} have indicated that slight changes in the mean configuration used in determining the potential have little effect on results.

It should be noted that the mean configuration is used solely in determining the potential with Eqs (4)-(6) and the calculations are multiconfiguration calculations. Initially in the present work we expected to include only all the mixing among the states in a complex, i.e. having the same set of n values, parity and J value, as done in Ref. 2 and in the cases for which numerical results are given in Ref. 3 and 4. However, test cases indicated significant effects due to mixing among the $n = 3$ and $n = 4$ levels with the same parity and

J value, especially on the collision strengths for excitation to some of the $n = 4$ levels with even parity for low and high values of Z. In presenting results in the Tables a group of mixed states, which includes all $n = 3$ and $n = 4$ states with the same parity and J value, is designated by a capital letter. A numerical subscript is added to indicate a particular energy level in the Group. For example, D_2 designates the next to the lowest energy level in Group D, which consists of all the $n = 3$ and $n = 4$ states with even parity and target ion J value $J'_t = 0$. The transition energy for each excited level, i.e. the difference between its energy and the energy of the ground level, and the jj coupled state giving the dominant contribution to each level are given for every excited level and Z value in Table I. In Table II the LS coupled state making the dominant contribution to each energy level is given for the convenience of those who desire to use LS coupling notation; however, pure jj coupling much more nearly applies for most of the values of Z considered here.

Since a hole in a subshell behaves like a single electron in the subshell in determining the angular momentum state of the ion and filled subshells contribute nothing, we use the following abbreviations:

$$(2p_{3/2} n'_a \ell'_a j'_a)_{J'_t} = (1s_{1/2}^2 2s_{1/2}^2 2p_{1/2}^2 2p_{3/2}^3 n'_a \ell'_a j'_a)_{J'_t} \quad (8)$$

$$(2p_{1/2} n'_a \ell'_a j'_a)_{J'_t} = (1s_{1/2}^2 2s_{1/2}^2 2p_{1/2}^2 2p_{3/2}^4 n'_a \ell'_a j'_a)_{J'_t} \quad (9)$$

$$(2s_{1/2} n'_a \ell'_a j'_a)_{J'_t} = (1s_{1/2}^2 2s_{1/2}^2 2p_{1/2}^2 2p_{3/2}^4 n'_a \ell'_a j'_a)_{J'_t} \quad (10)$$

$$2p n'_a \ell'_a {}^{2s+1}L_{J'_t} = 1s^2 2s^2 2p^5 n'_a \ell'_a {}^{2s+1}L_{J'_t} \quad (11)$$

and

$$2s n'_a \ell'_a {}^{2s+1}L_{J'_t} = 1s^2 2s^2 2p^6 n'_a \ell'_a {}^{2s+1}L_{J'_t} \quad (12)$$

Also in Table I we follow the quite common practice of designating a relativistic subshell $n\bar{l}j$ by $n\bar{l}^*$ if $j = \bar{l} - 1/2$ and by $n\bar{l}$ if $j = \bar{l} + 1/2$ so that, for example, the left hand side of Eq (8) is written

$$\begin{aligned} (2p_{3/2} n'_a \bar{l}'_a j'_a)_{J'_t} &= (2p n'_a \bar{l}'^*_a)_{J'_t}, \quad j'_a = \bar{l}'_a - 1/2 \\ &= (2p n'_a \bar{l}'_a)_{J'_t}, \quad j'_a = \bar{l}'_a + 1/2 \end{aligned} \quad (13)$$

and the left hand side of Eq (9) is written

$$\begin{aligned} (2p_{1/2} n'_a \bar{l}'_a j'_a)_{J'_t} &= (2p^* n'_a \bar{l}'^*_a)_{J'_t}, \quad j'_a = \bar{l}'_a - 1/2 \\ &= (2p^* n'_a \bar{l}'_a)_{J'_t}, \quad j'_a = \bar{l}'_a + 1/2. \end{aligned} \quad (14)$$

It should be mentioned that in the present calculations the so-called Breit interaction, the QED corrections due to self energy and vacuum polarization and the effect of a finite nuclear size have been omitted. The importance of these corrections increases with Z , but, as discussed in Ref. 3, the effect on the transition energies is always (for $Z \leq 92$) somewhat under 1% and generally appears to be too small to appreciably affect the oscillator strengths and collision strengths except possibly for a few very weak transitions.

In Table III the electric dipole radiative oscillator strengths for transitions between the ground level and the $n = 3$ and $n = 4$ excited levels are given. These excited levels must have odd parity and $J'_t = 1$. We call this group of excited levels Group K. For the corresponding transition energies ΔE and jj coupled states, i.e. the jj coupled state making the dominant contribution to each of these levels, one should see Table I and for the corresponding LS coupled states one should see Table II. The present oscillator strengths were calculated with the formula

$$f_{if} = \frac{\Delta E_{if}(\text{Ry})}{3g_i} \sum_{M_f, M_i} \left| \langle \psi_f | \sum_{\alpha} \vec{r}_{\alpha} | \psi_i \rangle \right|^2, \quad (15)$$

where g_i is the statistical weight of the initial level ($g_i = 1$ in the present case) and ψ_f and ψ_i are the final and initial antisymmetrized target ion wave functions constructed as described in Ref. 3 from orbitals that are self consistent solutions of the Dirac equation using the central potential obtained with Eqs. (4)-(7). Eq (15) neglects retardation effects, but comparisons with other relativistic calculations made in Ref. 3 show very good agreement and indicate that for transitions involving orbitals with $n > 1$ the retardation effects are generally small.

In Table IV the relativistic distorted wave collision strengths Ω for excitation from the ground level to the 88 excited levels with $n = 3$ and $n = 4$ are given for the six scattered electron energies given by Eq (2) and the 71 values of Z in the range covered by Eq.(1). Again one should see Tables I and II for the corresponding transition energies ΔE and jj coupled or LS coupled states. The relation between the cross section $Q(i-f)$ and the collision strength $\Omega(i-f)$ for a transition $i-f$ is

$$Q(i-f) = \frac{\pi a_0^2}{k_i^2 g_i} \Omega(i-f), \quad (16)$$

where a_0 is the Bohr radius and k_i is the relativistic wave number of the impact electron. The relation between k_i and the kinetic energy $E_i(\text{Ry})$ of the impact electron is

$$k_i^2 = E_i(\text{Ry}) \left[1 + \frac{a^2}{4} E_i(\text{Ry}) \right], \quad (17)$$

where α is the fine structure constant $\alpha = e^2/\hbar c$. Of course, $E_1(\text{Ry})$ is related to the transition energy $\Delta E_{if}(\text{Ry})$ and the scattered electron energy E' in units of Z_{eff}^2 Rydbergs by

$$E_1(\text{Ry}) = \Delta E_{if}(\text{Ry}) + Z_{\text{eff}}^2 E', \quad (18)$$

where Z_{eff} is given by Eq (3).

In obtaining the results given in Table IV the relativistic distorted wave orbitals of the free electrons are solutions of the Dirac equation corresponding to the central potential obtained with Eqs (4)-(7), which, as noted previously, is the same as used for the bound electrons. Exchange is included in the scattering matrix elements, e.g. Eqs (9) and (10) of Ref. 4, but unitarization is omitted. The latter should be a very good approximation in treating the highly charged ions considered here.

In carrying out the calculations the factorization technique of Bar-Shalom et al⁷ was used to express the collision strength in the form

$$\Omega = 8 \sum_{j_a, j'_a} \sum_{j_{al}, j'_{al}} B^\lambda(j_a j'_a, j_{al} j'_{al}) Q^\lambda(j_a j'_a, j_{al} j'_{al}), \quad (19)$$

where the abbreviations $j_a = n_a l_a j_a$, $j'_a = n'_a l'_a j'_a$, $j_{al} = n_{al} l_{al} j_{al}$ and $j'_{al} = n'_{al} l'_{al} j'_{al}$ have been used. Here j_a and j_{al} represent orbitals in the initial target ion wave function, while j'_a and j'_{al} represent orbitals in the final target ion wave function. A convenient feature of Eq (19) is that the B^λ are functions only of the target ion quantum numbers and mixing coefficients plus λ , while Q^λ contains the radial contribution and depends only on λ and the bound and free orbitals with the summation over the free electron angular momenta l, j, l' and j' performed within it, e.g. Eqs (48)-(52) of Ref. 4. In the present application the B^λ are especially simple. Specifically, for excitation

from the ground level to an excited level U_i with total angular momentum quantum number J'_t

$$B^\lambda(j_a j'_a, j_{al} j'_{al}) = b[U_i, (2k_{aj_a} n'_{aj'_a})_{J'_t}] b[U_i, (2k_{al j_{al}} n'_{al j'_{al}})_{J'_t}] \delta_{J'_t \lambda}, \quad (20)$$

where $b[U_i, (2k_{aj_a} n'_{aj'_a})_{J'_t}]$ is the mixing coefficient giving the contribution of state $(2k_{aj_a} n'_{aj'_a})_{J'_t}$ to level U_i and $b[U_i, (2k_{al j_{al}} n'_{al j'_{al}})_{J'_t}]$ has an analogous meaning. Of course, in the present case n'_a and n'_{al} can each be either 3 or 4.

The B^λ can be regarded as part of the atomic structure part of the calculation, which is very rapid. By far the most lengthy part of the calculations is the determination of the Q^λ . However, $Z^2 Q^\lambda$ is a very slowly varying function of Z and also N , the number of bound electrons per ion. In fact in our earlier rapid method based on use of non-relativistic hydrogenic basis states, e.g. Ref. 2 and 8, $Z^2 Q^\lambda$ would be independent of Z and N . Thus, one would expect that fits to Z and N could easily be made after making detailed calculations for only a few values of Z and N . In the present application to neon-like ions we made detailed relativistic distorted wave calculations for each of the six values of Z

$$Z = 22, 30, 42, 56, 74 \text{ and } 92 \quad (21)$$

for each of the six scattered electron energies E' given by Eq (2). In each case the Q^λ 's were calculated for the three impact electron energies E_i in units of Z^2_{eff} Rydbergs $E_i = 0.13 + E'$, $E_i = 0.197 + E'$ and $E_i = 0.264 + E'$, where 0.13 and 0.264 spans the range of transition energies in units of Z^2_{eff} Rydbergs for excitation to the $n = 3$ and $n = 4$ levels. Then each Q^λ was fit to the form

$$Z^2 Q^\lambda = a_1 Z^3 + a_2 Z^2 + a_3 Z + a_4 + a_5 Z^{-1} + a_6 Z^{-2} \quad (22)$$

These results were then used in Eq (19) to compute the values for Ω for all 88 transitions for each of the 71 values of Z in the range given by Eq (1). In doing this the values of the Q^λ for the exact energy of each transition were obtained by interpolation. Numerous test calculations have indicated that the numerical error due to these procedures is under 1%.

As discussed in Sec. IIE of Ref. 3, we could have made use of a similar fit procedure for the radial part of the atomic structure calculations. However, the structure calculations are so rapid that making detailed structure calculations for each of the 71 values of Z contributes only a minor part ($\sim 4\%$) to the computing time for the complete calculations, which almost totally goes into the detailed calculations of the Q^λ for the six values of Z given by Eq (21). This complete computing time is presently about 3 hrs CPU time on the Cray supercomputers at the Magnetic Fusion Energy Computing Center at Livermore, CA. Additional improvements in the efficiency of our programs are expected in future work.

Comparisons of results by the present method with those by more elaborate relativistic approaches and a few available experimental results have been made in Ref. 3 and 4. These comparisons indicate that for $Z \gtrsim 2.5N$ the results by the present rapid approach are essentially as accurate as those by the most elaborate relativistic programs presently available. This accuracy is probably within a few percent for the non-resonance contribution to the collision strength. The resonance part, which is expected to be important principally for weak transitions in ions with low and moderate Z values, can later be calculated by the method of Cowan⁹ modified to give a fully relativistic treatment and added to the present non-resonant part whenever it is significant. We intend to do this in future work.

With regard to comparisons between the present results and those of Ref. 2, we note that, as discussed at the end of Sec. IIIA of Ref. 4, for $26 \leq Z \lesssim 50$

the agreement for excitation to the $n = 3$ levels is quite good, mostly within 15% or 20%, but for $Z = 74$ discrepancies by a factor of 2 or more occur in a few cases presumably due principally to the effects of relativity on the radial functions. Also at the low Z end of the range we cover the agreement is poorer due presumably to the effects of the more approximate treatment of the electron-electron interaction in Ref. 2. For excitation to the $n = 4$ levels the general agreement is slightly worse. In fact, in a few cases for low Z , mostly for some of the collision strengths for excitation to even parity $n = 4$ levels with $J'_L = 2$, discrepancies by factors of about 3 to 5 occur. This is principally due to the added effect of neglect of mixing between the $n = 3$ and $n = 4$ states in the earlier treatment of Ref. 2. It should also be mentioned that, as a consequence of the latter, there is not a one to one correspondence between the present designation of levels by a capital letter with a numerical subscript and the similar designation of levels in Ref. 2. For example, present Group D contains the states of both Groups D and M of Ref. 2 and present Group K contains the states of Groups I and T of Ref. 2.

Since mixing among the $n = 3$ and $n = 4$ states is significant in some cases for low and high Z , where the energies are nearby or even overlap, one might expect that similarly mixing of the $n = 4$ states with the $n = 5$ states and so on would be significant. However, the cross sections generally decrease with increase in n value of the upper levels. Hence, analogous to the fact that inclusion of mixing of the $n = 3$ and 4 states principally affects the weaker collision strengths for excitation to the $n = 4$ levels, probably inclusion of mixing with the $n = 5$ states would have quite a small effect on results for the $n = 4$ levels and essentially no effect on results for the $n = 3$ levels.

Finally we note that a complete set of the present results is on file at the Magnetic Fusion Energy Computer Network at Livermore, CA, and is available¹⁰ to those with access to that network, or is available to others on a magnetic tape at request from the authors.

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EXPLANATION OF TABLES

TABLE I. Labeling of Levels in jj Coupling and Level Energies

This table gives the jj basis state making the dominant contribution to each energy level and the energy ΔE in eV of each level relative to the ground level for every value of Z in the range $22 \leq Z \leq 92$. The abbreviations given by Eqs (8), (9), (10), (13) and (14) are used in giving the jj basis states.

Table II. Labeling of Levels in LS Coupling

This table gives the LS coupled basis state making the dominant contribution to each energy level for every value of Z in the range $22 \leq Z \leq 92$. The abbreviations given by Eqs (11) and (12) are used in giving the LS basis states. The table is clarified by consideration of a specific example: The LS basis state making the dominant contribution to each of the energy levels in Group D when $Z = 36$ is $2p3p \ ^3P_0$ for the lowest energy level in the group D_1 , $2p3p \ ^1S_0$ for the next higher level D_2 , $2s3s \ ^1S_0$ for the next higher level D_3 , $2p4p \ ^1S_0$ for D_4 , $2p4p \ ^3P_0$ for D_5 and $2s4s \ ^1S_0$ for the highest level in the group D_6 .

Table III. Electric Dipole Oscillator Strengths f for Transitions between the Ground Level and the Given Upper Levels.

Includes all Z values in the range $22 \leq Z \leq 92$.

Table IV. Collision Strengths Ω for Excitation from the Ground Level to the Given Upper Levels as a Function of Z and Scattered Electron Energy in Units of Z_{eff}^2 Rydbergs.

Includes all Z values in the range $22 \leq Z \leq 92$.

Table IV gives values for the collision strength from which one can obtain the values for the cross section using Eqs (16)-(18). The statistical weight g_1 in Eq (16) is unity in the present case, the

fine structure constant α in Eq (17) has the value $1/137.039$, the Z_{eff} in Eq (18) is given by Eq (3) and the transition energy ΔE_{if} (Ry) in Eq (18) is obtained from the corresponding entry in eV given in Table I by dividing by the conversion factor 13.60535 eV/Ry.

- Z Nuclear charge number
- E' Scattered electron energy in units of Z_{eff}^2 Ry.
- Z_{eff} Effective nuclear charge given by Eq (3).

TABLE 1. Labeling of Levels in jj Coupling and Level Energies, 22-2-92

	D1		D2		D3		D4		D5		D6	
Z	STATE	E	STATE	E	STATE	E	STATE	E	STATE	E	STATE	E
22	(2p3p)10	489.5	(2p3p)10	565.7	(2a3a)10	568.5	(2a3a)10	628.6	(2a3a)10	625.4	(2a3a)10	720.4
22	(2p3p)10	553.4	(2a3a)10	571.0	(2a3a)10	637.4	(2a3a)10	712.8	(2a3a)10	720.3	(2a3a)10	810.4
24	(2p3p)10	621.4	(2a3a)10	640.2	(2a3a)10	710.3	(2a3a)10	802.1	(2a3a)10	810.9	(2a3a)10	904.4
25	(2p3p)10	712.2	(2a3a)10	712.2	(2a3a)10	787.7	(2a3a)10	902.4	(2a3a)10	902.4	(2a3a)10	1007.5
25	(2p3p)10	749.1	(2a3a)10	790.3	(2a3a)10	869.0	(2a3a)10	996.1	(2a3a)10	1007.9	(2a3a)10	1112.7
27	(2p3p)10	848.7	(2a3a)10	871.2	(2a3a)10	932.7	(2a3a)10	1100.7	(2a3a)10	1114.5	(2a3a)10	1222.4
27	(2p3p)10	932.0	(2a3a)10	936.2	(2a3a)10	1041.9	(2a3a)10	1210.5	(2a3a)10	1226.5	(2a3a)10	1342.7
29	(2p3p)10	1019.3	(2a3a)10	1045.1	(2a3a)10	1118.9	(2a3a)10	1325.4	(2a3a)10	1343.9	(2a3a)10	1465.3
30	(2p3p)10	1110.3	(2a3a)10	1128.1	(2a3a)10	1232.0	(2a3a)10	1445.4	(2a3a)10	1464.9	(2a3a)10	1592.5
31	(2p3p)10	1203.2	(2a3a)10	1225.1	(2a3a)10	1321.3	(2a3a)10	1570.4	(2a3a)10	1595.3	(2a3a)10	1727.3
33	(2p3p)10	1302.9	(2a3a)10	1326.2	(2a3a)10	1436.7	(2a3a)10	1700.8	(2a3a)10	1729.3	(2a3a)10	1866.4
33	(2p3p)10	1406.3	(2a3a)10	1441.4	(2a3a)10	1548.4	(2a3a)10	1836.3	(2a3a)10	1868.9	(2a3a)10	2011.6
34	(2p3p)10	1512.8	(2a3a)10	1550.9	(2a3a)10	1662.2	(2a3a)10	1974.8	(2a3a)10	2014.1	(2a3a)10	2162.2
35	(2p3p)10	1623.0	(2a3a)10	1664.8	(2a3a)10	1780.3	(2a3a)10	2122.2	(2a3a)10	2163.0	(2a3a)10	2318.5
35	(2p3p)10	1736.9	(2a3a)10	1782.3	(2a3a)10	1902.7	(2a3a)10	2273.4	(2a3a)10	2321.4	(2a3a)10	2480.5
37	(2p3p)10	1834.7	(2a3a)10	1904.5	(2a3a)10	2029.3	(2a3a)10	2429.4	(2a3a)10	2483.9	(2a3a)10	2641.4
39	(2p3p)10	1976.2	(2a3a)10	2033.9	(2a3a)10	2160.4	(2a3a)10	2590.5	(2a3a)10	2652.0	(2a3a)10	2822.1
40	(2p3p)10	2101.4	(2a3a)10	2161.8	(2a3a)10	2293.8	(2a3a)10	2756.8	(2a3a)10	2826.0	(2a3a)10	3017.6
40	(2p3p)10	2250.8	(2a3a)10	2287.0	(2a3a)10	2433.3	(2a3a)10	2928.3	(2a3a)10	3003.8	(2a3a)10	3181.1
41	(2p3p)10	2363.7	(2a3a)10	2426.4	(2a3a)10	2580.0	(2a3a)10	3103.0	(2a3a)10	3181.4	(2a3a)10	3358.4
42	(2p3p)10	2500.5	(2a3a)10	2579.8	(2a3a)10	2729.9	(2a3a)10	3284.9	(2a3a)10	3380.3	(2a3a)10	3556.1
42	(2p3p)10	2641.1	(2a3a)10	2729.3	(2a3a)10	2886.3	(2a3a)10	3473.9	(2a3a)10	3581.1	(2a3a)10	3779.3
44	(2p3p)10	2785.5	(2a3a)10	2862.7	(2a3a)10	3040.3	(2a3a)10	3666.1	(2a3a)10	3784.9	(2a3a)10	3999.4
44	(2p3p)10	2923.7	(2a3a)10	3003.4	(2a3a)10	3203.0	(2a3a)10	3863.3	(2a3a)10	3995.9	(2a3a)10	4205.3
46	(2p3p)10	3068.5	(2a3a)10	3153.1	(2a3a)10	3371.9	(2a3a)10	4066.2	(2a3a)10	4211.2	(2a3a)10	4427.3
47	(2p3p)10	3241.4	(2a3a)10	3370.3	(2a3a)10	3542.2	(2a3a)10	4279.4	(2a3a)10	4432.2	(2a3a)10	4652.4
48	(2p3p)10	3401.3	(2a3a)10	3542.3	(2a3a)10	3711.9	(2a3a)10	4487.1	(2a3a)10	4643.3	(2a3a)10	4881.1
49	(2p3p)10	3564.8	(2a3a)10	3711.1	(2a3a)10	3901.1	(2a3a)10	4705.3	(2a3a)10	4897.7	(2a3a)10	5132.3
50	(2p3p)10	3732.2	(2a3a)10	3900.7	(2a3a)10	4092.8	(2a3a)10	4928.9	(2a3a)10	5129.4	(2a3a)10	5380.5
51	(2p3p)10	3903.7	(2a3a)10	4087.2	(2a3a)10	4279.4	(2a3a)10	5157.6	(2a3a)10	5368.7	(2a3a)10	5633.1
53	(2p3p)10	4076.4	(2a3a)10	4275.4	(2a3a)10	4474.2	(2a3a)10	5391.4	(2a3a)10	5642.6	(2a3a)10	5892.4
53	(2p3p)10	4257.3	(2a3a)10	4474.4	(2a3a)10	4670.0	(2a3a)10	5630.7	(2a3a)10	5904.1	(2a3a)10	6164.3
54	(2p3p)10	4440.1	(2a3a)10	4677.7	(2a3a)10	4884.9	(2a3a)10	5873.4	(2a3a)10	6172.5	(2a3a)10	6439.3
55	(2p3p)10	4626.7	(2a3a)10	4884.0	(2a3a)10	5097.1	(2a3a)10	6123.2	(2a3a)10	6447.7	(2a3a)10	6721.4
56	(2p3p)10	4817.2	(2a3a)10	5096.1	(2a3a)10	5314.7	(2a3a)10	6380.2	(2a3a)10	6729.9	(2a3a)10	7010.2
57	(2p3p)10	5011.3	(2a3a)10	5313.3	(2a3a)10	5548.4	(2a3a)10	6640.4	(2a3a)10	7019.1	(2a3a)10	7306.4
58	(2p3p)10	5229.7	(2a3a)10	5554.4	(2a3a)10	5785.9	(2a3a)10	6904.2	(2a3a)10	7313.8	(2a3a)10	7605.8
59	(2p3p)10	5431.8	(2a3a)10	5764.4	(2a3a)10	5999.9	(2a3a)10	7177.2	(2a3a)10	7619.1	(2a3a)10	7920.5
60	(2p3p)10	5617.8	(2a3a)10	5998.4	(2a3a)10	6229.3	(2a3a)10	7453.4	(2a3a)10	7926.1	(2a3a)10	8228.7
61	(2p3p)10	5827.7	(2a3a)10	6227.9	(2a3a)10	6454.1	(2a3a)10	7735.0	(2a3a)10	8248.3	(2a3a)10	8544.4
62	(2p3p)10	6041.4	(2a3a)10	6453.1	(2a3a)10	6681.9	(2a3a)10	8021.9	(2a3a)10	8571.9	(2a3a)10	8881.4
63	(2p3p)10	6259.1	(2a3a)10	6722.9	(2a3a)10	6912.5	(2a3a)10	8314.2	(2a3a)10	8908.0	(2a3a)10	9248.4
64	(2p3p)10	6480.7	(2a3a)10	6990.9	(2a3a)10	7154.4	(2a3a)10	8611.8	(2a3a)10	9249.5	(2a3a)10	9588.0
65	(2p3p)10	6706.2	(2a3a)10	7223.4	(2a3a)10	7395.4	(2a3a)10	8914.8	(2a3a)10	9598.8	(2a3a)10	9945.2
66	(2p3p)10	6935.6	(2a3a)10	7522.3	(2a3a)10	7698.1	(2a3a)10	9223.1	(2a3a)10	9956.2	(2a3a)10	10316.1
67	(2p3p)10	7168.2	(2a3a)10	7792.4	(2a3a)10	7989.4	(2a3a)10	9536.8	(2a3a)10	10321.8	(2a3a)10	10686.4
68	(2p3p)10	7404.2	(2a3a)10	8076.0	(2a3a)10	8284.0	(2a3a)10	9854.4	(2a3a)10	10645.8	(2a3a)10	11061.4
69	(2p3p)10	7647.4	(2a3a)10	8366.9	(2a3a)10	8583.4	(2a3a)10	10180.4	(2a3a)10	11078.0	(2a3a)10	11547.0
70	(2p3p)10	7892.5	(2a3a)10	8661.2	(2a3a)10	8894.4	(2a3a)10	10510.4	(2a3a)10	11468.9	(2a3a)10	11936.5
71	(2p3p)10	8141.4	(2a3a)10	8962.3	(2a3a)10	9272.3	(2a3a)10	10845.7	(2a3a)10	11868.4	(2a3a)10	12324.9
72	(2p3p)10	8394.7	(2a3a)10	9270.1	(2a3a)10	9587.3	(2a3a)10	11188.5	(2a3a)10	12277.3	(2a3a)10	12662.5
73	(2p3p)10	8651.6	(2a3a)10	9584.8	(2a3a)10	9909.2	(2a3a)10	11532.7	(2a3a)10	12693.1	(2a3a)10	13050.4
74	(2p3p)10	8912.4	(2a3a)10	9904.6	(2a3a)10	10230.9	(2a3a)10	11881.4	(2a3a)10	13122.2	(2a3a)10	13439.4
75	(2p3p)10	9177.5	(2a3a)10	10223.7	(2a3a)10	10571.9	(2a3a)10	12241.5	(2a3a)10	13558.6	(2a3a)10	13891.4
76	(2p3p)10	9446.5	(2a3a)10	10572.0	(2a3a)10	10918.9	(2a3a)10	12604.2	(2a3a)10	14004.8	(2a3a)10	14447.5
77	(2p3p)10	9719.3	(2a3a)10	10915.9	(2a3a)10	11270.4	(2a3a)10	12973.3	(2a3a)10	14460.8	(2a3a)10	14912.4
78	(2p3p)10	9991.2	(2a3a)10	11267.5	(2a3a)10	11636.3	(2a3a)10	13345.0	(2a3a)10	14928.9	(2a3a)10	15389.6
79	(2p3p)10	10277.1	(2a3a)10	11626.9	(2a3a)10	11997.8	(2a3a)10	13725.1	(2a3a)10	15405.3	(2a3a)10	15871.4
80	(2p3p)10	10562.0	(2a3a)10	11994.4	(2a3a)10	12373.7	(2a3a)10	14109.7	(2a3a)10	15891.2	(2a3a)10	16374.0
81	(2p3p)10	10850.9	(2a3a)10	12370.1	(2a3a)10	12758.0	(2a3a)10	14500.0	(2a3a)10	16387.9	(2a3a)10	16882.4
82	(2p3p)10	11143.8	(2a3a)10	12754.2	(2a3a)10	13151.0	(2a3a)10	14895.7	(2a3a)10	16896.4	(2a3a)10	17402.3
83	(2p3p)10	11440.8	(2a3a)10	13147.1	(2a3a)10	13552.9	(2a3a)10	15287.1	(2a3a)10	17416.6	(2a3a)10	17932.9
84	(2p3p)10	11741.7	(2a3a)10	13548.7	(2a3a)10	13963.4	(2a3a)10	15674.0	(2a3a)10	17948.7	(2a3a)10	18477.4
85	(2p3p)10	12046.7	(2a3a)10	13959.3	(2a3a)10	14384.2	(2a3a)10	16114.5	(2a3a)10	18491.5	(2a3a)10	19032.9
86	(2p3p)10	12355.8	(2a3a)10	14279.3	(2a3a)10	14814.2	(2a3a)10	16534.7	(2a3a)10	19047.0	(2a3a)10	19600.9
87	(2p3p)10	12668.9	(2a3a)10	14609.2	(2a3a)10	15254.0	(2a3a)10	16958.5	(2a3a)10	19615.0	(2a3a)10	20181.8
88	(2p3p)10	12986.6	(2a3a)10	15048.7	(2a3a)10	15704.0	(2a3a)10	17387.9	(2a3a)10	20195.8	(2a3a)10	20783.9
89	(2p3p)10	13307.9	(2a3a)10	15498.2	(2a3a)10	16164.5	(2a3a)10	17822.9	(2a3a)10	20789.6	(2a3a)10	21397.4
90	(2p3p)10	13632.6	(2a3a)10	16158.4	(2a3a)10	16645.0	(2a3a)10	18267.4	(2a3a)10	21397.3	(2a3a)10	22020.3
91	(2p3p)10	13962.0	(2a3a)10	16662.1	(2a3a)10	17116.2	(2a3a)10	18710.0	(2a3a)10	22018.8	(2a3a)10	22641.4
92	(2p3p)10	14293.9	(2a3a)10	17111.0	(2a3a)10	17612.1	(2a3a)10	19162.1	(2a3a)10	22638.4	(2a3a)10	23292.4

Z	STATE	E	STATE	E	STATE	E	STATE	E	STATE	E	STATE	E
22	(2p3p)11	480.3	(2p3p)11	483.4	(2a3a)11	489.4	(2a3a)11	491.3	(2a3a)11	563.3	(2a3a)11	621.4
22	(2p3p)11	542.4	(2a3a)11	544.8	(2a3a)11	554.1	(2a3a)11	556.1	(2a3a)11	631.8	(2a3a)11	693.0
24	(2p3p)11	610.2	(2a3a)11	616.0	(2a3a)11	622.3	(2a3a)11	624.9	(2a3a)11	704.3	(2a3a)11	772.9
25	(2p3p)11	680.8	(2a3a)11	686.9	(2a3a)11	698.9	(2a3a)11	697.4	(2a3a)11	780.8	(2a3a)11	853.4
26	(2p3p)11	739.1	(2a3a)11	743.6	(2a3a)11	771.2	(2a3a)11	774.5	(2a3a)11	861.3	(2a3a)11	939.0
27	(2p3p)11	825.1	(2a3a)11	840.1	(2a3a)11	851.6	(2a3a)11	853.4	(2a3a)11	945.8	(2a3a)11	1028.5
28	(2p3p)11	918.8	(2a3a)11	922.3	(2a3a)11	928.0	(2a3a)11	940.4	(2a3a)11	1034.4	(2a3a)11	1121.2
29	(2p3p)11	1000.2	(2a3a)11	1008.3	(2a3a)11	1024.4	(2a3a)11	1029.6	(2a3a)11	1127.0	(2a3a)11	1220.0
30	(2p3p)11	1089.3	(2a3a)11	1098.1	(2a3a)11	1114.9	(2a3a)11	1123.0	(2a3a)11	1222.8	(2a	

	E1	E2	E3	E4	E5	E6
Z	STATE	STATE	STATE	STATE	STATE	STATE
57	(2p 3p) 4849.6	(2p 3p) 4844.4	(2p 3p) 5280.3	(2p 3p) 5378.5	(2p 3p) 5317.7	(2p 3p) 5852.3
58	(2p 3p) 5037.0	(2p 3p) 5161.4	(2p 3p) 5302.1	(2p 3p) 5326.1	(2p 3p) 5315.8	(2p 3p) 6074.9
59	(2p 3p) 5227.8	(2p 3p) 5362.3	(2p 3p) 5750.1	(2p 3p) 5867.7	(2p 3p) 5979.1	(2p 3p) 6434.6
60	(2p 3p) 5421.8	(2p 3p) 5567.1	(2p 3p) 5963.2	(2p 3p) 6107.5	(2p 3p) 6218.2	(2p 3p) 6598.7
61	(2p 3p) 5619.0	(2p 3p) 5773.8	(2p 3p) 6201.9	(2p 3p) 6357.6	(2p 3p) 6463.1	(2p 3p) 6860.2
62	(2p 3p) 5819.4	(2p 3p) 5986.4	(2p 3p) 6446.4	(2p 3p) 6614.0	(2p 3p) 6713.9	(2p 3p) 7128.3
63	(2p 3p) 6022.9	(2p 3p) 6204.8	(2p 3p) 6676.9	(2p 3p) 6876.9	(2p 3p) 6970.5	(2p 3p) 7402.1
64	(2p 3p) 6229.5	(2p 3p) 6425.2	(2p 3p) 6952.7	(2p 3p) 7146.3	(2p 3p) 7230.3	(2p 3p) 7684.7
65	(2p 3p) 6439.3	(2p 3p) 6647.5	(2p 3p) 7214.7	(2p 3p) 7422.3	(2p 3p) 7502.2	(2p 3p) 7972.2
66	(2p 3p) 6652.0	(2p 3p) 6877.7	(2p 3p) 7482.9	(2p 3p) 7703.3	(2p 3p) 7777.6	(2p 3p) 8261.8
67	(2p 3p) 6867.8	(2p 3p) 7109.9	(2p 3p) 7757.2	(2p 3p) 7995.0	(2p 3p) 8039.9	(2p 3p) 8571.8
68	(2p 3p) 7086.4	(2p 3p) 7349.9	(2p 3p) 8037.8	(2p 3p) 8291.5	(2p 3p) 8348.2	(2p 3p) 8882.1
69	(2p 3p) 7308.4	(2p 3p) 7583.8	(2p 3p) 8324.8	(2p 3p) 8594.4	(2p 3p) 8654.3	(2p 3p) 9200.0
70	(2p 3p) 7532.0	(2p 3p) 7827.9	(2p 3p) 8618.4	(2p 3p) 8904.0	(2p 3p) 8968.2	(2p 3p) 9521.7
71	(2p 3p) 7760.3	(2p 3p) 8077.7	(2p 3p) 8918.4	(2p 3p) 9219.2	(2p 3p) 9286.9	(2p 3p) 9835.2
72	(2p 3p) 7990.8	(2p 3p) 8329.3	(2p 3p) 9225.3	(2p 3p) 9536.6	(2p 3p) 9593.3	(2p 3p) 10200.9
73	(2p 3p) 8223.9	(2p 3p) 8583.3	(2p 3p) 9539.4	(2p 3p) 9845.1	(2p 3p) 9913.6	(2p 3p) 10551.0
74	(2p 3p) 8459.7	(2p 3p) 8845.8	(2p 3p) 9860.3	(2p 3p) 10166.2	(2p 3p) 10237.7	(2p 3p) 10901.5
75	(2p 3p) 8698.2	(2p 3p) 9108.0	(2p 3p) 10189.8	(2p 3p) 10534.0	(2p 3p) 10609.2	(2p 3p) 11276.8
76	(2p 3p) 8939.2	(2p 3p) 9376.4	(2p 3p) 10523.8	(2p 3p) 10907.6	(2p 3p) 11077.0	(2p 3p) 11652.0
77	(2p 3p) 9182.9	(2p 3p) 9648.1	(2p 3p) 10864.7	(2p 3p) 11282.0	(2p 3p) 11454.1	(2p 3p) 12038.4
78	(2p 3p) 9429.1	(2p 3p) 9923.7	(2p 3p) 11217.3	(2p 3p) 11658.9	(2p 3p) 11731.6	(2p 3p) 12333.2
79	(2p 3p) 9677.7	(2p 3p) 10203.3	(2p 3p) 11575.7	(2p 3p) 11997.2	(2p 3p) 12101.8	(2p 3p) 12627.7
80	(2p 3p) 9928.7	(2p 3p) 10487.0	(2p 3p) 11942.2	(2p 3p) 12333.8	(2p 3p) 12507.9	(2p 3p) 13232.1
81	(2p 3p) 10182.0	(2p 3p) 10779.4	(2p 3p) 12216.6	(2p 3p) 12716.7	(2p 3p) 12916.2	(2p 3p) 13676.9
82	(2p 3p) 10437.5	(2p 3p) 11086.3	(2p 3p) 12599.9	(2p 3p) 13109.1	(2p 3p) 13325.3	(2p 3p) 14112.0
83	(2p 3p) 10695.2	(2p 3p) 11361.9	(2p 3p) 13009.1	(2p 3p) 13510.4	(2p 3p) 13746.9	(2p 3p) 14536.0
84	(2p 3p) 10955.0	(2p 3p) 11661.4	(2p 3p) 13442.1	(2p 3p) 13920.7	(2p 3p) 14205.3	(2p 3p) 15015.7
85	(2p 3p) 11216.1	(2p 3p) 11983.2	(2p 3p) 13890.1	(2p 3p) 14340.1	(2p 3p) 14645.1	(2p 3p) 15540.2
86	(2p 3p) 11480.5	(2p 3p) 12273.1	(2p 3p) 14350.6	(2p 3p) 14769.5	(2p 3p) 15116.7	(2p 3p) 15964.2
87	(2p 3p) 11746.0	(2p 3p) 12584.9	(2p 3p) 14749.0	(2p 3p) 15208.6	(2p 3p) 15596.9	(2p 3p) 16437.0
88	(2p 3p) 12013.2	(2p 3p) 12900.6	(2p 3p) 15187.3	(2p 3p) 15657.7	(2p 3p) 16080.4	(2p 3p) 16962.1
89	(2p 3p) 12282.1	(2p 3p) 13220.7	(2p 3p) 15645.9	(2p 3p) 16117.3	(2p 3p) 16580.9	(2p 3p) 17490.3
90	(2p 3p) 12552.5	(2p 3p) 13554.8	(2p 3p) 16128.7	(2p 3p) 16587.7	(2p 3p) 17097.2	(2p 3p) 18027.7
91	(2p 3p) 12824.2	(2p 3p) 13872.7	(2p 3p) 16643.8	(2p 3p) 17067.2	(2p 3p) 17618.3	(2p 3p) 18570.2
92	(2p 3p) 13097.3	(2p 3p) 14204.8	(2p 3p) 17144.3	(2p 3p) 17542.1	(2p 3p) 18159.0	(2p 3p) 19127.8
	E7	E8	E9	E10	E11	E12
Z	STATE	STATE	STATE	STATE	STATE	STATE
22	(2p 4p) 624.2	(2p 4p) 625.9	(2p 4p) 631.2	(2p 4p) 631.7	(2p 4p) 643.6	(2p 4p) 718.9
23	(2p 4p) 708.2	(2p 4p) 709.6	(2p 4p) 716.2	(2p 4p) 716.8	(2p 4p) 728.8	(2p 4p) 800.0
24	(2p 4p) 761.9	(2p 4p) 762.5	(2p 4p) 769.5	(2p 4p) 769.7	(2p 4p) 781.8	(2p 4p) 850.0
25	(2p 4p) 890.7	(2p 4p) 892.5	(2p 4p) 903.2	(2p 4p) 903.2	(2p 4p) 914.7	(2p 4p) 1005.3
26	(2p 4p) 989.7	(2p 4p) 991.4	(2p 4p) 1003.3	(2p 4p) 1004.5	(2p 4p) 1015.4	(2p 4p) 1111.5
27	(2p 4p) 1092.7	(2p 4p) 1095.8	(2p 4p) 1109.8	(2p 4p) 1111.2	(2p 4p) 1121.2	(2p 4p) 1222.1
28	(2p 4p) 1202.8	(2p 4p) 1205.2	(2p 4p) 1221.4	(2p 4p) 1223.4	(2p 4p) 1232.2	(2p 4p) 1340.2
29	(2p 4p) 1313.0	(2p 4p) 1316.7	(2p 4p) 1339.1	(2p 4p) 1341.0	(2p 4p) 1348.3	(2p 4p) 1468.7
30	(2p 4p) 1426.4	(2p 4p) 1429.3	(2p 4p) 1444.8	(2p 4p) 1446.1	(2p 4p) 1458.1	(2p 4p) 1590.9
31	(2p 4p) 1546.7	(2p 4p) 1549.1	(2p 4p) 1570.1	(2p 4p) 1572.9	(2p 4p) 1585.9	(2p 4p) 1724.6
32	(2p 4p) 1670.2	(2p 4p) 1673.9	(2p 4p) 1694.0	(2p 4p) 1697.2	(2p 4p) 1727.5	(2p 4p) 1868.4
33	(2p 4p) 1824.8	(2p 4p) 1829.0	(2p 4p) 1863.4	(2p 4p) 1866.2	(2p 4p) 1887.2	(2p 4p) 2108.9
34	(2p 4p) 1966.6	(2p 4p) 1971.9	(2p 4p) 2006.1	(2p 4p) 2009.5	(2p 4p) 2032.8	(2p 4p) 2268.4
35	(2p 4p) 2109.2	(2p 4p) 2114.5	(2p 4p) 2153.1	(2p 4p) 2156.2	(2p 4p) 2184.2	(2p 4p) 2418.0
36	(2p 4p) 2259.0	(2p 4p) 2264.9	(2p 4p) 2303.3	(2p 4p) 2310.7	(2p 4p) 2331.3	(2p 4p) 2577.0
37	(2p 4p) 2412.9	(2p 4p) 2420.6	(2p 4p) 2462.7	(2p 4p) 2477.8	(2p 4p) 2484.2	(2p 4p) 2644.7
38	(2p 4p) 2573.9	(2p 4p) 2581.3	(2p 4p) 2625.2	(2p 4p) 2643.0	(2p 4p) 2653.0	(2p 4p) 2816.2
39	(2p 4p) 2736.9	(2p 4p) 2747.3	(2p 4p) 2793.0	(2p 4p) 2811.5	(2p 4p) 2827.7	(2p 4p) 2997.6
40	(2p 4p) 2900.0	(2p 4p) 2918.4	(2p 4p) 2964.0	(2p 4p) 2989.2	(2p 4p) 3006.6	(2p 4p) 3182.0
41	(2p 4p) 3064.2	(2p 4p) 3086.7	(2p 4p) 3144.1	(2p 4p) 3184.8	(2p 4p) 3193.1	(2p 4p) 3374.3
42	(2p 4p) 3244.6	(2p 4p) 3276.2	(2p 4p) 3327.5	(2p 4p) 3376.3	(2p 4p) 3387.9	(2p 4p) 3571.6
43	(2p 4p) 3444.9	(2p 4p) 3482.9	(2p 4p) 3551.0	(2p 4p) 3573.9	(2p 4p) 3586.8	(2p 4p) 3779.1
44	(2p 4p) 3640.4	(2p 4p) 3684.8	(2p 4p) 3769.0	(2p 4p) 3777.4	(2p 4p) 3791.9	(2p 4p) 3974.5
45	(2p 4p) 3845.9	(2p 4p) 3893.8	(2p 4p) 3988.9	(2p 4p) 3998.4	(2p 4p) 4003.0	(2p 4p) 4200.9
46	(2p 4p) 4054.2	(2p 4p) 4106.1	(2p 4p) 4205.1	(2p 4p) 4215.1	(2p 4p) 4218.1	(2p 4p) 4435.9
47	(2p 4p) 4262.5	(2p 4p) 4324.6	(2p 4p) 4427.7	(2p 4p) 4437.9	(2p 4p) 4445.1	(2p 4p) 4680.7
48	(2p 4p) 4472.9	(2p 4p) 4534.3	(2p 4p) 4637.4	(2p 4p) 4648.1	(2p 4p) 4655.8	(2p 4p) 4897.7
49	(2p 4p) 4686.8	(2p 4p) 4748.2	(2p 4p) 4851.9	(2p 4p) 4862.4	(2p 4p) 4871.9	(2p 4p) 5127.0
50	(2p 4p) 4899.6	(2p 4p) 4961.6	(2p 4p) 5066.8	(2p 4p) 5078.0	(2p 4p) 5087.9	(2p 4p) 5334.3
51	(2p 4p) 5113.2	(2p 4p) 5175.3	(2p 4p) 5281.5	(2p 4p) 5293.1	(2p 4p) 5302.8	(2p 4p) 5550.1
52	(2p 4p) 5326.6	(2p 4p) 5388.7	(2p 4p) 5495.9	(2p 4p) 5508.3	(2p 4p) 5518.4	(2p 4p) 5764.4
53	(2p 4p) 5542.7	(2p 4p) 5604.8	(2p 4p) 5713.0	(2p 4p) 5726.4	(2p 4p) 5735.9	(2p 4p) 6000.2
54	(2p 4p) 5760.2	(2p 4p) 5822.3	(2p 4p) 5931.2	(2p 4p) 5945.6	(2p 4p) 5955.1	(2p 4p) 6226.7
55	(2p 4p) 5979.9	(2p 4p) 6042.0	(2p 4p) 6151.9	(2p 4p) 6167.3	(2p 4p) 6177.9	(2p 4p) 6454.2
56	(2p 4p) 6201.1	(2p 4p) 6263.2	(2p 4p) 6374.1	(2p 4p) 6390.5	(2p 4p) 6401.1	(2p 4p) 6681.9
57	(2p 4p) 6423.3	(2p 4p) 6485.4	(2p 4p) 6597.2	(2p 4p) 6614.6	(2p 4p) 6626.1	(2p 4p) 6909.7
58	(2p 4p) 6647.5	(2p 4p) 6709.6	(2p 4p) 6822.3	(2p 4p) 6840.7	(2p 4p) 6852.2	(2p 4p) 7140.4
59	(2p 4p) 6872.9	(2p 4p) 6935.0	(2p 4p) 7047.7	(2p 4p) 7066.1	(2p 4p) 7077.6	(2p 4p) 7368.9
60	(2p 4p) 7100.4	(2p 4p) 7162.5	(2p 4p) 7275.2	(2p 4p) 7294.6	(2p 4p) 7306.1	(2p 4p) 7604.4
61	(2p 4p) 7327.9	(2p 4p) 7390.0	(2p 4p) 7502.7	(2p 4p) 7522.1	(2p 4p) 7533.6	(2p 4p) 7830.9
62	(2p 4p) 7556.4	(2p 4p) 7618.5	(2p 4p) 7731.2	(2p 4p) 7750.6	(2p 4p) 7762.1	(2p 4p) 8059.4
63	(2p 4p) 7784.9	(2p 4p) 7847.0	(2p 4p) 7959.7	(2p 4p) 7979.1	(2p 4p) 7990.6	(2p 4p) 8290.9
64	(2p 4p) 8013.4	(2p 4p) 8075.5	(2p 4p) 8188.2	(2p 4p) 8207.6	(2p 4p) 8219.1	(2p 4p) 8511.4
65	(2p 4p) 8241.9	(2p 4p) 8304.0	(2p 4p) 8416.7	(2p 4p) 8436.1	(2p 4p) 8447.6	(2p 4p) 8742.9
66	(2p 4p) 8470.4	(2p 4p) 8532.5	(2p 4p) 8645.2	(2p 4p) 8664.6	(2p 4p) 8676.1	(2p 4p) 8974.4
67	(2p 4p) 8698.9	(2p 4p) 8761.0	(2p 4p) 8873.7	(2p 4p) 8893.1	(2p 4p) 8904.6	(2p 4p) 9206.9
68	(2p 4p) 8927.4	(2p 4p) 8989.5	(2p 4p) 9102.2	(2p 4p) 9121.6	(2p 4p) 9133.1	(2p 4p) 9435.4
69	(2p 4p) 9155.9	(2p 4p) 9218.0	(2p 4p) 9330.7	(2p 4p) 9350.1	(2p 4p) 9361.6	(2p 4p) 9662.9
70	(2p 4p) 9384.4	(2p 4p) 9446.5	(2p 4p) 9559.2	(2p 4p) 9578.6	(2p 4p) 9590.1	(2p 4p) 9890.4
71	(2p 4p) 9612.9	(2p 4p) 9675.0	(2p 4p) 9787.7	(2p 4p) 9807.1	(2p 4p) 9818.6	(2p 4p) 10197.9
72	(2p 4p) 9841.4	(2p 4p) 9903.5	(2p 4p) 10016.2	(2p 4p) 10035.6	(2p 4p) 10047.1	(2p 4p) 10395.4
73	(2p 4p) 10069.9	(2p 4p) 10132.0	(2p 4p) 10244.7	(2p 4p) 10264.1	(2p 4p) 10275.6	(2p 4p) 10622.9
74	(2p 4p) 10298.4	(2p 4p) 10360.5	(2p 4p) 10473.2	(2p 4p) 10492.6	(2p 4p) 10504.1	(2p 4p) 10890.4
75	(2p 4p) 10526.9	(2p 4p) 10589.0	(2p 4p) 10701.7	(2p 4p) 10721.1	(2p 4p) 10732.6	(2p 4p) 11107.9
76	(2p 4p) 10755.4	(2p 4p) 10817.5	(2p 4p) 10930.2	(2p 4p) 10949.6	(2p 4p) 10961.1	(2p 4p) 11345.4
77	(2p 4p) 10983.9	(2p 4p) 11046.0	(2p 4p) 11158.7	(2p 4p) 11178.1	(2p 4p) 11189.6	(2p 4p) 11622.9
78	(2p 4p) 11212.4	(2p 4p) 11274.5	(2p 4p) 11387.2	(2p 4p) 11406.6	(2p 4p) 11418.1	(2p 4p) 11890.4
79	(2p 4p) 11440.9	(2p 4p) 11503.0	(2p 4p) 11615.7	(2p 4p) 11635.1	(2p 4p) 11646.6	(2p 4p) 12167.9
80	(2p 4p) 11669.4	(2p 4p) 11731.5	(2p 4p) 11844.2	(2p 4p) 11863.6	(2p 4p) 11875.1	(2p 4p) 12405.4
81	(2p 4p) 11897.9	(2p 4p) 11960.0	(2p 4p) 12072.7	(2p 4p) 12092.1	(2p 4p) 12103.6	(2p 4p) 12682.9
82	(2p 4p) 12126.4	(2p 4p) 12188.5	(2p 4p) 12301.2	(2p 4p) 12320.6	(2p 4p) 12332.1	(2p 4p) 12860.4
83	(2p 4p) 12354.9	(2p 4p) 12417.0	(2p 4p) 12529.7	(2p 4p) 12549.1	(2p 4p) 12560.6	(2p 4p) 13137.9
84	(2p 4p) 12583.4	(2p 4p) 12645.5	(2p 4p) 12758.2	(2p 4p		

	F1	F2	F3	F4	F5
Z	STATE	STATE	STATE	STATE	STATE
22	(2s) 4s1/2	741.4	(2p) 3p1/2	482.9	(2p) 3p1/2
23	(2s) 4s1/2	822.2	(2p) 3p1/2	547.0	(2p) 3p1/2
24	(2s) 4s1/2	920.0	(2p) 3p1/2	612.9	(2p) 3p1/2
25	(2s) 4s1/2	1022.3	(2p) 3p1/2	684.9	(2p) 3p1/2
26	(2s) 4s1/2	1111.7	(2p) 3p1/2	756.8	(2p) 3p1/2
27	(2s) 4s1/2	1233.3	(2p) 3p1/2	830.9	(2p) 3p1/2
28	(2s) 4s1/2	1374.4	(2p) 3p1/2	919.9	(2p) 3p1/2
29	(2s) 4s1/2	1499.1	(2p) 3p1/2	1003.9	(2p) 3p1/2
30	(2s) 4s1/2	1629.3	(2p) 3p1/2	1093.0	(2p) 3p1/2
31	(2s) 4s1/2	1743.1	(2p) 3p1/2	1183.7	(2p) 3p1/2
32	(2s) 4s1/2	1906.4	(2p) 3p1/2	1282.1	(2p) 3p1/2
33	(2s) 4s1/2	2033.7	(2p) 3p1/2	1382.2	(2p) 3p1/2
34	(2s) 4s1/2	2204.6	(2p) 3p1/2	1483.9	(2p) 3p1/2
35	(2s) 4s1/2	2343.2	(2p) 3p1/2	1593.3	(2p) 3p1/2
36	(2s) 4s1/2	2529.6	(2p) 3p1/2	1704.3	(2p) 3p1/2
37	(2s) 4s1/2	2679.9	(2p) 3p1/2	1818.9	(2p) 3p1/2
38	(2s) 4s1/2	2874.2	(2p) 3p1/2	1927.7	(2p) 3p1/2
39	(2s) 4s1/2	3038.4	(2p) 3p1/2	2059.0	(2p) 3p1/2
40	(2s) 4s1/2	3284.6	(2p) 3p1/2	2184.4	(2p) 3p1/2
41	(2s) 4s1/2	3440.9	(2p) 3p1/2	2313.4	(2p) 3p1/2
42	(2s) 4s1/2	3611.4	(2p) 3p1/2	2444.0	(2p) 3p1/2
43	(2s) 4s1/2	3790.4	(2p) 3p1/2	2582.1	(2p) 3p1/2
44	(2s) 4s1/2	4081.0	(2p) 3p1/2	2721.8	(2p) 3p1/2
45	(2s) 4s1/2	4280.3	(2p) 3p1/2	2863.0	(2p) 3p1/2
46	(2s) 4s1/2	4504.0	(2p) 3p1/2	2911.7	(2p) 3p1/2
47	(2s) 4s1/2	4738.1	(2p) 3p1/2	3162.0	(2p) 3p1/2
48	(2s) 4s1/2	4971.9	(2p) 3p1/2	3323.2	(2p) 3p1/2
49	(2s) 4s1/2	5222.2	(2p) 3p1/2	3472.8	(2p) 3p1/2
50	(2s) 4s1/2	5474.3	(2p) 3p1/2	3630.3	(2p) 3p1/2
51	(2s) 4s1/2	5723.2	(2p) 3p1/2	3797.9	(2p) 3p1/2
52	(2s) 4s1/2	5999.0	(2p) 3p1/2	3963.0	(2p) 3p1/2
53	(2s) 4s1/2	6277.9	(2p) 3p1/2	4132.9	(2p) 3p1/2
54	(2s) 4s1/2	6551.7	(2p) 3p1/2	4310.1	(2p) 3p1/2
55	(2s) 4s1/2	6829.7	(2p) 3p1/2	4487.7	(2p) 3p1/2
56	(2s) 4s1/2	7123.0	(2p) 3p1/2	4668.4	(2p) 3p1/2
57	(2s) 4s1/2	7432.9	(2p) 3p1/2	4852.6	(2p) 3p1/2
58	(2s) 4s1/2	7742.7	(2p) 3p1/2	5040.3	(2p) 3p1/2
59	(2s) 4s1/2	8064.7	(2p) 3p1/2	5231.1	(2p) 3p1/2
60	(2s) 4s1/2	8395.3	(2p) 3p1/2	5425.1	(2p) 3p1/2
61	(2s) 4s1/2	8737.7	(2p) 3p1/2	5622.4	(2p) 3p1/2
62	(2s) 4s1/2	9098.1	(2p) 3p1/2	5822.8	(2p) 3p1/2
63	(2s) 4s1/2	9408.4	(2p) 3p1/2	6026.3	(2p) 3p1/2
64	(2s) 4s1/2	9742.8	(2p) 3p1/2	6233.7	(2p) 3p1/2
65	(2s) 4s1/2	10128.4	(2p) 3p1/2	6445.0	(2p) 3p1/2
66	(2s) 4s1/2	10562.3	(2p) 3p1/2	6655.6	(2p) 3p1/2
67	(2s) 4s1/2	10984.7	(2p) 3p1/2	6871.4	(2p) 3p1/2
68	(2s) 4s1/2	11574.0	(2p) 3p1/2	7090.2	(2p) 3p1/2
69	(2s) 4s1/2	11674.4	(2p) 3p1/2	7312.0	(2p) 3p1/2
70	(2s) 4s1/2	12084.0	(2p) 3p1/2	7536.7	(2p) 3p1/2
71	(2s) 4s1/2	12504.0	(2p) 3p1/2	7764.2	(2p) 3p1/2
72	(2s) 4s1/2	12923.3	(2p) 3p1/2	7994.4	(2p) 3p1/2
73	(2s) 4s1/2	13371.9	(2p) 3p1/2	8227.7	(2p) 3p1/2
74	(2s) 4s1/2	13820.2	(2p) 3p1/2	8462.3	(2p) 3p1/2
75	(2s) 4s1/2	14278.8	(2p) 3p1/2	8702.1	(2p) 3p1/2
76	(2s) 4s1/2	14747.9	(2p) 3p1/2	8943.2	(2p) 3p1/2
77	(2s) 4s1/2	15227.6	(2p) 3p1/2	9186.9	(2p) 3p1/2
78	(2s) 4s1/2	15718.3	(2p) 3p1/2	9433.1	(2p) 3p1/2
79	(2s) 4s1/2	16220.2	(2p) 3p1/2	9681.8	(2p) 3p1/2
80	(2s) 4s1/2	16723.4	(2p) 3p1/2	9932.8	(2p) 3p1/2
81	(2s) 4s1/2	17238.7	(2p) 3p1/2	10186.0	(2p) 3p1/2
82	(2s) 4s1/2	17765.8	(2p) 3p1/2	10441.9	(2p) 3p1/2
83	(2s) 4s1/2	18304.9	(2p) 3p1/2	10699.3	(2p) 3p1/2
84	(2s) 4s1/2	18847.6	(2p) 3p1/2	10959.4	(2p) 3p1/2
85	(2s) 4s1/2	19403.0	(2p) 3p1/2	11221.2	(2p) 3p1/2
86	(2s) 4s1/2	20071.7	(2p) 3p1/2	11483.0	(2p) 3p1/2
87	(2s) 4s1/2	20744.2	(2p) 3p1/2	11750.3	(2p) 3p1/2
88	(2s) 4s1/2	21431.2	(2p) 3p1/2	12021.8	(2p) 3p1/2
89	(2s) 4s1/2	21922.3	(2p) 3p1/2	12296.8	(2p) 3p1/2
90	(2s) 4s1/2	22548.8	(2p) 3p1/2	12575.7	(2p) 3p1/2
91	(2s) 4s1/2	23200.0	(2p) 3p1/2	12857.0	(2p) 3p1/2
92	(2s) 4s1/2	23909.9	(2p) 3p1/2	13102.2	(2p) 3p1/2
Z	STATE	STATE	STATE	STATE	STATE
29	(2s) 4p1/2	625.8	(2p) 4p1/2	424.7	(2p) 4p1/2
30	(2s) 4p1/2	709.0	(2p) 4p1/2	510.0	(2p) 4p1/2
31	(2s) 4p1/2	797.7	(2p) 4p1/2	596.9	(2p) 4p1/2
32	(2s) 4p1/2	891.4	(2p) 4p1/2	685.0	(2p) 4p1/2
33	(2s) 4p1/2	990.3	(2p) 4p1/2	774.2	(2p) 4p1/2
34	(2s) 4p1/2	1094.3	(2p) 4p1/2	864.3	(2p) 4p1/2
35	(2s) 4p1/2	1203.7	(2p) 4p1/2	954.3	(2p) 4p1/2
36	(2s) 4p1/2	1317.9	(2p) 4p1/2	1045.8	(2p) 4p1/2
37	(2s) 4p1/2	1437.2	(2p) 4p1/2	1140.2	(2p) 4p1/2
38	(2s) 4p1/2	1561.4	(2p) 4p1/2	1236.7	(2p) 4p1/2
39	(2s) 4p1/2	1690.1	(2p) 4p1/2	1336.3	(2p) 4p1/2
40	(2s) 4p1/2	1823.3	(2p) 4p1/2	1438.9	(2p) 4p1/2
41	(2s) 4p1/2	1961.1	(2p) 4p1/2	1544.7	(2p) 4p1/2
42	(2s) 4p1/2	2103.5	(2p) 4p1/2	1653.7	(2p) 4p1/2
43	(2s) 4p1/2	2250.3	(2p) 4p1/2	1765.9	(2p) 4p1/2
44	(2s) 4p1/2	2401.6	(2p) 4p1/2	1881.3	(2p) 4p1/2
45	(2s) 4p1/2	2557.3	(2p) 4p1/2	1999.9	(2p) 4p1/2
46	(2s) 4p1/2	2717.4	(2p) 4p1/2	2121.7	(2p) 4p1/2
47	(2s) 4p1/2	2881.9	(2p) 4p1/2	2246.7	(2p) 4p1/2
48	(2s) 4p1/2	3050.9	(2p) 4p1/2	2374.9	(2p) 4p1/2
49	(2s) 4p1/2	3224.4	(2p) 4p1/2	2506.3	(2p) 4p1/2
50	(2s) 4p1/2	3402.4	(2p) 4p1/2	2640.9	(2p) 4p1/2
51	(2s) 4p1/2	3584.9	(2p) 4p1/2	2778.7	(2p) 4p1/2
52	(2s) 4p1/2	3771.9	(2p) 4p1/2	2919.7	(2p) 4p1/2
53	(2s) 4p1/2	3963.4	(2p) 4p1/2	3063.9	(2p) 4p1/2
54	(2s) 4p1/2	4159.4	(2p) 4p1/2	3211.3	(2p) 4p1/2
55	(2s) 4p1/2	4360.9	(2p) 4p1/2	3361.9	(2p) 4p1/2
56	(2s) 4p1/2	4566.9	(2p) 4p1/2	3515.7	(2p) 4p1/2
57	(2s) 4p1/2	4777.4	(2p) 4p1/2	3672.7	(2p) 4p1/2
58	(2s) 4p1/2	4992.4	(2p) 4p1/2	3832.9	(2p) 4p1/2
59	(2s) 4p1/2	5211.9	(2p) 4p1/2	3996.3	(2p) 4p1/2
60	(2s) 4p1/2	5435.9	(2p) 4p1/2	4162.9	(2p) 4p1/2
61	(2s) 4p1/2	5664.4	(2p) 4p1/2	4332.7	(2p) 4p1/2
62	(2s) 4p1/2	5897.4	(2p) 4p1/2	4505.7	(2p) 4p1/2
63	(2s) 4p1/2	6134.9	(2p) 4p1/2	4681.9	(2p) 4p1/2
64	(2s) 4p1/2	6376.9	(2p) 4p1/2	4861.9	(2p) 4p1/2
65	(2s) 4p1/2	6624.4	(2p) 4p1/2	5044.9	(2p) 4p1/2
66	(2s) 4p1/2	6876.4	(2p) 4p1/2	5231.9	(2p) 4p1/2
67	(2s) 4p1/2	7133.4	(2p) 4p1/2	5421.9	(2p) 4p1/2
68	(2s) 4p1/2	7395.4	(2p) 4p1/2	5614.9	(2p) 4p1/2
69	(2s) 4p1/2	7662.4	(2p) 4p1/2	5810.9	(2p) 4p1/2
70	(2s) 4p1/2	7934.4	(2p) 4p1/2	6009.9	(2p) 4p1/2
71	(2s) 4p1/2	8211.4	(2p) 4p1/2	6211.9	(2p) 4p1/2
72	(2s) 4p1/2	8493.4	(2p) 4p1/2	6415.9	(2p) 4p1/2
73	(2s) 4p1/2	8780.4	(2p) 4p1/2	6621.9	(2p) 4p1/2
74	(2s) 4p1/2	9072.4	(2p) 4p1/2	6829.9	(2p) 4p1/2
75	(2s) 4p1/2	9369.4	(2p) 4p1/2	7039.9	(2p) 4p1/2
76	(2s) 4p1/2	9671.4	(2p) 4p1/2	7251.9	(2p) 4p1/2
77	(2s) 4p1/2	9978.4	(2p) 4p1/2	7465.9	(2p) 4p1/2
78	(2s) 4p1/2	10290.4	(2p) 4p1/2	7681.9	(2p) 4p1/2
79	(2s) 4p1/2	10607.4	(2p) 4p1/2	7899.9	(2p) 4p1/2
80	(2s) 4p1/2	10929.4	(2p) 4p1/2	8119.9	(2p) 4p1/2
81	(2s) 4p1/2	11256.4	(2p) 4p1/2	8341.9	(2p) 4p1/2
82	(2s) 4p1/2	11588.4	(2p) 4p1/2	8564.9	(2p) 4p1/2
83	(2s) 4p1/2	11925.4	(2p) 4p1/2	8789.9	(2p) 4p1/2
84	(2s) 4p1/2	12267.4	(2p) 4p1/2	9016.9	(2p) 4p1/2
85	(2s) 4p1/2	12614.4	(2p) 4p1/2	9244.9	(2p) 4p1/2
86	(2s) 4p1/2	12966.4	(2p) 4p1/2	9473.9	(2p) 4p1/2
87	(2s) 4p1/2	13323.4	(2p) 4p1/2	9704.9	(2p) 4p1/2
88	(2s) 4p1/2	13685.4	(2p) 4p1/2	9936.9	(2p) 4p1/2
89	(2s) 4p1/2	14052.4	(2p) 4p1/2	10169.9	(2p) 4p1/2
90	(2s) 4p1/2	14424.4	(2p) 4p1/2	10403.9	(2p) 4p1/2
91	(2s) 4p1/2	14801.4	(2p) 4p1/2	10638.9	(2p) 4p1/2
92	(2s) 4p1/2	15183.4	(2p) 4p1/2	10874.9	(2p) 4p1/2

	F6		F7		F8		F9		F10		F11	
Z	STATE	AE	STATE	AE	STATE	AE	STATE	AE	STATE	AE	STATE	AE
37	(2p 4p) 12 4578.4		(2p 4p) 12 4627.3		(2p 4p) 12 4710.3		(2p 4p) 12 4719.0		(2p 4p) 12 7037.2		(2p 4p) 12 7142.3	
38	(2p 4p) 12 4580.0		(2p 4p) 12 4630.2		(2p 4p) 12 4712.2		(2p 4p) 12 4721.2		(2p 4p) 12 7122.3		(2p 4p) 12 7143.2	
39	(2p 4p) 12 7104.4		(2p 4p) 12 7113.4		(2p 4p) 12 7251.3		(2p 4p) 12 7257.1		(2p 4p) 12 7444.9		(2p 4p) 12 7735.5	
40	(2p 4p) 12 7277.9		(2p 4p) 12 7479.5		(2p 4p) 12 7530.3		(2p 4p) 12 7538.2		(2p 4p) 12 7980.1		(2p 4p) 12 8072.4	
41	(2p 4p) 12 7454.4		(2p 4p) 12 7720.8		(2p 4p) 12 7814.2		(2p 4p) 12 7820.8		(2p 4p) 12 8303.0		(2p 4p) 12 8399.2	
42	(2p 4p) 12 7526.0		(2p 4p) 12 8007.7		(2p 4p) 12 8103.7		(2p 4p) 12 8130.7		(2p 4p) 12 8432.8		(2p 4p) 12 8732.8	
43	(2p 4p) 12 8027.2		(2p 4p) 12 8299.4		(2p 4p) 12 8399.4		(2p 4p) 12 8399.4		(2p 4p) 12 8772.5		(2p 4p) 12 8971.2	
44	(2p 4p) 12 8314.2		(2p 4p) 12 8594.7		(2p 4p) 12 8694.7		(2p 4p) 12 8707.0		(2p 4p) 12 9219.4		(2p 4p) 12 9424.5	
45	(2p 4p) 12 8810.8		(2p 4p) 12 8849.4		(2p 4p) 12 9004.8		(2p 4p) 12 9032.4		(2p 4p) 12 9474.9		(2p 4p) 12 9782.7	
46	(2p 4p) 12 9112.4		(2p 4p) 12 9207.4		(2p 4p) 12 9319.7		(2p 4p) 12 9325.2		(2p 4p) 12 10028.0		(2p 4p) 12 10149.5	
47	(2p 4p) 12 9419.1		(2p 4p) 12 9520.8		(2p 4p) 12 9632.3		(2p 4p) 12 9642.4		(2p 4p) 12 10410.1		(2p 4p) 12 10524.8	
48	(2p 4p) 12 9720.7		(2p 4p) 12 9837.6		(2p 4p) 12 9949.3		(2p 4p) 12 9965.9		(2p 4p) 12 10790.8		(2p 4p) 12 10909.0	
49	(2p 4p) 12 10047.3		(2p 4p) 12 10163.8		(2p 4p) 12 10282.1		(2p 4p) 12 10293.9		(2p 4p) 12 11186.0		(2p 4p) 12 11301.1	
50	(2p 4p) 12 10367.0		(2p 4p) 12 10493.4		(2p 4p) 12 10615.2		(2p 4p) 12 10627.8		(2p 4p) 12 11379.1		(2p 4p) 12 11704.3	
51	(2p 4p) 12 10695.6		(2p 4p) 12 10828.5		(2p 4p) 12 10953.8		(2p 4p) 12 10967.3		(2p 4p) 12 11877.0		(2p 4p) 12 12115.0	
52	(2p 4p) 12 11027.1		(2p 4p) 12 11158.9		(2p 4p) 12 11278.0		(2p 4p) 12 11312.4		(2p 4p) 12 12404.3		(2p 4p) 12 12534.9	
53	(2p 4p) 12 11363.7		(2p 4p) 12 11514.9		(2p 4p) 12 11647.7		(2p 4p) 12 11663.1		(2p 4p) 12 12821.0		(2p 4p) 12 12977.4	
54	(2p 4p) 12 11703.2		(2p 4p) 12 11864.2		(2p 4p) 12 12003.0		(2p 4p) 12 12019.4		(2p 4p) 12 13587.7		(2p 4p) 12 13748.2	
55	(2p 4p) 12 12031.4		(2p 4p) 12 12222.0		(2p 4p) 12 12363.8		(2p 4p) 12 12381.3		(2p 4p) 12 13714.2		(2p 4p) 12 13895.0	
56	(2p 4p) 12 12402.9		(2p 4p) 12 12588.4		(2p 4p) 12 12730.3		(2p 4p) 12 12746.9		(2p 4p) 12 14171.1		(2p 4p) 12 14320.1	
57	(2p 4p) 12 12759.2		(2p 4p) 12 12953.2		(2p 4p) 12 13102.3		(2p 4p) 12 13122.2		(2p 4p) 12 14428.4		(2p 4p) 12 14791.7	
58	(2p 4p) 12 13120.3		(2p 4p) 12 13326.5		(2p 4p) 12 13480.0		(2p 4p) 12 13501.1		(2p 4p) 12 15114.3		(2p 4p) 12 15274.1	
59	(2p 4p) 12 13486.3		(2p 4p) 12 13705.3		(2p 4p) 12 13843.4		(2p 4p) 12 13870.7		(2p 4p) 12 16429.1		(2p 4p) 12 16747.6	
60	(2p 4p) 12 13852.3		(2p 4p) 12 14080.4		(2p 4p) 12 14232.2		(2p 4p) 12 14274.1		(2p 4p) 12 18105.2		(2p 4p) 12 18422.3	
61	(2p 4p) 12 14222.6		(2p 4p) 12 14479.5		(2p 4p) 12 14647.9		(2p 4p) 12 14672.3		(2p 4p) 12 18477.8		(2p 4p) 12 18798.8	
62	(2p 4p) 12 14613.6		(2p 4p) 12 14877.0		(2p 4p) 12 15047.4		(2p 4p) 12 15074.0		(2p 4p) 12 17129.9		(2p 4p) 12 17517.0	
63	(2p 4p) 12 14999.0		(2p 4p) 12 15276.0		(2p 4p) 12 15453.3		(2p 4p) 12 15481.4		(2p 4p) 12 17479.5		(2p 4p) 12 17857.4	
64	(2p 4p) 12 15389.2		(2p 4p) 12 15682.6		(2p 4p) 12 15883.3		(2p 4p) 12 15895.1		(2p 4p) 12 18222.7		(2p 4p) 12 18610.4	
65	(2p 4p) 12 15784.0		(2p 4p) 12 16094.9		(2p 4p) 12 16329.2		(2p 4p) 12 16343.3		(2p 4p) 12 18783.0		(2p 4p) 12 18974.1	
66	(2p 4p) 12 16182.5		(2p 4p) 12 16512.5		(2p 4p) 12 16778.4		(2p 4p) 12 16798.4		(2p 4p) 12 19253.4		(2p 4p) 12 19521.4	
67	(2p 4p) 12 16644.0		(2p 4p) 12 16973.9		(2p 4p) 12 17249.4		(2p 4p) 12 17170.4		(2p 4p) 12 19642.9		(2p 4p) 12 20147.5	
68	(2p 4p) 12 17177.3		(2p 4p) 12 17563.0		(2p 4p) 12 17970.3		(2p 4p) 12 17607.3		(2p 4p) 12 20543.2		(2p 4p) 12 20753.9	
69	(2p 4p) 12 17704.0		(2p 4p) 12 17779.7		(2p 4p) 12 18011.1		(2p 4p) 12 18020.2		(2p 4p) 12 21127.8		(2p 4p) 12 21374.4	
70	(2p 4p) 12 18229.0		(2p 4p) 12 18249.5		(2p 4p) 12 18457.6		(2p 4p) 12 18449.9		(2p 4p) 12 21786.9		(2p 4p) 12 22010.0	
71	(2p 4p) 12 18848.4		(2p 4p) 12 18826.4		(2p 4p) 12 19054.9		(2p 4p) 12 19054.8		(2p 4p) 12 22421.0		(2p 4p) 12 22644.7	
72	(2p 4p) 12 19138.4		(2p 4p) 12 19244.1		(2p 4p) 12 19375.3		(2p 4p) 12 19421.8		(2p 4p) 12 22900.5		(2p 4p) 12 23227.0	

	F12		F13		G1		G2		G3		G4	
Z	STATE	AE	STATE	AE	STATE	AE	STATE	AE	STATE	AE	STATE	AE
22	(2s 4s) 12 741.3		(2s 4s) 12 742.7		(2s 4s) 12 486.2		(2s 4s) 12 421.6		(2s 4s) 12 425.8		(2p 4p) 12 443.4	
23	(2s 4s) 12 832.4		(2s 4s) 12 834.9		(2s 4s) 12 347.4		(2s 4s) 12 495.2		(2s 4s) 12 709.3		(2p 4p) 12 779.0	
24	(2s 4s) 12 920.8		(2s 4s) 12 922.3		(2s 4s) 12 615.6		(2s 4s) 12 772.8		(2s 4s) 12 798.1		(2p 4p) 12 819.6	
25	(2s 4s) 12 1029.2		(2s 4s) 12 1031.2		(2s 4s) 12 724.2		(2s 4s) 12 840.4		(2s 4s) 12 865.2		(2p 4p) 12 859.2	
26	(2s 4s) 12 1141.8		(2s 4s) 12 1143.6		(2s 4s) 12 740.4		(2s 4s) 12 929.1		(2s 4s) 12 951.2		(2p 4p) 12 1015.9	
27	(2s 4s) 12 1225.4		(2s 4s) 12 1237.4		(2s 4s) 12 829.0		(2s 4s) 12 1027.1		(2s 4s) 12 1092.3		(2p 4p) 12 1121.8	
28	(2s 4s) 12 1378.3		(2s 4s) 12 1378.7		(2s 4s) 12 921.3		(2s 4s) 12 1122.9		(2s 4s) 12 1204.9		(2p 4p) 12 1222.8	
29	(2s 4s) 12 1499.2		(2s 4s) 12 1501.3		(2s 4s) 12 1007.3		(2s 4s) 12 1220.9		(2s 4s) 12 1319.4		(2p 4p) 12 1349.0	
30	(2s 4s) 12 1629.5		(2s 4s) 12 1631.9		(2s 4s) 12 1097.2		(2s 4s) 12 1323.1		(2s 4s) 12 1429.0		(2p 4p) 12 1470.3	
31	(2s 4s) 12 1767.9		(2s 4s) 12 1767.9		(2s 4s) 12 1189.7		(2s 4s) 12 1429.4		(2s 4s) 12 1563.7		(2p 4p) 12 1594.8	
32	(2s 4s) 12 1904.8		(2s 4s) 12 1907.3		(2s 4s) 12 1286.3		(2s 4s) 12 1540.4		(2s 4s) 12 1683.4		(2p 4p) 12 1633.4	
33	(2s 4s) 12 2054.0		(2s 4s) 12 2054.9		(2s 4s) 12 1389.4		(2s 4s) 12 1648.6		(2s 4s) 12 1828.7		(2p 4p) 12 1845.3	
34	(2s 4s) 12 2204.9		(2s 4s) 12 2207.9		(2s 4s) 12 1494.4		(2s 4s) 12 1773.2		(2s 4s) 12 1948.9		(2p 4p) 12 2077.2	
35	(2s 4s) 12 2363.5		(2s 4s) 12 2368.8		(2s 4s) 12 1603.3		(2s 4s) 12 1899.3		(2s 4s) 12 2114.2		(2p 4p) 12 2154.3	
36	(2s 4s) 12 2520.0		(2s 4s) 12 2533.3		(2s 4s) 12 1716.1		(2s 4s) 12 2027.9		(2s 4s) 12 2284.7		(2p 4p) 12 2304.6	
37	(2s 4s) 12 2700.4		(2s 4s) 12 2704.1		(2s 4s) 12 1823.2		(2s 4s) 12 2182.1		(2s 4s) 12 2460.3		(2p 4p) 12 2479.4	
38	(2s 4s) 12 2874.7		(2s 4s) 12 2880.6		(2s 4s) 12 1932.8		(2s 4s) 12 2276.8		(2s 4s) 12 2581.1		(2p 4p) 12 2624.7	
39	(2s 4s) 12 3050.9		(2s 4s) 12 3063.1		(2s 4s) 12 2076.9		(2s 4s) 12 2441.2		(2s 4s) 12 2747.1		(2p 4p) 12 2774.3	
40	(2s 4s) 12 3247.2		(2s 4s) 12 3251.6		(2s 4s) 12 2204.8		(2s 4s) 12 2580.3		(2s 4s) 12 2918.3		(2p 4p) 12 2967.6	
41	(2s 4s) 12 3441.8		(2s 4s) 12 3446.3		(2s 4s) 12 2336.4		(2s 4s) 12 2726.2		(2s 4s) 12 3094.6		(2p 4p) 12 3143.8	
42	(2s 4s) 12 3642.1		(2s 4s) 12 3647.1		(2s 4s) 12 2471.9		(2s 4s) 12 2877.0		(2s 4s) 12 3276.1		(2p 4p) 12 3289.2	
43	(2s 4s) 12 3848.8		(2s 4s) 12 3854.2		(2s 4s) 12 2611.3		(2s 4s) 12 3048.4		(2s 4s) 12 3464.7		(2p 4p) 12 3437.7	
44	(2s 4s) 12 4061.8		(2s 4s) 12 4067.5		(2s 4s) 12 2754.4		(2s 4s) 12 3225.3		(2s 4s) 12 3654.4		(2p 4p) 12 3731.8	
45	(2s 4s) 12 4281.1		(2s 4s) 12 4287.3		(2s 4s) 12 2901.4		(2s 4s) 12 3376.9		(2s 4s) 12 3851.7		(2p 4p) 12 3910.9	
46	(2s 4s) 12 4504.9		(2s 4s) 12 4511.4		(2s 4s) 12 3052.2		(2s 4s) 12 3573.7		(2s 4s) 12 4034.0		(2p 4p) 12 4133.2	
47	(2s 4s) 12 4739.1		(2s 4s) 12 4746.1		(2s 4s) 12 3206.9		(2s 4s) 12 3733.7		(2s 4s) 12 4241.9		(2p 4p) 12 4324.8	
48	(2s 4s) 12 4977.9		(2s 4s) 12 4983.4		(2s 4s) 12 3363.2		(2s 4s) 12 3904.3		(2s 4s) 12 4459.2		(2p 4p) 12 4528.7	
49	(2s 4s) 12 5222.4		(2s 4s) 12 5221.4		(2s 4s) 12 3527.6		(2s 4s) 12 4113.2		(2s 4s) 12 4692.1		(2p 4p) 12 4739.8	
50	(2s 4s) 12 5473.5		(2s 4s) 12 5484.1		(2s 4s) 12 3693.7		(2s 4s) 12 4333.4		(2s 4s) 12 4913.3		(2p 4p) 12 4963.2	
51	(2s 4s) 12 5724.8		(2s 4s) 12 5743.7		(2s 4s) 12 3863.7		(2s 4s) 12 4537.2		(2s 4s) 12 5143.7		(2p 4p) 12 5218.8	
52	(2s 4s) 12 6000.2		(2s 4s) 12 6010.2		(2s 4s) 12 4037.5		(2s 4s) 12 4744.3		(2s 4s) 12 5377.4		(2p 4p) 12 5451.6	
53	(2s 4s) 12 6277.2		(2s 4s) 12 6283.1		(2s 4s) 12 4213.2		(2s 4s) 12 4961.2		(2s 4s) 12 5616.3		(2p 4p) 12 5673.1	
54	(2s 4s) 12 6553.1		(2s 4s) 12 6564.5		(2s 4s) 12 4397.9		(2s 4s) 12 5181.9		(2s 4s) 12 5870.4		(2p 4p) 12 5929.4	
55	(2s 4s) 12 6840.2		(2s 4s) 12 6852.4		(2s 4s) 12 4582.2		(2s 4s) 12 5406.4		(2s 4s) 12 6109.9		(2p 4p) 12 6181.5	
56	(2s 4s) 12 7124.6		(2s 4s) 12 7147.4		(2s 4s) 12 4771.3		(2s 4s) 12 5641.0		(2s 4s) 12 6364.4		(2p 4p) 12 6448.8	
57	(2s 4s) 12 7424.3		(2s 4s) 12 7450.3		(2s 4s) 12 4964.4		(2s 4s) 12 5877.7		(2s 4s) 12 6624.4		(2p 4p) 12 6711.4	
58	(2s 4s) 12 7745.8		(2s 4s) 12 7780.6		(2s 4s) 12 5161.7		(2s 4s) 12 6128.4		(2s 4s) 12 6889.9		(2p 4p) 12 6979.3	

	05		06		07		08		09		10		11		12
	Z	STATE	E	STATE	E	STATE	E	STATE	E	STATE	E	STATE	E	STATE	E
22	12	4p 13	643.7	(2p4s)13	649.4	(2p4s)13	649.7	(2s 4s)13	711.9	(2p 4s)14	643.3	(2p 4p)14	643.6	(2p 4p)14	643.6
23	12	4p 13	729.0	(2p4s)13	734.2	(2p4s)13	736.0	(2s 4s)13	822.3	(2p 4s)14	729.4	(2p 4p)14	729.4	(2p 4p)14	729.4
24	12	4p 13	815.5	(2p4s)13	820.8	(2p4s)13	822.5	(2s 4s)13	908.9	(2p 4s)14	815.1	(2p 4p)14	815.1	(2p 4p)14	815.1
25	12	4p 13	913.2	(2p4s)13	918.9	(2p4s)13	920.8	(2s 4s)13	1003.7	(2p 4s)14	913.7	(2p 4p)14	913.7	(2p 4p)14	913.7
26	12	4p 13	1014.0	(2p4s)13	1020.7	(2p4s)13	1028.9	(2s 4s)13	1141.9	(2p 4s)14	1015.4	(2p 4p)14	1015.4	(2p 4p)14	1015.4
27	12	4p 13	1121.9	(2p4s)13	1137.0	(2p4s)13	1137.9	(2s 4s)13	1253.4	(2p 4s)14	1121.3	(2p 4p)14	1121.3	(2p 4p)14	1121.3
28	12	4p 13	1222.9	(2p4s)13	1239.0	(2p4s)13	1251.1	(2s 4s)13	1374.8	(2p 4s)14	1223.3	(2p 4p)14	1223.3	(2p 4p)14	1223.3
29	12	4p 13	1347.1	(2p4s)13	1373.1	(2p4s)13	1370.4	(2s 4s)13	1499.3	(2p 4s)14	1348.8	(2p 4p)14	1348.8	(2p 4p)14	1348.8
30	12	4p 13	1474.9	(2p4s)13	1494.9	(2p4s)13	1492.8	(2s 4s)13	1629.8	(2p 4s)14	1476.4	(2p 4p)14	1476.4	(2p 4p)14	1476.4
31	12	4p 13	1597.9	(2p4s)13	1623.3	(2p4s)13	1623.7	(2s 4s)13	1765.7	(2p 4s)14	1598.2	(2p 4p)14	1598.2	(2p 4p)14	1598.2
32	12	4p 13	1728.0	(2p4s)13	1764.4	(2p4s)13	1761.7	(2s 4s)13	1907.3	(2p 4s)14	1727.8	(2p 4p)14	1727.8	(2p 4p)14	1727.8
33	12	4p 13	1843.4	(2p4s)13	1913.0	(2p4s)13	1903.5	(2s 4s)13	2054.3	(2p 4s)14	1843.5	(2p 4p)14	1843.5	(2p 4p)14	1843.5
34	12	4p 13	2007.4	(2p4s)13	2090.9	(2p4s)13	2090.9	(2s 4s)13	2207.3	(2p 4s)14	2006.4	(2p 4p)14	2006.4	(2p 4p)14	2006.4
35	12	4p 13	2134.3	(2p4s)13	2205.4	(2p4s)13	2204.0	(2s 4s)13	2364.2	(2p 4s)14	2133.3	(2p 4p)14	2133.3	(2p 4p)14	2133.3
36	12	4p 13	2264.4	(2p4s)13	2343.4	(2p4s)13	2343.2	(2s 4s)13	2521.2	(2p 4s)14	2263.7	(2p 4p)14	2263.7	(2p 4p)14	2263.7
37	12	4p 13	2444.4	(2p4s)13	2537.1	(2p4s)13	2537.8	(2s 4s)13	2701.4	(2p 4s)14	2443.1	(2p 4p)14	2443.1	(2p 4p)14	2443.1
38	12	4p 13	2627.3	(2p4s)13	2697.7	(2p4s)13	2698.3	(2s 4s)13	2877.8	(2p 4s)14	2625.7	(2p 4p)14	2625.7	(2p 4p)14	2625.7
39	12	4p 13	2779.0	(2p4s)13	2874.3	(2p4s)13	2873.1	(2s 4s)13	3060.3	(2p 4s)14	2773.3	(2p 4p)14	2773.3	(2p 4p)14	2773.3
40	12	4p 13	2948.1	(2p4s)13	3054.8	(2p4s)13	3057.8	(2s 4s)13	3248.8	(2p 4s)14	2946.8	(2p 4p)14	2946.8	(2p 4p)14	2946.8
41	12	4p 13	3144.4	(2p4s)13	3245.4	(2p4s)13	3244.9	(2s 4s)13	3443.4	(2p 4s)14	3144.7	(2p 4p)14	3144.7	(2p 4p)14	3144.7
42	12	4p 13	3339.9	(2p4s)13	3440.1	(2p4s)13	3441.3	(2s 4s)13	3644.1	(2p 4s)14	3338.1	(2p 4p)14	3338.1	(2p 4p)14	3338.1
43	12	4p 13	3518.7	(2p4s)13	3640.9	(2p4s)13	3642.3	(2s 4s)13	3851.1	(2p 4s)14	3517.4	(2p 4p)14	3517.4	(2p 4p)14	3517.4
44	12	4p 13	3712.7	(2p4s)13	3848.0	(2p4s)13	3849.4	(2s 4s)13	4064.4	(2p 4s)14	3710.8	(2p 4p)14	3710.8	(2p 4p)14	3710.8
45	12	4p 13	3912.0	(2p4s)13	4061.4	(2p4s)13	4062.1	(2s 4s)13	4284.1	(2p 4s)14	3909.4	(2p 4p)14	3909.4	(2p 4p)14	3909.4
46	12	4p 13	4114.4	(2p4s)13	4281.2	(2p4s)13	4282.1	(2s 4s)13	4510.2	(2p 4s)14	4112.7	(2p 4p)14	4112.7	(2p 4p)14	4112.7
47	12	4p 13	4326.3	(2p4s)13	4507.4	(2p4s)13	4509.9	(2s 4s)13	4742.9	(2p 4s)14	4323.4	(2p 4p)14	4323.4	(2p 4p)14	4323.4
48	12	4p 13	4542.3	(2p4s)13	4740.1	(2p4s)13	4742.4	(2s 4s)13	4982.1	(2p 4s)14	4539.2	(2p 4p)14	4539.2	(2p 4p)14	4539.2
49	12	4p 13	4761.7	(2p4s)13	4979.3	(2p4s)13	4982.0	(2s 4s)13	5228.0	(2p 4s)14	4758.3	(2p 4p)14	4758.3	(2p 4p)14	4758.3
50	12	4p 13	4987.7	(2p4s)13	5202.3	(2p4s)13	5208.3	(2s 4s)13	5480.7	(2p 4s)14	4983.7	(2p 4p)14	4983.7	(2p 4p)14	4983.7
51	12	4p 13	5218.2	(2p4s)13	5429.2	(2p4s)13	5430.2	(2s 4s)13	5740.2	(2p 4s)14	5214.2	(2p 4p)14	5214.2	(2p 4p)14	5214.2
52	12	4p 13	5454.0	(2p4s)13	5737.0	(2p4s)13	5741.2	(2s 4s)13	6004.7	(2p 4s)14	5450.0	(2p 4p)14	5450.0	(2p 4p)14	5450.0
53	12	4p 13	5694.0	(2p4s)13	6005.4	(2p4s)13	6008.1	(2s 4s)13	6280.2	(2p 4s)14	5691.4	(2p 4p)14	5691.4	(2p 4p)14	5691.4
54	12	4p 13	5942.9	(2p4s)13	6277.9	(2p4s)13	6282.0	(2s 4s)13	6560.8	(2p 4s)14	5938.0	(2p 4p)14	5938.0	(2p 4p)14	5938.0
55	12	4p 13	6195.1	(2p4s)13	6538.7	(2p4s)13	6543.0	(2s 4s)13	6848.7	(2p 4s)14	6189.8	(2p 4p)14	6189.8	(2p 4p)14	6189.8
56	12	4p 13	6452.7	(2p4s)13	6804.4	(2p4s)13	6809.4	(2s 4s)13	7142.9	(2p 4s)14	6447.0	(2p 4p)14	6447.0	(2p 4p)14	6447.0
57	12	4p 13	6713.7	(2p4s)13	7141.9	(2p4s)13	7147.7	(2s 4s)13	7444.4	(2p 4s)14	6709.4	(2p 4p)14	6709.4	(2p 4p)14	6709.4
58	12	4p 13	6984.1	(2p4s)13	7444.4	(2p4s)13	7450.2	(2s 4s)13	7754.3	(2p 4s)14	6977.4	(2p 4p)14	6977.4	(2p 4p)14	6977.4
59	12	4p 13	7257.8	(2p4s)13	7754.8	(2p4s)13	7760.9	(2s 4s)13	8074.4	(2p 4s)14	7250.7	(2p 4p)14	7250.7	(2p 4p)14	7250.7
60	12	4p 13	7537.0	(2p4s)13	8072.8	(2p4s)13	8079.9	(2s 4s)13	8400.3	(2p 4s)14	7529.3	(2p 4p)14	7529.3	(2p 4p)14	7529.3
61	12	4p 13	7821.0	(2p4s)13	8398.3	(2p4s)13	8405.4	(2s 4s)13	8732.9	(2p 4s)14	7813.3	(2p 4p)14	7813.3	(2p 4p)14	7813.3
62	12	4p 13	8111.9	(2p4s)13	8730.2	(2p4s)13	8737.3	(2s 4s)13	9073.4	(2p 4s)14	8102.7	(2p 4p)14	8102.7	(2p 4p)14	8102.7
63	12	4p 13	8407.0	(2p4s)13	9073.4	(2p4s)13	9082.2	(2s 4s)13	9423.4	(2p 4s)14	8397.4	(2p 4p)14	8397.4	(2p 4p)14	8397.4
64	12	4p 13	8707.9	(2p4s)13	9422.8	(2p4s)13	9432.7	(2s 4s)13	9783.4	(2p 4s)14	8697.8	(2p 4p)14	8697.8	(2p 4p)14	8697.8
65	12	4p 13	9014.3	(2p4s)13	9782.0	(2p4s)13	9791.4	(2s 4s)13	10150.3	(2p 4s)14	9003.3	(2p 4p)14	9003.3	(2p 4p)14	9003.3
66	12	4p 13	9324.1	(2p4s)13	10148.8	(2p4s)13	10159.0	(2s 4s)13	10535.6	(2p 4s)14	9311.7	(2p 4p)14	9311.7	(2p 4p)14	9311.7
67	12	4p 13	9641.3	(2p4s)13	10548.1	(2p4s)13	10559.1	(2s 4s)13	10929.7	(2p 4s)14	9629.1	(2p 4p)14	9629.1	(2p 4p)14	9629.1
68	12	4p 13	9964.6	(2p4s)13	10948.6	(2p4s)13	10959.0	(2s 4s)13	11322.7	(2p 4s)14	9951.4	(2p 4p)14	9951.4	(2p 4p)14	9951.4
69	12	4p 13	10294.8	(2p4s)13	11350.3	(2p4s)13	11351.9	(2s 4s)13	11724.9	(2p 4s)14	10281.0	(2p 4p)14	10281.0	(2p 4p)14	10281.0
70	12	4p 13	10628.8	(2p4s)13	11753.6	(2p4s)13	11757.0	(2s 4s)13	12121.4	(2p 4s)14	10614.0	(2p 4p)14	10614.0	(2p 4p)14	10614.0
71	12	4p 13	10968.3	(2p4s)13	12151.1	(2p4s)13	12159.9	(2s 4s)13	12523.4	(2p 4s)14	10952.4	(2p 4p)14	10952.4	(2p 4p)14	10952.4
72	12	4p 13	11313.2	(2p4s)13	12554.2	(2p4s)13	12561.9	(2s 4s)13	12926.1	(2p 4s)14	11299.4	(2p 4p)14	11299.4	(2p 4p)14	11299.4
73	12	4p 13	11664.1	(2p4s)13	12954.9	(2p4s)13	12962.7	(2s 4s)13	13329.4	(2p 4s)14	11651.3	(2p 4p)14	11651.3	(2p 4p)14	11651.3
74	12	4p 13	12020.4	(2p4s)13	13357.3	(2p4s)13	13364.9	(2s 4s)13	13733.9	(2p 4s)14	12007.7	(2p 4p)14	12007.7	(2p 4p)14	12007.7
75	12	4p 13	12382.4	(2p4s)13	13758.2	(2p4s)13	13767.4	(2s 4s)13	14140.2	(2p 4s)14	12368.9	(2p 4p)14	12368.9	(2p 4p)14	12368.9
76	12	4p 13	12750.0	(2p4s)13	14157.3	(2p4s)13	14168.1	(2s 4s)13	14547.2	(2p 4s)14	12735.0	(2p 4p)14	12735.0	(2p 4p)14	12735.0
77	12	4p 13	13122.2	(2p4s)13	14557.9	(2p4s)13	14569.1	(2s 4s)13	14954.8	(2p 4s)14	13101.0	(2p 4p)14	13101.0	(2p 4p)14	13101.0
78	12	4p 13	13500.2	(2p4s)13	14959.2	(2p4s)13	14970.4	(2s 4s)13	15362.9	(2p 4s)14	13478.4	(2p 4p)14	13478.4	(2p 4p)14	13478.4
79	12	4p 13	13884.6	(2p4s)13	15360.8	(2p4s)13	15372.0	(2s 4s)13	15772.2	(2p 4s)14	13861.9	(2p 4p)14	13861.9	(2p 4p)14	13861.9
80	12	4p 13	14277.2	(2p4s)13	15763.4	(2p4s)13	15774.3	(2s 4s)13	16182.4	(2p 4s)14	14250.9	(2p 4p)14	14250.9	(2p 4p)14	14250.9
81	12	4p 13	14677.3	(2p4s)13	16166.0	(2p4s)13	16176.1	(2s 4s)13	16593.7	(2p 4s)14	14654.3	(2p 4p)14	14654.3	(2p 4p)14	14654.3
82	12	4p 13	15073.2	(2p4s)13	16568.2	(2p4s)13	16578.3	(2s 4s)13	17006.3	(2p 4s)14	15049.9	(2p 4p)14	15049.9	(2p 4p)14	15049.9
83	12	4p 13	15468.6	(2p4s)13	16970.7	(2p4s)13	16980.9	(2s 4s)13	17419.1	(2p 4s)14	15443.9	(2p 4p)14	15443.9	(2p 4p)14	15443.9
84	12	4p 13	15864.2	(2p4s)13	17373.4	(2p4s)13	17384.6	(2s 4s)13	17832.2	(2p 4s)14	15847.7	(2p 4p)14	15847.7	(2p 4p)14	15847.7
85	12	4p 13	16261.9	(2p4s)13	17776.3	(2p4s)13	17787.5	(2s 4s)13	18246.4	(2p 4s)14	16246.1	(2p 4p)14	16246.1	(2p 4p)14	16246.1
86	12	4p 13	16660.4	(2p4s)13	18180.3	(2p4s)13	18191.5	(2s 4s)13	18661.9	(2p 4s)14	16654.8	(2p 4p)14	16654.8	(2p 4p)14	16654.8
87	12	4p 13	17060.0	(2p4s)13	18585.2	(2p4s)13	18596.4	(2s 4s)13	19078.4	(2p 4s)14	17054.3	(2p 4p)			

K3	K4	K7	K8	K9	K10
STATE	SE	STATE	SE	STATE	SE
22	(22-2401) 322.0	(22-2401) 308.4	(22-2401) 391.3	(22-2401) 415.7	(22-2401) 421.3
23	(22-2401) 399.9	(22-2401) 439.1	(22-2401) 642.1	(22-2401) 498.3	(22-2401) 705.7
24	(22-2401) 471.7	(22-2401) 722.8	(22-2401) 737.0	(22-2401) 788.3	(22-2401) 795.3
25	(22-2401) 747.3	(22-2401) 812.1	(22-2401) 816.0	(22-2401) 879.3	(22-2401) 870.2
26	(22-2401) 827.3	(22-2401) 894.4	(22-2401) 896.0	(22-2401) 977.9	(22-2401) 990.4
27	(22-2401) 811.2	(22-2401) 881.1	(22-2401) 906.1	(22-2401) 1009.9	(22-2401) 1096.1
28	(22-2401) 999.2	(22-2401) 1071.7	(22-2401) 1077.4	(22-2401) 1197.2	(22-2401) 1207.2
29	(22-2401) 1091.3	(22-2401) 1140.4	(22-2401) 1172.9	(22-2401) 1202.4	(22-2401) 1203.7
30	(22-2401) 1187.5	(22-2401) 1245.2	(22-2401) 1278.4	(22-2401) 1321.1	(22-2401) 1343.4
31	(22-2401) 1288.0	(22-2401) 1346.1	(22-2401) 1374.3	(22-2401) 1344.7	(22-2401) 1373.1
32	(22-2401) 1392.7	(22-2401) 1478.2	(22-2401) 1488.8	(22-2401) 1472.9	(22-2401) 1504.3
33	(22-2401) 1501.4	(22-2401) 1566.8	(22-2401) 1597.3	(22-2401) 1607.1	(22-2401) 1644.8
34	(22-2401) 1614.9	(22-2401) 1702.1	(22-2401) 1714.2	(22-2401) 1743.9	(22-2401) 1799.0
35	(22-2401) 1732.4	(22-2401) 1821.9	(22-2401) 1835.4	(22-2401) 1807.8	(22-2401) 2136.2
36	(22-2401) 1854.7	(22-2401) 1946.0	(22-2401) 1961.4	(22-2401) 2226.7	(22-2401) 2289.8
37	(22-2401) 1981.2	(22-2401) 2036.4	(22-2401) 2091.7	(22-2401) 2279.8	(22-2401) 2406.4
38	(22-2401) 2112.3	(22-2401) 2207.1	(22-2401) 2256.4	(22-2401) 2351.9	(22-2401) 2468.2
39	(22-2401) 2247.9	(22-2401) 2344.3	(22-2401) 2344.1	(22-2401) 2714.1	(22-2401) 2773.2
40	(22-2401) 2388.2	(22-2401) 2484.0	(22-2401) 2510.2	(22-2401) 2883.4	(22-2401) 2947.3
41	(22-2401) 2523.0	(22-2401) 2632.1	(22-2401) 2659.1	(22-2401) 3039.7	(22-2401) 3124.8
42	(22-2401) 2648.7	(22-2401) 2752.7	(22-2401) 2812.2	(22-2401) 3204.1	(22-2401) 3252.1
43	(22-2401) 2827.0	(22-2401) 2937.9	(22-2401) 2971.2	(22-2401) 3422.6	(22-2401) 3479.9
44	(22-2401) 2994.3	(22-2401) 3097.8	(22-2401) 3134.7	(22-2401) 3411.2	(22-2401) 3607.6
45	(22-2401) 3160.4	(22-2401) 3242.3	(22-2401) 3260.0	(22-2401) 3807.8	(22-2401) 3885.7
46	(22-2401) 3329.9	(22-2401) 3431.8	(22-2401) 3474.4	(22-2401) 4007.3	(22-2401) 4089.0
47	(22-2401) 3503.6	(22-2401) 3603.3	(22-2401) 3648.4	(22-2401) 4218.2	(22-2401) 4277.3
48	(22-2401) 3682.9	(22-2401) 3784.2	(22-2401) 3834.2	(22-2401) 4434.9	(22-2401) 4500.2
49	(22-2401) 3861.3	(22-2401) 3968.0	(22-2401) 4027.4	(22-2401) 4646.4	(22-2401) 4700.2
50	(22-2401) 4036.8	(22-2401) 4156.4	(22-2401) 4221.6	(22-2401) 4856.9	(22-2401) 4934.4
51	(22-2401) 4211.3	(22-2401) 4330.2	(22-2401) 4401.2	(22-2401) 5061.9	(22-2401) 5162.8
52	(22-2401) 4382.2	(22-2401) 4504.9	(22-2401) 4574.4	(22-2401) 5271.0	(22-2401) 5411.3
53	(22-2401) 4556.7	(22-2401) 4679.7	(22-2401) 4751.1	(22-2401) 5480.2	(22-2401) 5634.9
54	(22-2401) 4731.3	(22-2401) 4861.3	(22-2401) 4933.3	(22-2401) 5691.2	(22-2401) 5903.4
55	(22-2401) 4906.4	(22-2401) 5174.0	(22-2401) 5279.4	(22-2401) 6002.4	(22-2401) 6194.1
56	(22-2401) 5080.9	(22-2401) 5349.7	(22-2401) 5503.4	(22-2401) 6202.7	(22-2401) 6407.8
57	(22-2401) 5258.1	(22-2401) 5520.7	(22-2401) 5707.4	(22-2401) 6408.0	(22-2401) 6670.4
58	(22-2401) 5432.3	(22-2401) 5691.3	(22-2401) 5877.7	(22-2401) 6598.2	(22-2401) 6837.2
59	(22-2401) 5607.9	(22-2401) 5862.4	(22-2401) 6052.9	(22-2401) 6788.7	(22-2401) 7004.9
60	(22-2401) 5782.4	(22-2401) 6032.2	(22-2401) 6234.4	(22-2401) 6974.1	(22-2401) 7243.9
61	(22-2401) 5957.9	(22-2401) 6202.7	(22-2401) 6414.4	(22-2401) 7159.7	(22-2401) 7483.9
62	(22-2401) 6132.4	(22-2401) 6372.8	(22-2401) 6594.4	(22-2401) 7344.5	(22-2401) 7748.1
63	(22-2401) 6307.9	(22-2401) 6547.3	(22-2401) 6774.4	(22-2401) 7529.6	(22-2401) 7944.1
64	(22-2401) 6482.4	(22-2401) 6721.8	(22-2401) 6951.4	(22-2401) 7714.1	(22-2401) 8140.1
65	(22-2401) 6657.9	(22-2401) 6896.3	(22-2401) 7126.4	(22-2401) 7899.0	(22-2401) 8325.7
66	(22-2401) 6832.4	(22-2401) 7070.8	(22-2401) 7301.4	(22-2401) 8083.8	(22-2401) 8511.3
67	(22-2401) 7007.9	(22-2401) 7245.3	(22-2401) 7476.4	(22-2401) 8268.3	(22-2401) 8696.3
68	(22-2401) 7182.4	(22-2401) 7419.8	(22-2401) 7645.4	(22-2401) 8453.3	(22-2401) 8881.3
69	(22-2401) 7357.9	(22-2401) 7594.3	(22-2401) 7814.4	(22-2401) 8638.3	(22-2401) 9066.3
70	(22-2401) 7532.4	(22-2401) 7768.8	(22-2401) 7983.4	(22-2401) 8823.3	(22-2401) 9251.3
71	(22-2401) 7707.9	(22-2401) 7943.3	(22-2401) 8158.4	(22-2401) 9008.3	(22-2401) 9436.3
72	(22-2401) 7882.4	(22-2401) 8117.8	(22-2401) 8323.4	(22-2401) 9193.3	(22-2401) 9621.3
73	(22-2401) 8057.9	(22-2401) 8292.3	(22-2401) 8498.4	(22-2401) 9378.3	(22-2401) 9806.3
74	(22-2401) 8232.4	(22-2401) 8466.8	(22-2401) 8663.4	(22-2401) 9563.3	(22-2401) 9991.3
75	(22-2401) 8407.9	(22-2401) 8641.3	(22-2401) 8848.4	(22-2401) 9748.3	(22-2401) 10176.3
76	(22-2401) 8582.4	(22-2401) 8815.8	(22-2401) 9023.4	(22-2401) 9933.3	(22-2401) 10361.3
77	(22-2401) 8757.9	(22-2401) 8990.3	(22-2401) 9208.4	(22-2401) 10118.3	(22-2401) 10546.3
78	(22-2401) 8932.4	(22-2401) 9164.8	(22-2401) 9383.4	(22-2401) 10303.3	(22-2401) 10731.3
79	(22-2401) 9107.9	(22-2401) 9339.3	(22-2401) 9558.4	(22-2401) 10488.3	(22-2401) 10916.3
80	(22-2401) 9282.4	(22-2401) 9513.8	(22-2401) 9733.4	(22-2401) 10673.3	(22-2401) 11101.3
81	(22-2401) 9457.9	(22-2401) 9688.3	(22-2401) 9908.4	(22-2401) 10858.3	(22-2401) 11286.3
82	(22-2401) 9632.4	(22-2401) 9862.8	(22-2401) 10083.4	(22-2401) 11043.3	(22-2401) 11471.3
83	(22-2401) 9807.9	(22-2401) 10037.3	(22-2401) 10258.4	(22-2401) 11228.3	(22-2401) 11656.3
84	(22-2401) 9982.4	(22-2401) 10211.8	(22-2401) 10433.4	(22-2401) 11413.3	(22-2401) 11841.3
85	(22-2401) 10157.9	(22-2401) 10386.3	(22-2401) 10608.4	(22-2401) 11598.3	(22-2401) 12026.3
86	(22-2401) 10332.4	(22-2401) 10560.8	(22-2401) 10783.4	(22-2401) 11783.3	(22-2401) 12211.3
87	(22-2401) 10507.9	(22-2401) 10735.3	(22-2401) 10958.4	(22-2401) 11968.3	(22-2401) 12396.3
88	(22-2401) 10682.4	(22-2401) 10909.8	(22-2401) 11133.4	(22-2401) 12153.3	(22-2401) 12581.3
89	(22-2401) 10857.9	(22-2401) 11084.3	(22-2401) 11308.4	(22-2401) 12338.3	(22-2401) 12766.3
90	(22-2401) 11032.4	(22-2401) 11258.8	(22-2401) 11483.4	(22-2401) 12523.3	(22-2401) 12951.3
91	(22-2401) 11207.9	(22-2401) 11433.3	(22-2401) 11658.4	(22-2401) 12708.3	(22-2401) 13136.3
92	(22-2401) 11382.4	(22-2401) 11607.8	(22-2401) 11833.4	(22-2401) 12893.3	(22-2401) 13321.3

	K11	K12	K13	K14	L1	L2
Z	STATE	SE	STATE	SE	STATE	SE
22	(22-2401) 322.0	(22-2401) 308.4	(22-2401) 391.3	(22-2401) 415.7	(22-2401) 421.3	(22-2401) 421.3
23	(22-2401) 399.9	(22-2401) 439.1	(22-2401) 642.1	(22-2401) 498.3	(22-2401) 705.7	(22-2401) 705.7
24	(22-2401) 471.7	(22-2401) 722.8	(22-2401) 737.0	(22-2401) 788.3	(22-2401) 795.3	(22-2401) 795.3
25	(22-2401) 747.3	(22-2401) 812.1	(22-2401) 816.0	(22-2401) 879.3	(22-2401) 870.2	(22-2401) 870.2
26	(22-2401) 827.3	(22-2401) 894.4	(22-2401) 896.0	(22-2401) 977.9	(22-2401) 990.4	(22-2401) 990.4
27	(22-2401) 811.2	(22-2401) 881.1	(22-2401) 906.1	(22-2401) 1009.9	(22-2401) 1096.1	(22-2401) 1096.1
28	(22-2401) 999.2	(22-2401) 1071.7	(22-2401) 1077.4	(22-2401) 1197.2	(22-2401) 1207.2	(22-2401) 1207.2
29	(22-2401) 1091.3	(22-2401) 1140.4	(22-2401) 1172.9	(22-2401) 1202.4	(22-2401) 1203.7	(22-2401) 1203.7
30	(22-2401) 1187.5	(22-2401) 1245.2	(22-2401) 1278.4	(22-2401) 1321.1	(22-2401) 1343.4	(22-2401) 1343.4
31	(22-2401) 1288.0	(22-2401) 1346.1	(22-2401) 1374.3	(22-2401) 1344.7	(22-2401) 1373.1	(22-2401) 1373.1
32	(22-2401) 1392.7	(22-2401) 1478.2	(22-2401) 1488.8	(22-2401) 1472.9	(22-2401) 1504.3	(22-2401) 1504.3
33	(22-2401) 1501.4	(22-2401) 1566.8	(22-2401) 1597.3	(22-2401) 1607.1	(22-2401) 1644.8	(22-2401) 1644.8
34	(22-2401) 1614.9	(22-2401) 1702.1	(22-2401) 1714.2	(22-2401) 1743.9	(22-2401) 1799.0	(22-2401) 1799.0
35	(22-2401) 1732.4	(22-2401) 1821.9	(22-2401) 1835.4	(22-2401) 1807.8	(22-2401) 2136.2	(22-2401) 2136.2
36	(22-2401) 1854.7	(22-2401) 1946.0	(22-2401) 1961.4	(22-2401) 2226.7	(22-2401) 2289.8	(22-2401) 2289.8
37	(22-2401) 1981.2	(22-2401) 2036.4	(22-2401) 2091.7	(22-2401) 2279.8	(22-2401) 2406.4	(22-2401) 2406.4
38	(22-2401) 2112.3	(22-2401) 2207.1	(22-2401) 2256.4	(22-2401) 2351.9	(22-2401) 2468.2	(22-2401) 2468.2
39	(22-2401) 2247.9	(22-2401) 2344.3	(22-2401) 2344.1	(22-2401) 2714.1	(22-2401) 2773.2	(22-2401) 2773.2
40	(22-2401) 2388.2	(22-2401) 2484.0	(22-2401) 2510.2	(22-2401) 2883.4	(22-2401) 2947.3	(22-2401) 2947.3
41	(22-2401) 2523.0	(22-2401) 2632.1	(22-2401) 2659.1	(22-2401) 3039.7	(22-2401) 3124.8	(22-2401) 3124.8
42	(22-2401) 2648.7	(22-2401) 2752.7	(22-2401) 2812.2	(22-2401) 3204.1	(22-2401) 3252.1	(22-2401) 3252.1
43	(22-2401) 2827.0	(22-2401) 2937.9	(22-2401) 2971.2	(22-2401) 3422.6	(22-2401) 3479.9	(22-2401) 3479.9
44	(22-2401) 2994.3	(22-2401) 3097.8	(22-2401) 3134.7	(22-2401) 3411.2	(22-2401) 3607.6	(22-2401) 3607.6
45	(22-2401) 3160.4	(22-2401) 3242.3	(22-2401) 3260.0	(22-2401) 3807.8	(22-2401) 3885.7	(22-2401) 3885.7
46	(22-2401) 3329.9	(22-2401) 3431.8	(22-2401) 3474.4	(22-2401) 4007.3	(22-2401) 4089.0	(22-2401) 4089.0
47	(22-2401) 3503.6	(22-2401) 3603.3	(22-2401) 3648.4	(22-2401) 4218.2	(22-2401) 4277.3	(22-2401) 4277.3
48	(22-2401) 3682.9	(22-2401) 3784.2	(22-2401) 3834.2	(22-2401) 4434.9	(22-2401) 4500.2	(22-2401) 4500.2
49	(22-2401) 3861.3	(22-2401) 3968.0	(22-2401) 4027.4	(22-2401) 4646.4	(22-2401) 4700.2	(22-2401) 4700.2
50	(22-2401) 4036.8	(22-2401) 4156.4	(22-2401) 4221.6	(22-2401) 4856.9	(22-2401) 4934.4	(22-2401) 4934.4
51	(22-2401) 4211.3	(22-2401) 4330.2	(22-2401) 4401.2	(22-2401) 5061.9	(22-2401) 5162.8	(22-2401) 5162.8
52	(22-2401) 4382.2	(22-2401) 4504.9	(22-2401) 4574.4	(22-2401) 5271.0	(22-2401) 5411.3	(22-2401) 5411.3
53	(22-2401) 4556.7	(22-2401) 4679.7	(22-2401) 4751.1	(22-2401) 5480.2	(22-2401) 5634.9	(22-2401) 5634.9
54	(22-2401) 4731.3	(22-2401) 4861.3	(22-2401) 4933.3	(22-2401) 5691.2	(22-2401) 5903.4	(22-2401) 5903.4
55	(22-2401) 4906.4	(22-2401) 5174.0	(22-2401) 5279.4	(22-2401) 6002.4	(22-2401) 6194.1	(22-2401) 6194.1
56	(22-2401) 5080.9	(22-2401) 5349.7	(22-2401) 5503.4	(22-2401) 6202.7	(22-2401) 6407.8	(22-2401) 6407.8
57	(22-2401) 5258.1	(22-2401) 5520.7	(22-2401) 5707.4	(22-2401) 6418.1	(22-2401) 6621.5	(22-2401) 6621.5
58	(22-2401) 5433.2	(22-2401) 5701.8	(22-2401) 5876.5	(22-2401) 6633.8	(22-2401) 6837.1	(22-2401) 6837.1
59	(22-2401) 5608.3	(22-2401) 5882.9	(22-2401) 6057.6	(22-2401) 6850.1	(22-2401) 7055.4	(22-2401) 7055.4
60	(22-2401) 5783.4	(22-2401) 6058.0	(22-2401) 6232.3	(22-2401) 7066.4	(22-2401) 7271.7	(22-2401) 7271.7
61	(22-2401) 5958.5	(22-2401) 6233.1	(22-2401) 6406.6	(22-2401) 7282.7	(22-2401) 7488.0	(22-2401) 7488.0
62	(22-2401) 6133.6	(22-2401) 6408.2	(22-2401) 6581.1	(22-2401) 7499.0	(22-2401) 7704.3	(22-2401) 7704.3
63	(22-2401) 6308.7	(22-2401) 6583.3	(22-2401) 6756.0	(22-2401) 7715.3	(22-2401) 7920.6	(22-2401) 7920.6
64	(22-2401) 6483.8	(22-2401) 6758.4	(22-2401) 6929.1	(22-2401) 7931.6	(22-2401) 8126.9	(22-2401) 8126.9
65	(22-2401) 6658.9	(22-2401) 6933.5	(22-2401) 7104.8	(22-2401) 8147.9	(22-2401) 8353.2	(22-2401) 8353.2
66	(22-2401) 6834.0	(22-2401) 7108.6	(22-2401) 7278.0	(22-2401) 8364.2	(22-2401) 8569.5	(22-2401) 8569.5
67	(22-2401) 7009.1	(22-2401) 7283.7	(22-2401) 7453.3	(22-2401) 8580.5	(22-2401) 8785.8	(22-2401) 8785.8
68	(22-2401) 7184.2	(22-2401) 7458.8	(22-2401) 7628.4	(22-2401) 8796.8	(22-2401) 9002.1	(22-2401) 9002.1
69	(22-2401) 7359.3	(22-2401) 7633.9	(22-2401) 7803.5	(22-2401) 9013.1	(22-2401) 9218.4	(22-2401) 9218.4
70	(22-2401) 7534.4	(22-2401) 7809.0	(22-2401) 7978.6	(22-2401) 9229.4	(22-2401) 9434.7	(22-2401) 9434.7
71	(22-2401) 7709.5	(22-2401) 7984.1	(22-2401) 8153.7	(22-2401) 9445.7	(22-2401) 9651.0	(22-2401) 9651.0
72	(22-2401) 7884.6	(22-2401) 8159.2	(22-2401) 8328.8	(22-2401) 9662.0	(22-2401) 9867.3	(22-2401) 9867.3
73	(22-2401) 8059.7	(22-2401) 8334.3	(22-2401) 8503.4	(22-2401) 9878.3	(22-2401) 10083.6	(22-2401) 10083.6
74	(22-2401) 8234.8	(22-2401) 8509.4	(22-2401) 8678.5	(22-2401) 10094.6	(22-2401) 10299.9	(22-2401) 10299.9
75	(22-2401) 8409.9	(22-2401) 8684.5	(22-2401) 8848.6	(22-2401) 10310.9	(22-2401) 10516.2	(22-2401) 10516.2
76	(22-2401) 8585.0	(22-2401) 8859.6	(22-2401) 9019.7	(22-2401) 10527.2	(22-2401) 10732.5	(22-2401) 10732.5
77	(22-2401) 8760.1	(22-2401) 9034.7	(22-2401) 9189.8	(22-2401) 10743.5	(22-2401) 10948.8	(22-2401) 10948.8
78	(22-2401) 8935.2	(22-2401) 9209.8	(22-2401) 9364.9	(22-2401) 10959.8	(22-2401) 11165.1	(22-2401) 11165.1
79	(22-2401) 9110.3	(22-2401) 9384.9	(22-2401) 9539.0	(22-2401) 11176.1	(22-2401) 11381.4	(22-2401) 11381.4
80	(22-2401) 9285.4	(22-2401) 9560.0	(22-2401) 9714.1	(22-2401) 11392.4	(22-2401) 11597.7	(22-2401) 11597.7
81	(22-2401) 9460.5	(22-2401) 9735.1	(22-2401) 9889.2	(22-2401) 11608.7	(22-2401) 11814.0	(22-2401) 11814.0
82	(22-2401) 9635.6	(22-2401) 9910.2	(22-2401) 10064.3	(22-2401) 11825.0	(22-2401) 12030.3	(22-2401) 12030.3
83	(22-2401) 9810.7	(22-2401) 10085.3	(22-2401) 10239.4	(22-2401) 12041.3	(22-2401) 12246.6	(22-2401) 12246.6
84	(22-2401) 9985.8	(22-2401) 10260.4	(22-2401) 10414.5	(22-2401) 12257.6	(22-2401) 12462.9	(22-2401) 12462.9
85	(22-2401) 10160.9	(22-2401) 10435.5	(22-2401) 10589.6	(22-2401) 12473.9	(22-2401) 12679.2	(22-2401) 12679.2
86	(22-2401) 10336.0	(22-2401) 10610.6	(22-2401) 10764.7	(22-2401) 12690.2	(22-2401) 12895.5	(22-2401) 12895.5
87	(22-2401) 10511.1	(22-2401) 10785.7	(22-2401) 10939.8	(22-2401) 12906.5	(22-2401) 13111.8	(22-2401) 13111.8
88	(22-2401) 10686.2	(22-2401) 10960.8	(22-2401) 11114.9	(22-2401) 13122.8	(22-2401) 13328.1	(22-2401) 13328.1
89	(22-2401) 10861.3	(22-2401) 11135.9	(22-2401) 11289.0	(22-2401) 13339.1	(22-2401) 13544.4	(22-2401) 13544.4
90	(22-2401) 11036.4	(22-2401) 11311.0	(22-2401) 11464.1	(22-2401) 13555.4	(22-2401) 13760.7	(22-2401) 13760.7
91	(22-2401) 11211.5	(22-2401) 11486.1	(22-2401) 11639.2	(22-2401) 13771.7	(22-2401) 13977.0	(22-2401) 13977.0
92	(22-2401) 11386.6	(22-2401) 11661.2	(22-2401) 11814.3	(22-2401) 13988.0	(22-2401) 14193.3	(22-2401) 14193.3
93	(22-2401) 11561.7	(22-2401) 11836.3	(22-2401) 11989.4	(22-2401) 14204.3	(22-2401) 14409.6	(22-2401) 14409.6
94	(22-2401) 11736.8	(22-2401) 12011.4	(22-2401) 12164.5	(22-2401) 14420.6	(22-2401) 14625.9	(22-2401) 14625.9
95	(22-2401) 11911.9	(22-2401) 12186.5	(22-2401) 12339.6	(22-2401) 14636.9	(22-2401) 14842.2	(22-2401) 14842.2
96	(22-2401) 12087.0	(22-2401) 12361.6	(22-2401) 12514.7	(22-2401) 14853.2	(22-2401) 15058.5	(22-2401) 15058.5
97	(22-2401) 12262.1	(22-2401) 12536.7	(22-2401) 12689.8	(22-2401) 15069.5	(22-2401) 15274.8	(22-2401) 15274.8
98	(22-2401) 12437.2	(22-2401) 12711.8	(22-2401) 12864.9	(22-2401) 15285.8	(22-2401) 15491.1	(22-2401) 15491.1
99	(22-2401) 12612.3	(22-2401) 12886.9	(22-2401) 13040.0	(22-2401) 15502.1	(22-2401) 15707.4	(22-2401) 15707.4
100	(22-2401) 12787.4	(22-2401) 13062.0	(22-2401) 13215.1	(22-2401) 15718.4	(22-2401) 15923.7	(22-2401) 15923.7

Z	K11		K12		K13		K14		L1		L2	
	STATE	AE	STATE	AE	STATE	AE	STATE	AE	STATE	AE	STATE	AE
37	(2p+4s) 11 6748.4	(2p+4s) 11 7109.8	(2s 4p+1) 7042.9	(2s 4p+1) 7042.9	(2s 4p+1) 7290.0	(2s 4p+1) 7290.0	(2s 4p+1) 7474.5	(2s 4p+1) 7474.5	(2s 4p+1) 7072.2	(2s 4p+1) 7072.2	(2s 4p+1) 7072.2	(2s 4p+1) 7072.2
38	(2p+4s) 11 7263.5	(2p+4s) 11 7411.0	(2s 4p+1) 7406.8	(2s 4p+1) 7406.8	(2s 4p+1) 7698.7	(2s 4p+1) 7698.7	(2s 4p+1) 7878.4	(2s 4p+1) 7878.4	(2s 4p+1) 7373.4	(2s 4p+1) 7373.4	(2s 4p+1) 7373.4	(2s 4p+1) 7373.4
39	(2p+4s) 11 7365.9	(2p+4s) 11 7719.8	(2s 4p+1) 7958.4	(2s 4p+1) 7958.4	(2s 4p+1) 8014.6	(2s 4p+1) 8014.6	(2s 4p+1) 8122.2	(2s 4p+1) 8122.2	(2s 4p+1) 7472.1	(2s 4p+1) 7472.1	(2s 4p+1) 7472.1	(2s 4p+1) 7472.1
40	(2p+4s) 11 7873.5	(2p+4s) 11 8034.1	(2s 4p+1) 8277.3	(2s 4p+1) 8277.3	(2s 4p+1) 8328.1	(2s 4p+1) 8328.1	(2s 4p+1) 8431.9	(2s 4p+1) 8431.9	(2s 4p+1) 7574.7	(2s 4p+1) 7574.7	(2s 4p+1) 7574.7	(2s 4p+1) 7574.7
41	(2p+4s) 11 8152.2	(2p+4s) 11 8340.2	(2s 4p+1) 8404.7	(2s 4p+1) 8404.7	(2s 4p+1) 8540.7	(2s 4p+1) 8540.7	(2s 4p+1) 8646.1	(2s 4p+1) 8646.1	(2s 4p+1) 7674.1	(2s 4p+1) 7674.1	(2s 4p+1) 7674.1	(2s 4p+1) 7674.1
42	(2p+4s) 11 8517.2	(2p+4s) 11 8672.1	(2s 4p+1) 8928.5	(2s 4p+1) 8928.5	(2s 4p+1) 9008.9	(2s 4p+1) 9008.9	(2s 4p+1) 9104.0	(2s 4p+1) 9104.0	(2s 4p+1) 7774.1	(2s 4p+1) 7774.1	(2s 4p+1) 7774.1	(2s 4p+1) 7774.1
43	(2p+4s) 11 8849.5	(2p+4s) 11 9032.0	(2s 4p+1) 9280.7	(2s 4p+1) 9280.7	(2s 4p+1) 9356.3	(2s 4p+1) 9356.3	(2s 4p+1) 9454.0	(2s 4p+1) 9454.0	(2s 4p+1) 7874.1	(2s 4p+1) 7874.1	(2s 4p+1) 7874.1	(2s 4p+1) 7874.1
44	(2p+4s) 11 9189.5	(2p+4s) 11 9380.1	(2s 4p+1) 9620.7	(2s 4p+1) 9620.7	(2s 4p+1) 9712.2	(2s 4p+1) 9712.2	(2s 4p+1) 9814.0	(2s 4p+1) 9814.0	(2s 4p+1) 7974.1	(2s 4p+1) 7974.1	(2s 4p+1) 7974.1	(2s 4p+1) 7974.1
45	(2p+4s) 11 9537.5	(2p+4s) 11 9734.2	(2s 4p+1) 9988.9	(2s 4p+1) 9988.9	(2s 4p+1) 10076.4	(2s 4p+1) 10076.4	(2s 4p+1) 10174.0	(2s 4p+1) 10174.0	(2s 4p+1) 8074.1	(2s 4p+1) 8074.1	(2s 4p+1) 8074.1	(2s 4p+1) 8074.1
46	(2p+4s) 11 9873.4	(2p+4s) 11 10101.0	(2s 4p+1) 10355.2	(2s 4p+1) 10355.2	(2s 4p+1) 10444.1	(2s 4p+1) 10444.1	(2s 4p+1) 10542.0	(2s 4p+1) 10542.0	(2s 4p+1) 8174.1	(2s 4p+1) 8174.1	(2s 4p+1) 8174.1	(2s 4p+1) 8174.1
47	(2p+4s) 11 10257.4	(2p+4s) 11 10474.2	(2s 4p+1) 10722.9	(2s 4p+1) 10722.9	(2s 4p+1) 10812.0	(2s 4p+1) 10812.0	(2s 4p+1) 10910.0	(2s 4p+1) 10910.0	(2s 4p+1) 8274.1	(2s 4p+1) 8274.1	(2s 4p+1) 8274.1	(2s 4p+1) 8274.1
48	(2p+4s) 11 10630.0	(2p+4s) 11 10854.2	(2s 4p+1) 11113.1	(2s 4p+1) 11113.1	(2s 4p+1) 11202.0	(2s 4p+1) 11202.0	(2s 4p+1) 11300.0	(2s 4p+1) 11300.0	(2s 4p+1) 8374.1	(2s 4p+1) 8374.1	(2s 4p+1) 8374.1	(2s 4p+1) 8374.1
49	(2p+4s) 11 11010.0	(2p+4s) 11 11247.0	(2s 4p+1) 11504.9	(2s 4p+1) 11504.9	(2s 4p+1) 11594.0	(2s 4p+1) 11594.0	(2s 4p+1) 11692.0	(2s 4p+1) 11692.0	(2s 4p+1) 8474.1	(2s 4p+1) 8474.1	(2s 4p+1) 8474.1	(2s 4p+1) 8474.1
50	(2p+4s) 11 11400.0	(2p+4s) 11 11646.8	(2s 4p+1) 11905.5	(2s 4p+1) 11905.5	(2s 4p+1) 12000.0	(2s 4p+1) 12000.0	(2s 4p+1) 12100.0	(2s 4p+1) 12100.0	(2s 4p+1) 8574.1	(2s 4p+1) 8574.1	(2s 4p+1) 8574.1	(2s 4p+1) 8574.1
51	(2p+4s) 11 11798.8	(2p+4s) 11 12055.9	(2s 4p+1) 12319.0	(2s 4p+1) 12319.0	(2s 4p+1) 12414.0	(2s 4p+1) 12414.0	(2s 4p+1) 12514.0	(2s 4p+1) 12514.0	(2s 4p+1) 8674.1	(2s 4p+1) 8674.1	(2s 4p+1) 8674.1	(2s 4p+1) 8674.1
52	(2p+4s) 11 12209.8	(2p+4s) 11 12474.2	(2s 4p+1) 12733.7	(2s 4p+1) 12733.7	(2s 4p+1) 12830.0	(2s 4p+1) 12830.0	(2s 4p+1) 12930.0	(2s 4p+1) 12930.0	(2s 4p+1) 8774.1	(2s 4p+1) 8774.1	(2s 4p+1) 8774.1	(2s 4p+1) 8774.1
53	(2p+4s) 11 12621.7	(2p+4s) 11 12892.3	(2s 4p+1) 13161.7	(2s 4p+1) 13161.7	(2s 4p+1) 13258.0	(2s 4p+1) 13258.0	(2s 4p+1) 13358.0	(2s 4p+1) 13358.0	(2s 4p+1) 8874.1	(2s 4p+1) 8874.1	(2s 4p+1) 8874.1	(2s 4p+1) 8874.1
54	(2p+4s) 11 13047.2	(2p+4s) 11 13340.1	(2s 4p+1) 13599.1	(2s 4p+1) 13599.1	(2s 4p+1) 13696.0	(2s 4p+1) 13696.0	(2s 4p+1) 13796.0	(2s 4p+1) 13796.0	(2s 4p+1) 8974.1	(2s 4p+1) 8974.1	(2s 4p+1) 8974.1	(2s 4p+1) 8974.1
55	(2p+4s) 11 13482.0	(2p+4s) 11 13788.0	(2s 4p+1) 14044.3	(2s 4p+1) 14044.3	(2s 4p+1) 14142.0	(2s 4p+1) 14142.0	(2s 4p+1) 14242.0	(2s 4p+1) 14242.0	(2s 4p+1) 9074.1	(2s 4p+1) 9074.1	(2s 4p+1) 9074.1	(2s 4p+1) 9074.1
56	(2p+4s) 11 13925.5	(2p+4s) 11 14244.0	(2s 4p+1) 14503.4	(2s 4p+1) 14503.4	(2s 4p+1) 14602.0	(2s 4p+1) 14602.0	(2s 4p+1) 14702.0	(2s 4p+1) 14702.0	(2s 4p+1) 9174.1	(2s 4p+1) 9174.1	(2s 4p+1) 9174.1	(2s 4p+1) 9174.1
57	(2p+4s) 11 14380.8	(2p+4s) 11 14714.3	(2s 4p+1) 14970.3	(2s 4p+1) 14970.3	(2s 4p+1) 15070.0	(2s 4p+1) 15070.0	(2s 4p+1) 15170.0	(2s 4p+1) 15170.0	(2s 4p+1) 9274.1	(2s 4p+1) 9274.1	(2s 4p+1) 9274.1	(2s 4p+1) 9274.1
58	(2p+4s) 11 14844.2	(2p+4s) 11 15194.2	(2s 4p+1) 15444.0	(2s 4p+1) 15444.0	(2s 4p+1) 15544.0	(2s 4p+1) 15544.0	(2s 4p+1) 15644.0	(2s 4p+1) 15644.0	(2s 4p+1) 9374.1	(2s 4p+1) 9374.1	(2s 4p+1) 9374.1	(2s 4p+1) 9374.1
59	(2p+4s) 11 15319.8	(2p+4s) 11 15682.7	(2s 4p+1) 15924.1	(2s 4p+1) 15924.1	(2s 4p+1) 16024.0	(2s 4p+1) 16024.0	(2s 4p+1) 16124.0	(2s 4p+1) 16124.0	(2s 4p+1) 9474.1	(2s 4p+1) 9474.1	(2s 4p+1) 9474.1	(2s 4p+1) 9474.1
60	(2p+4s) 11 15804.9	(2p+4s) 11 16184.9	(2s 4p+1) 16404.9	(2s 4p+1) 16404.9	(2s 4p+1) 16504.0	(2s 4p+1) 16504.0	(2s 4p+1) 16604.0	(2s 4p+1) 16604.0	(2s 4p+1) 9574.1	(2s 4p+1) 9574.1	(2s 4p+1) 9574.1	(2s 4p+1) 9574.1
61	(2p+4s) 11 16300.7	(2p+4s) 11 16697.4	(2s 4p+1) 16894.8	(2s 4p+1) 16894.8	(2s 4p+1) 17000.0	(2s 4p+1) 17000.0	(2s 4p+1) 17100.0	(2s 4p+1) 17100.0	(2s 4p+1) 9674.1	(2s 4p+1) 9674.1	(2s 4p+1) 9674.1	(2s 4p+1) 9674.1
62	(2p+4s) 11 16807.3	(2p+4s) 11 17222.1	(2s 4p+1) 17466.1	(2s 4p+1) 17466.1	(2s 4p+1) 17572.0	(2s 4p+1) 17572.0	(2s 4p+1) 17672.0	(2s 4p+1) 17672.0	(2s 4p+1) 9774.1	(2s 4p+1) 9774.1	(2s 4p+1) 9774.1	(2s 4p+1) 9774.1
63	(2p+4s) 11 17325.8	(2p+4s) 11 17757.8	(2s 4p+1) 18057.4	(2s 4p+1) 18057.4	(2s 4p+1) 18164.0	(2s 4p+1) 18164.0	(2s 4p+1) 18272.0	(2s 4p+1) 18272.0	(2s 4p+1) 9874.1	(2s 4p+1) 9874.1	(2s 4p+1) 9874.1	(2s 4p+1) 9874.1
64	(2p+4s) 11 17855.2	(2p+4s) 11 18297.8	(2s 4p+1) 18654.7	(2s 4p+1) 18654.7	(2s 4p+1) 18762.0	(2s 4p+1) 18762.0	(2s 4p+1) 18870.0	(2s 4p+1) 18870.0	(2s 4p+1) 9974.1	(2s 4p+1) 9974.1	(2s 4p+1) 9974.1	(2s 4p+1) 9974.1
65	(2p+4s) 11 18394.8	(2p+4s) 11 18848.9	(2s 4p+1) 19100.7	(2s 4p+1) 19100.7	(2s 4p+1) 19208.0	(2s 4p+1) 19208.0	(2s 4p+1) 19316.0	(2s 4p+1) 19316.0	(2s 4p+1) 10074.1	(2s 4p+1) 10074.1	(2s 4p+1) 10074.1	(2s 4p+1) 10074.1
66	(2p+4s) 11 18944.2	(2p+4s) 11 19414.2	(2s 4p+1) 19670.3	(2s 4p+1) 19670.3	(2s 4p+1) 19778.0	(2s 4p+1) 19778.0	(2s 4p+1) 19886.0	(2s 4p+1) 19886.0	(2s 4p+1) 10174.1	(2s 4p+1) 10174.1	(2s 4p+1) 10174.1	(2s 4p+1) 10174.1
67	(2p+4s) 11 19513.8	(2p+4s) 11 20001.3	(2s 4p+1) 20252.7	(2s 4p+1) 20252.7	(2s 4p+1) 20360.0	(2s 4p+1) 20360.0	(2s 4p+1) 20468.0	(2s 4p+1) 20468.0	(2s 4p+1) 10274.1	(2s 4p+1) 10274.1	(2s 4p+1) 10274.1	(2s 4p+1) 10274.1
68	(2p+4s) 11 20104.2	(2p+4s) 11 20604.2	(2s 4p+1) 20852.9	(2s 4p+1) 20852.9	(2s 4p+1) 20960.0	(2s 4p+1) 20960.0	(2s 4p+1) 21068.0	(2s 4p+1) 21068.0	(2s 4p+1) 10374.1	(2s 4p+1) 10374.1	(2s 4p+1) 10374.1	(2s 4p+1) 10374.1
69	(2p+4s) 11 20716.2	(2p+4s) 11 21216.2	(2s 4p+1) 21453.7	(2s 4p+1) 21453.7	(2s 4p+1) 21562.0	(2s 4p+1) 21562.0	(2s 4p+1) 21670.0	(2s 4p+1) 21670.0	(2s 4p+1) 10474.1	(2s 4p+1) 10474.1	(2s 4p+1) 10474.1	(2s 4p+1) 10474.1
70	(2p+4s) 11 21349.0	(2p+4s) 11 21877.0	(2s 4p+1) 22081.1	(2s 4p+1) 22081.1	(2s 4p+1) 22190.0	(2s 4p+1) 22190.0	(2s 4p+1) 22298.0	(2s 4p+1) 22298.0	(2s 4p+1) 10574.1	(2s 4p+1) 10574.1	(2s 4p+1) 10574.1	(2s 4p+1) 10574.1
71	(2p+4s) 11 21910.4	(2p+4s) 11 22464.4	(2s 4p+1) 22718.9	(2s 4p+1) 22718.9	(2s 4p+1) 22828.0	(2s 4p+1) 22828.0	(2s 4p+1) 22936.0	(2s 4p+1) 22936.0	(2s 4p+1) 10674.1	(2s 4p+1) 10674.1	(2s 4p+1) 10674.1	(2s 4p+1) 10674.1
72	(2p+4s) 11 22543.7	(2p+4s) 11 23183.2	(2s 4p+1) 23371.7	(2s 4p+1) 23371.7	(2s 4p+1) 23480.0	(2s 4p+1) 23480.0	(2s 4p+1) 23588.0	(2s 4p+1) 23588.0	(2s 4p+1) 10774.1	(2s 4p+1) 10774.1	(2s 4p+1) 10774.1	(2s 4p+1) 10774.1
73	(2p+4s) 11 23200.0	(2p+4s) 11 23840.0	(2s 4p+1) 24040.0	(2s 4p+1) 24040.0	(2s 4p+1) 24150.0	(2s 4p+1) 24150.0	(2s 4p+1) 24258.0	(2s 4p+1) 24258.0	(2s 4p+1) 10874.1	(2s 4p+1) 10874.1	(2s 4p+1) 10874.1	(2s 4p+1) 10874.1
74	(2p+4s) 11 23870.0	(2p+4s) 11 24480.0	(2s 4p+1) 24720.0	(2s 4p+1) 24720.0	(2s 4p+1) 24830.0	(2s 4p+1) 24830.0	(2s 4p+1) 24938.0	(2s 4p+1) 24938.0	(2s 4p+1) 10974.1	(2s 4p+1) 10974.1	(2s 4p+1) 10974.1	(2s 4p+1) 10974.1
75	(2p+4s) 11 24560.0	(2p+4s) 11 25160.0	(2s 4p+1) 25420.0	(2s 4p+1) 25420.0	(2s 4p+1) 25530.0	(2s 4p+1) 25530.0	(2s 4p+1) 25638.0	(2s 4p+1) 25638.0	(2s 4p+1) 11074.1	(2s 4p+1) 11074.1	(2s 4p+1) 11074.1	(2s 4p+1) 11074.1
76	(2p+4s) 11 25270.0	(2p+4s) 11 25870.0	(2s 4p+1) 26140.0	(2s 4p+1) 26140.0	(2s 4p+1) 26250.0	(2s 4p+1) 26250.0	(2s 4p+1) 26358.0	(2s 4p+1) 26358.0	(2s 4p+1) 11174.1	(2s 4p+1) 11174.1	(2s 4p+1) 11174.1	(2s 4p+1) 11174.1
77	(2p+4s) 11 26000.0	(2p+4s) 11 26600.0	(2s 4p+1) 26880.0	(2s 4p+1) 26880.0	(2s 4p+1) 26990.0	(2s 4p+1) 26990.0	(2s 4p+1) 27098.0	(2s 4p+1) 27098.0	(2s 4p+1) 11274.1	(2s 4p+1) 11274.1	(2s 4p+1) 11274.1	(2s 4p+1) 11274.1
78	(2p+4s) 11 26750.0	(2p+4s) 11 27350.0	(2s 4p+1) 27640.0	(2s 4p+1) 27640.0	(2s 4p+1) 27750.0	(2s 4p+1) 27750.0	(2s 4p+1) 27858.0	(2s 4p+1) 27858.0	(2s 4p+1) 11374.1	(2s 4p+1) 11374.1	(2s 4p+1) 11374.1	(2s 4p+1) 11374.1
79	(2p+4s) 11 27520.0	(2p+4s) 11 28120.0	(2s 4p+1) 28420.0	(2s 4p+1) 28420.0	(2s 4p+1) 28530.0	(2s 4p+1) 28530.0	(2s 4p+1) 28638.0	(2s 4p+1) 28638.0	(2s 4p+1) 11474.1	(2s 4p+1) 11474.1	(2s 4p+1) 11474.1	(2s 4p+1) 11474.1
80	(2p+4s) 11 28310.0	(2p+4s) 11 28910.0	(2s 4p+1) 29220.0	(2s 4p+1) 29220.0	(2s 4p+1) 29330.0	(2s 4p+1) 29330.0	(2s 4p+1) 29438.0	(2s 4p+1) 29438.0	(2s 4p+1) 11574.1	(2s 4p+1) 11574.1	(2s 4p+1) 11574.1	(2s 4p+1) 11574.1
81	(2p+4s) 11 29120.0	(2p+4s) 11 29720.0	(2s 4p+1) 30040.0	(2s 4p+1) 30040.0	(2s 4p+1) 30150.0	(2s 4p+1) 30150.0	(2s 4p+1) 30258.0	(2s 4p+1) 30258.0	(2s 4p+1) 11674.1	(2s 4p+1) 11674.1	(2s 4p+1) 11674.1	(2s 4p+1) 11674.1
82	(2p+4s) 11 29950.0	(2p+4s) 11 30550.0	(2s 4p+1) 30880.0	(2s 4p+1) 30880.0	(2s 4p+1) 30990.0	(2s 4p+1) 30990.0	(2s 4p+1) 31098.0	(2s 4p+1) 31098.0	(2s 4p+1) 11774.1	(2s 4p+1) 11774.1</		

L9		L10		L11		L12		L13		M1	
1	STATE	AE	STATE	AE	STATE	AE	STATE	AE	STATE	AE	
22	(2p 4p12)	629.4	(2p 4p12)	644.0	(2p 4p12)	644.1	(2p 4p12)	729.4	(2p 4p12)	744.8	
23	(2p 4p12)	722.2	(2p 4p12)	730.1	(2p 4p12)	730.2	(2p 4p12)	809.4	(2p 4p12)	809.4	
24	(2p 4p12)	811.1	(2p 4p12)	811.1	(2p 4p12)	821.7	(2p 4p12)	911.4	(2p 4p12)	911.4	
25	(2p 4p12)	901.1	(2p 4p12)	918.4	(2p 4p12)	918.4	(2p 4p12)	1018.6	(2p 4p12)	1040.7	
26	(2p 4p12)	1006.9	(2p 4p12)	1020.6	(2p 4p12)	1020.9	(2p 4p12)	1129.9	(2p 4p12)	1149.9	
27	(2p 4p12)	1112.6	(2p 4p12)	1128.3	(2p 4p12)	1128.6	(2p 4p12)	1229.6	(2p 4p12)	1242.8	
28	(2p 4p12)	1224.0	(2p 4p12)	1241.4	(2p 4p12)	1241.6	(2p 4p12)	1329.7	(2p 4p12)	1362.6	
29	(2p 4p12)	1329.5	(2p 4p12)	1350.0	(2p 4p12)	1350.4	(2p 4p12)	1449.3	(2p 4p12)	1480.9	
30	(2p 4p12)	1440.2	(2p 4p12)	1464.1	(2p 4p12)	1464.7	(2p 4p12)	1549.7	(2p 4p12)	1579.8	
31	(2p 4p12)	1536.0	(2p 4p12)	1561.3	(2p 4p12)	1561.4	(2p 4p12)	1649.4	(2p 4p12)	1679.3	
32	(2p 4p12)	1717.0	(2p 4p12)	1749.1	(2p 4p12)	1749.8	(2p 4p12)	1849.1	(2p 4p12)	1879.4	
33	(2p 4p12)	1832.1	(2p 4p12)	1870.1	(2p 4p12)	1870.9	(2p 4p12)	1949.1	(2p 4p12)	1979.3	
34	(2p 4p12)	1994.4	(2p 4p12)	2026.7	(2p 4p12)	2027.0	(2p 4p12)	2119.2	(2p 4p12)	2149.7	
35	(2p 4p12)	2146.9	(2p 4p12)	2179.0	(2p 4p12)	2180.0	(2p 4p12)	2249.9	(2p 4p12)	2279.5	
36	(2p 4p12)	2292.5	(2p 4p12)	2324.7	(2p 4p12)	2324.8	(2p 4p12)	2399.4	(2p 4p12)	2429.5	
37	(2p 4p12)	2449.7	(2p 4p12)	2481.0	(2p 4p12)	2481.3	(2p 4p12)	2549.7	(2p 4p12)	2579.8	
38	(2p 4p12)	2611.2	(2p 4p12)	2643.0	(2p 4p12)	2643.3	(2p 4p12)	2699.7	(2p 4p12)	2729.8	
39	(2p 4p12)	2779.4	(2p 4p12)	2811.9	(2p 4p12)	2812.4	(2p 4p12)	2869.7	(2p 4p12)	2899.8	
40	(2p 4p12)	2946.9	(2p 4p12)	2979.1	(2p 4p12)	2979.4	(2p 4p12)	3029.7	(2p 4p12)	3059.8	
41	(2p 4p12)	3028.4	(2p 4p12)	3060.6	(2p 4p12)	3060.9	(2p 4p12)	3119.7	(2p 4p12)	3149.8	
42	(2p 4p12)	3211.1	(2p 4p12)	3243.3	(2p 4p12)	3243.3	(2p 4p12)	3299.7	(2p 4p12)	3329.8	
43	(2p 4p12)	3399.1	(2p 4p12)	3431.3	(2p 4p12)	3431.6	(2p 4p12)	3489.7	(2p 4p12)	3519.8	
44	(2p 4p12)	3592.4	(2p 4p12)	3624.6	(2p 4p12)	3624.9	(2p 4p12)	3679.7	(2p 4p12)	3709.8	
45	(2p 4p12)	3740.9	(2p 4p12)	3773.1	(2p 4p12)	3773.4	(2p 4p12)	3829.7	(2p 4p12)	3859.8	
46	(2p 4p12)	3934.5	(2p 4p12)	3966.7	(2p 4p12)	3967.0	(2p 4p12)	4019.7	(2p 4p12)	4049.8	
47	(2p 4p12)	4128.1	(2p 4p12)	4160.3	(2p 4p12)	4160.6	(2p 4p12)	4219.7	(2p 4p12)	4249.8	
48	(2p 4p12)	4321.7	(2p 4p12)	4353.9	(2p 4p12)	4354.2	(2p 4p12)	4419.7	(2p 4p12)	4449.8	
49	(2p 4p12)	4515.3	(2p 4p12)	4547.5	(2p 4p12)	4547.8	(2p 4p12)	4619.7	(2p 4p12)	4649.8	
50	(2p 4p12)	4708.9	(2p 4p12)	4741.1	(2p 4p12)	4741.4	(2p 4p12)	4819.7	(2p 4p12)	4849.8	
51	(2p 4p12)	4902.5	(2p 4p12)	4934.7	(2p 4p12)	4935.0	(2p 4p12)	4999.7	(2p 4p12)	5029.8	
52	(2p 4p12)	5096.1	(2p 4p12)	5128.3	(2p 4p12)	5128.6	(2p 4p12)	5199.7	(2p 4p12)	5229.8	
53	(2p 4p12)	5289.7	(2p 4p12)	5321.9	(2p 4p12)	5322.2	(2p 4p12)	5399.7	(2p 4p12)	5429.8	
54	(2p 4p12)	5483.3	(2p 4p12)	5515.5	(2p 4p12)	5515.8	(2p 4p12)	5599.7	(2p 4p12)	5629.8	
55	(2p 4p12)	5676.9	(2p 4p12)	5709.1	(2p 4p12)	5709.4	(2p 4p12)	5799.7	(2p 4p12)	5829.8	
56	(2p 4p12)	5870.5	(2p 4p12)	5902.7	(2p 4p12)	5903.0	(2p 4p12)	5999.7	(2p 4p12)	6029.8	
57	(2p 4p12)	6064.1	(2p 4p12)	6096.3	(2p 4p12)	6096.6	(2p 4p12)	6199.7	(2p 4p12)	6229.8	
58	(2p 4p12)	6257.7	(2p 4p12)	6289.9	(2p 4p12)	6290.2	(2p 4p12)	6399.7	(2p 4p12)	6429.8	
59	(2p 4p12)	6451.3	(2p 4p12)	6483.5	(2p 4p12)	6483.8	(2p 4p12)	6599.7	(2p 4p12)	6629.8	
60	(2p 4p12)	6644.9	(2p 4p12)	6677.1	(2p 4p12)	6677.4	(2p 4p12)	6799.7	(2p 4p12)	6829.8	
61	(2p 4p12)	6838.5	(2p 4p12)	6870.7	(2p 4p12)	6871.0	(2p 4p12)	6999.7	(2p 4p12)	7029.8	
62	(2p 4p12)	7032.1	(2p 4p12)	7064.3	(2p 4p12)	7064.6	(2p 4p12)	7199.7	(2p 4p12)	7229.8	
63	(2p 4p12)	7225.7	(2p 4p12)	7257.9	(2p 4p12)	7258.2	(2p 4p12)	7399.7	(2p 4p12)	7429.8	
64	(2p 4p12)	7419.3	(2p 4p12)	7451.5	(2p 4p12)	7451.8	(2p 4p12)	7599.7	(2p 4p12)	7629.8	
65	(2p 4p12)	7612.9	(2p 4p12)	7645.1	(2p 4p12)	7645.4	(2p 4p12)	7799.7	(2p 4p12)	7829.8	
66	(2p 4p12)	7806.5	(2p 4p12)	7838.7	(2p 4p12)	7839.0	(2p 4p12)	7999.7	(2p 4p12)	8029.8	
67	(2p 4p12)	8000.1	(2p 4p12)	8032.3	(2p 4p12)	8032.6	(2p 4p12)	8199.7	(2p 4p12)	8229.8	
68	(2p 4p12)	8193.7	(2p 4p12)	8225.9	(2p 4p12)	8226.2	(2p 4p12)	8399.7	(2p 4p12)	8429.8	
69	(2p 4p12)	8387.3	(2p 4p12)	8419.5	(2p 4p12)	8419.8	(2p 4p12)	8599.7	(2p 4p12)	8629.8	
70	(2p 4p12)	8580.9	(2p 4p12)	8613.1	(2p 4p12)	8613.4	(2p 4p12)	8799.7	(2p 4p12)	8829.8	
71	(2p 4p12)	8774.5	(2p 4p12)	8806.7	(2p 4p12)	8807.0	(2p 4p12)	8999.7	(2p 4p12)	9029.8	
72	(2p 4p12)	8968.1	(2p 4p12)	9000.3	(2p 4p12)	9000.6	(2p 4p12)	9199.7	(2p 4p12)	9229.8	
73	(2p 4p12)	9161.7	(2p 4p12)	9193.9	(2p 4p12)	9194.2	(2p 4p12)	9399.7	(2p 4p12)	9429.8	
74	(2p 4p12)	9355.3	(2p 4p12)	9387.5	(2p 4p12)	9387.8	(2p 4p12)	9599.7	(2p 4p12)	9629.8	
75	(2p 4p12)	9548.9	(2p 4p12)	9581.1	(2p 4p12)	9581.4	(2p 4p12)	9799.7	(2p 4p12)	9829.8	
76	(2p 4p12)	9742.5	(2p 4p12)	9774.7	(2p 4p12)	9775.0	(2p 4p12)	9999.7	(2p 4p12)	10029.8	
77	(2p 4p12)	9936.1	(2p 4p12)	9968.3	(2p 4p12)	9968.6	(2p 4p12)	10199.7	(2p 4p12)	10229.8	
78	(2p 4p12)	10129.7	(2p 4p12)	10161.9	(2p 4p12)	10162.2	(2p 4p12)	10399.7	(2p 4p12)	10429.8	
79	(2p 4p12)	10323.3	(2p 4p12)	10355.5	(2p 4p12)	10355.8	(2p 4p12)	10599.7	(2p 4p12)	10629.8	
80	(2p 4p12)	10516.9	(2p 4p12)	10549.1	(2p 4p12)	10549.4	(2p 4p12)	10799.7	(2p 4p12)	10829.8	
81	(2p 4p12)	10710.5	(2p 4p12)	10742.7	(2p 4p12)	10743.0	(2p 4p12)	10999.7	(2p 4p12)	11029.8	
82	(2p 4p12)	10904.1	(2p 4p12)	10936.3	(2p 4p12)	10936.6	(2p 4p12)	11199.7	(2p 4p12)	11229.8	
83	(2p 4p12)	11097.7	(2p 4p12)	11129.9	(2p 4p12)	11130.2	(2p 4p12)	11399.7	(2p 4p12)	11429.8	
84	(2p 4p12)	11291.3	(2p 4p12)	11323.5	(2p 4p12)	11323.8	(2p 4p12)	11599.7	(2p 4p12)	11629.8	
85	(2p 4p12)	11484.9	(2p 4p12)	11517.1	(2p 4p12)	11517.4	(2p 4p12)	11799.7	(2p 4p12)	11829.8	
86	(2p 4p12)	11678.5	(2p 4p12)	11710.7	(2p 4p12)	11711.0	(2p 4p12)	11999.7	(2p 4p12)	12029.8	
87	(2p 4p12)	11872.1	(2p 4p12)	11904.3	(2p 4p12)	11904.6	(2p 4p12)	12199.7	(2p 4p12)	12229.8	
88	(2p 4p12)	12065.7	(2p 4p12)	12097.9	(2p 4p12)	12098.2	(2p 4p12)	12399.7	(2p 4p12)	12429.8	
89	(2p 4p12)	12259.3	(2p 4p12)	12291.5	(2p 4p12)	12291.8	(2p 4p12)	12599.7	(2p 4p12)	12629.8	
90	(2p 4p12)	12452.9	(2p 4p12)	12485.1	(2p 4p12)	12485.4	(2p 4p12)	12799.7	(2p 4p12)	12829.8	
91	(2p 4p12)	12646.5	(2p 4p12)	12678.7	(2p 4p12)	12679.0	(2p 4p12)	12999.7	(2p 4p12)	13029.8	
92	(2p 4p12)	12840.1	(2p 4p12)	12872.3	(2p 4p12)	12872.6	(2p 4p12)	13199.7	(2p 4p12)	13229.8	
93	(2p 4p12)	13033.7	(2p 4p12)	13065.9	(2p 4p12)	13066.2	(2p 4p12)	13399.7	(2p 4p12)	13429.8	
94	(2p 4p12)	13227.3	(2p 4p12)	13259.5	(2p 4p12)	13259.8	(2p 4p12)	13599.7	(2p 4p12)	13629.8	
95	(2p 4p12)	13420.9	(2p 4p12)	13453.1	(2p 4p12)	13453.4	(2p 4p12)	13799.7	(2p 4p12)	13829.8	
96	(2p 4p12)	13614.5	(2p 4p12)	13646.7	(2p 4p12)	13647.0	(2p 4p12)	13999.7	(2p 4p12)	14029.8	
97	(2p 4p12)	13808.1	(2p 4p12)	13840.3	(2p 4p12)	13840.6	(2p 4p12)	14199.7	(2p 4p12)	14229.8	
98	(2p 4p12)	14001.7	(2p 4p12)	14033.9	(2p 4p12)	14034.2	(2p 4p12)	14399.7	(2p 4p12)	14429.8	
99	(2p 4p12)	14195.3	(2p 4p12)	14227.5	(2p 4p12)	14227.8	(2p 4p12)	14599.7	(2p 4p12)	14629.8	
100	(2p 4p12)	14388.9	(2p 4p12)	14421.1	(2p 4p12)	14421.4	(2p 4p12)	14799.7	(2p 4p12)	14829.8	
101	(2p 4p12)	14582.5	(2p 4p12)	14614.7	(2p 4p12)	14615.0	(2p 4p12)	14999.7	(2p 4p12)	15029.8	
102	(2p 4p12)	14776.1	(2p 4p12)	14808.3	(2p 4p12)	14808.6	(2p 4p12)	15199.7	(2p 4p12)	15229.8	
103	(2p 4p12)	14969.7	(2p 4p12)	15001.9	(2p 4p12)	15002.2	(2p 4p12)	15399.7	(2p 4p12)	15429.8	
104	(2p 4p12)	15163.3	(2p 4p12)	15195.5	(2p 4p12)	15195.8	(2p 4p12)	15599.7	(2p 4p12)	15629.8	
105	(2p 4p12)	15356.9	(2p 4p12)	15389.1	(2p 4p12)	15389.4	(2p 4p12)	15799.7	(2p 4p12)	15829.8	
106	(2p 4p12)	15550.5	(2p 4p12)	15582.7	(2p 4p12)	15583.0	(2p 4p12)	15999.7	(2p 4p12)	16029.8	
107	(2p 4p12)	15744.1	(2p 4p12)	15776.3	(2p 4p12)	15776.6	(2p 4p12)	16199.7	(2p 4p12)	16229.8	
108	(2p 4p12)	15937.7	(2p 4p12)	15969.9	(2p 4p12)	15970.2	(2p 4p12)	16399.7	(2p 4p12)	16429.8	
109	(2p 4p12)	16131.3	(2p 4p12)	16163.5	(2p 4p12)	16163.8	(2p 4p12)	16599.7	(2p 4p12)	16629.8	
110	(2p 4p12)	16324.9	(2p 4p12)	16357.1	(2p 4p12)	16357.4	(2p 4p12)	16799.7	(2p 4p12)	16829.8	
111	(2p 4p12)	16518.5	(2p 4p12)	16550.7	(2p 4p12)	16551.0	(2p 4p12)	16999.7	(2p 4p12)	17029.8	
112	(2p 4p12)	16712.1	(2p 4p12)	16744.3	(2p 4p12)	16744.6	(2p 4p12)	17199.7	(2p 4p12)	17229.8	
113	(2p 4p12)	16905.7	(2p 4p12)	16937.9	(2p 4p12)	16938.2	(2p 4p12)	17399.7	(2p 4p12)	17429.8	
114	(2p 4p12)	17099.3	(2p 4p12)	17131.5	(2p 4p12)	17131.8	(2p 4p12)	17599.7	(2p 4p12)	17629.8	
115	(2p 4p12)	17292.9	(2p 4p								

TABLE 1. Labeling of Levels in J₂ Coupling and Level Energies, 21562

	H2		H3		H4		H5		H6		H7	
Z	STATE	ΔE	STATE	ΔE	STATE	ΔE	STATE	ΔE	STATE	ΔE	STATE	ΔE
37	(2) 34 13 5124.3	(2) 34 13 5349.8	(2) 44 13 6472.3	(2) 44 13 6486.4	(2) 44 13 6953.8	(2) 44 13 7110.1	(2) 44 13 7418.2	(2) 44 13 7782.3	(2) 44 13 8101.4	(2) 44 13 8428.2	(2) 44 13 8742.4	(2) 44 13 9104.4
38	(2) 34 13 5329.5	(2) 34 13 5786.4	(2) 44 13 6926.3	(2) 44 13 6953.8	(2) 44 13 7210.2	(2) 44 13 7226.4	(2) 44 13 7727.9	(2) 44 13 8045.3	(2) 44 13 8270.5	(2) 44 13 8503.3	(2) 44 13 8768.7	(2) 44 13 9094.0
39	(2) 34 13 5532.7	(2) 34 13 6029.7	(2) 44 13 7210.2	(2) 44 13 7226.4	(2) 44 13 7727.9	(2) 44 13 7750.2	(2) 44 13 8270.5	(2) 44 13 8503.3	(2) 44 13 8768.7	(2) 44 13 9094.0	(2) 44 13 9455.0	(2) 44 13 9812.8
40	(2) 34 13 5718.0	(2) 34 13 6278.1	(2) 44 13 7487.1	(2) 44 13 7503.7	(2) 44 13 7984.2	(2) 44 13 8001.4	(2) 44 13 8503.3	(2) 44 13 8768.7	(2) 44 13 9094.0	(2) 44 13 9455.0	(2) 44 13 9812.8	(2) 44 13 10181.6
41	(2) 34 13 5937.3	(2) 34 13 6539.0	(2) 44 13 7744.4	(2) 44 13 7760.2	(2) 44 13 8270.5	(2) 44 13 8297.2	(2) 44 13 8768.7	(2) 44 13 9094.0	(2) 44 13 9455.0	(2) 44 13 9812.8	(2) 44 13 10181.6	(2) 44 13 10554.4
42	(2) 34 13 6175.8	(2) 34 13 6797.4	(2) 44 13 8057.0	(2) 44 13 8077.2	(2) 44 13 8503.3	(2) 44 13 8520.5	(2) 44 13 8951.9	(2) 44 13 9261.0	(2) 44 13 9573.4	(2) 44 13 9883.3	(2) 44 13 10220.4	(2) 44 13 10551.0
43	(2) 34 13 6398.3	(2) 34 13 7046.4	(2) 44 13 8320.0	(2) 44 13 8371.5	(2) 44 13 8648.3	(2) 44 13 8671.0	(2) 44 13 8951.9	(2) 44 13 9261.0	(2) 44 13 9573.4	(2) 44 13 9883.3	(2) 44 13 10220.4	(2) 44 13 10551.0
44	(2) 34 13 6624.9	(2) 34 13 7242.4	(2) 44 13 8648.3	(2) 44 13 8671.0	(2) 44 13 8951.9	(2) 44 13 8976.5	(2) 44 13 9261.0	(2) 44 13 9573.4	(2) 44 13 9883.3	(2) 44 13 10220.4	(2) 44 13 10551.0	(2) 44 13 10887.1
45	(2) 34 13 6855.4	(2) 34 13 7425.4	(2) 44 13 8951.9	(2) 44 13 8976.5	(2) 44 13 9261.0	(2) 44 13 9287.1	(2) 44 13 9573.4	(2) 44 13 9883.3	(2) 44 13 10220.4	(2) 44 13 10551.0	(2) 44 13 10887.1	(2) 44 13 11228.5
46	(2) 34 13 7090.4	(2) 34 13 7718.1	(2) 44 13 9261.0	(2) 44 13 9287.1	(2) 44 13 9573.4	(2) 44 13 9603.3	(2) 44 13 9883.3	(2) 44 13 10220.4	(2) 44 13 10551.0	(2) 44 13 10887.1	(2) 44 13 11228.5	(2) 44 13 11575.5
47	(2) 34 13 7329.3	(2) 34 13 8013.3	(2) 44 13 9573.4	(2) 44 13 9603.3	(2) 44 13 9883.3	(2) 44 13 9924.9	(2) 44 13 10220.4	(2) 44 13 10551.0	(2) 44 13 10887.1	(2) 44 13 11228.5	(2) 44 13 11575.5	(2) 44 13 11927.9
48	(2) 34 13 7572.4	(2) 34 13 8216.2	(2) 44 13 9883.3	(2) 44 13 9924.9	(2) 44 13 10220.4	(2) 44 13 10232.0	(2) 44 13 10551.0	(2) 44 13 10887.1	(2) 44 13 11228.5	(2) 44 13 11575.5	(2) 44 13 11927.9	(2) 44 13 12285.8
49	(2) 34 13 7819.4	(2) 34 13 8422.7	(2) 44 13 10220.4	(2) 44 13 10232.0	(2) 44 13 10551.0	(2) 44 13 10584.4	(2) 44 13 10887.1	(2) 44 13 11228.5	(2) 44 13 11575.5	(2) 44 13 11927.9	(2) 44 13 12285.8	(2) 44 13 12649.1
50	(2) 34 13 8079.3	(2) 34 13 8631.1	(2) 44 13 10551.0	(2) 44 13 10584.4	(2) 44 13 10887.1	(2) 44 13 10922.8	(2) 44 13 11228.5	(2) 44 13 11575.5	(2) 44 13 11927.9	(2) 44 13 12285.8	(2) 44 13 12649.1	(2) 44 13 13017.9
51	(2) 34 13 8328.4	(2) 34 13 8874.4	(2) 44 13 10887.1	(2) 44 13 10922.8	(2) 44 13 11228.5	(2) 44 13 11254.4	(2) 44 13 11575.5	(2) 44 13 11927.9	(2) 44 13 12285.8	(2) 44 13 12649.1	(2) 44 13 13017.9	(2) 44 13 13392.3
52	(2) 34 13 8584.4	(2) 34 13 9113.8	(2) 44 13 11228.5	(2) 44 13 11254.4	(2) 44 13 11575.5	(2) 44 13 11615.7	(2) 44 13 11927.9	(2) 44 13 12285.8	(2) 44 13 12649.1	(2) 44 13 13017.9	(2) 44 13 13392.3	(2) 44 13 13772.1
53	(2) 34 13 8850.4	(2) 34 13 9314.0	(2) 44 13 11575.5	(2) 44 13 11615.7	(2) 44 13 11927.9	(2) 44 13 12285.8	(2) 44 13 12649.1	(2) 44 13 13017.9	(2) 44 13 13392.3	(2) 44 13 13772.1	(2) 44 13 14157.5	(2) 44 13 14548.5
54	(2) 34 13 9119.7	(2) 34 13 9514.0	(2) 44 13 11927.9	(2) 44 13 12285.8	(2) 44 13 12649.1	(2) 44 13 12696.8	(2) 44 13 13017.9	(2) 44 13 13392.3	(2) 44 13 13772.1	(2) 44 13 14157.5	(2) 44 13 14548.5	(2) 44 13 14940.4
55	(2) 34 13 9391.1	(2) 34 13 9746.2	(2) 44 13 12285.8	(2) 44 13 12649.1	(2) 44 13 12696.8	(2) 44 13 13017.9	(2) 44 13 13392.3	(2) 44 13 13772.1	(2) 44 13 14157.5	(2) 44 13 14548.5	(2) 44 13 14940.4	(2) 44 13 15347.0
56	(2) 34 13 9647.9	(2) 34 13 10007.2	(2) 44 13 12649.1	(2) 44 13 13017.9	(2) 44 13 13392.3	(2) 44 13 13443.7	(2) 44 13 13772.1	(2) 44 13 14157.5	(2) 44 13 14548.5	(2) 44 13 14940.4	(2) 44 13 15347.0	(2) 44 13 15754.7
57	(2) 34 13 9948.9	(2) 34 13 10267.4	(2) 44 13 13017.9	(2) 44 13 13392.3	(2) 44 13 13772.1	(2) 44 13 13828.9	(2) 44 13 14157.5	(2) 44 13 14548.5	(2) 44 13 14940.4	(2) 44 13 15347.0	(2) 44 13 15754.7	(2) 44 13 16167.9
58	(2) 34 13 10234.1	(2) 34 13 10517.4	(2) 44 13 13392.3	(2) 44 13 13772.1	(2) 44 13 14157.5	(2) 44 13 14217.1	(2) 44 13 14548.5	(2) 44 13 14940.4	(2) 44 13 15347.0	(2) 44 13 15754.7	(2) 44 13 16167.9	(2) 44 13 16584.8
59	(2) 34 13 10522.7	(2) 34 13 10761.9	(2) 44 13 14157.5	(2) 44 13 14217.1	(2) 44 13 14548.5	(2) 44 13 14611.3	(2) 44 13 14940.4	(2) 44 13 15347.0	(2) 44 13 15754.7	(2) 44 13 16167.9	(2) 44 13 16584.8	(2) 44 13 17011.3
60	(2) 34 13 10811.7	(2) 34 13 11028.4	(2) 44 13 14548.5	(2) 44 13 14611.3	(2) 44 13 14940.4	(2) 44 13 15007.2	(2) 44 13 15347.0	(2) 44 13 15754.7	(2) 44 13 16167.9	(2) 44 13 16584.8	(2) 44 13 17011.3	(2) 44 13 17444.4
61	(2) 34 13 11111.9	(2) 34 13 11308.8	(2) 44 13 14940.4	(2) 44 13 15007.2	(2) 44 13 15347.0	(2) 44 13 15413.4	(2) 44 13 15754.7	(2) 44 13 16167.9	(2) 44 13 16584.8	(2) 44 13 17011.3	(2) 44 13 17444.4	(2) 44 13 17877.2
62	(2) 34 13 11404.0	(2) 34 13 11607.4	(2) 44 13 15347.0	(2) 44 13 15413.4	(2) 44 13 15754.7	(2) 44 13 15826.2	(2) 44 13 16167.9	(2) 44 13 16584.8	(2) 44 13 17011.3	(2) 44 13 17444.4	(2) 44 13 17877.2	(2) 44 13 18311.4
63	(2) 34 13 11703.4	(2) 34 13 11917.4	(2) 44 13 15754.7	(2) 44 13 15826.2	(2) 44 13 16167.9	(2) 44 13 16242.3	(2) 44 13 16584.8	(2) 44 13 17011.3	(2) 44 13 17444.4	(2) 44 13 17877.2	(2) 44 13 18311.4	(2) 44 13 18763.7
64	(2) 34 13 12006.4	(2) 34 13 12234.4	(2) 44 13 16167.9	(2) 44 13 16242.3	(2) 44 13 16584.8	(2) 44 13 16668.2	(2) 44 13 17011.3	(2) 44 13 17444.4	(2) 44 13 17877.2	(2) 44 13 18311.4	(2) 44 13 18763.7	(2) 44 13 19211.5
65	(2) 34 13 12323.3	(2) 34 13 12563.3	(2) 44 13 16584.8	(2) 44 13 16668.2	(2) 44 13 17011.3	(2) 44 13 17096.9	(2) 44 13 17444.4	(2) 44 13 17877.2	(2) 44 13 18311.4	(2) 44 13 18763.7	(2) 44 13 19211.5	(2) 44 13 19651.6
66	(2) 34 13 12647.4	(2) 34 13 12898.8	(2) 44 13 17011.3	(2) 44 13 17096.9	(2) 44 13 17444.4	(2) 44 13 17531.3	(2) 44 13 17877.2	(2) 44 13 18311.4	(2) 44 13 18763.7	(2) 44 13 19211.5	(2) 44 13 19651.6	(2) 44 13 20104.4
67	(2) 34 13 12978.2	(2) 34 13 13234.3	(2) 44 13 17444.4	(2) 44 13 17531.3	(2) 44 13 17877.2	(2) 44 13 17971.7	(2) 44 13 18311.4	(2) 44 13 18763.7	(2) 44 13 19211.5	(2) 44 13 19651.6	(2) 44 13 20104.4	(2) 44 13 20554.0
68	(2) 34 13 13324.4	(2) 34 13 13574.8	(2) 44 13 17877.2	(2) 44 13 17971.7	(2) 44 13 18311.4	(2) 44 13 18417.8	(2) 44 13 18763.7	(2) 44 13 19211.5	(2) 44 13 19651.6	(2) 44 13 20104.4	(2) 44 13 20554.0	(2) 44 13 21057.5
69	(2) 34 13 13684.7	(2) 34 13 13934.7	(2) 44 13 18311.4	(2) 44 13 18417.8	(2) 44 13 18763.7	(2) 44 13 18864.8	(2) 44 13 19211.5	(2) 44 13 19651.6	(2) 44 13 20104.4	(2) 44 13 20554.0	(2) 44 13 21057.5	(2) 44 13 21511.3
70	(2) 34 13 14057.7	(2) 34 13 14306.4	(2) 44 13 18763.7	(2) 44 13 18864.8	(2) 44 13 19211.5	(2) 44 13 19327.7	(2) 44 13 19651.6	(2) 44 13 20104.4	(2) 44 13 20554.0	(2) 44 13 21057.5	(2) 44 13 21511.3	(2) 44 13 22011.4
71	(2) 34 13 14440.2	(2) 34 13 14697.7	(2) 44 13 19211.5	(2) 44 13 19327.7	(2) 44 13 19651.6	(2) 44 13 19771.7	(2) 44 13 20104.4	(2) 44 13 20554.0	(2) 44 13 21057.5	(2) 44 13 21511.3	(2) 44 13 22011.4	(2) 44 13 22465.8
72	(2) 34 13 14847.2	(2) 34 13 15161.8	(2) 44 13 19651.6	(2) 44 13 19771.7	(2) 44 13 20104.4	(2) 44 13 20258.4	(2) 44 13 20554.0	(2) 44 13 21057.5	(2) 44 13 21511.3	(2) 44 13 22011.4	(2) 44 13 22465.8	(2) 44 13 22915.8

I	M0			M1			M2			M3						
	STATE	SE	SE	STATE	SE	SE	STATE	SE	SE	STATE	SE	SE				
22	(2)	44	13	746.9	(2)	34	14	518.0	(2)	44	14	657.7	(2)	44	14	744.8
23	(2)	44	13	829.5	(2)	34	14	582.9	(2)	44	14	722.3	(2)	44	14	829.4
24	(2)	44	13	927.5	(2)	34	14	653.4	(2)	44	14	812.3	(2)	44	14	937.4
25	(2)	44	13	1040.9	(2)	34	14	727.1	(2)	44	14	907.3	(2)	44	14	1040.9
26	(2)	44	13	1149.7	(2)	34	14	804.3	(2)	44	14	1007.9	(2)	44	14	1149.8
27	(2)	44	13	1264.0	(2)	34	14	883.4	(2)	44	14	1112.2	(2)	44	14	1264.0
28	(2)	44	13	1383.9	(2)	34	14	970.3	(2)	44	14	1222.1	(2)	44	14	1383.7
29	(2)	44	13	1509.2	(2)	34	14	1059.0	(2)	44	14	1328.4	(2)	44	14	1509.0
30	(2)	44	13	1640.1	(2)	34	14	1151.5	(2)	44	14	1439.3	(2)	44	14	1640.0
31	(2)	44	13	1776.7	(2)	34	14	1247.8	(2)	44	14	1583.1	(2)	44	14	1776.5
32	(2)	44	13	1918.9	(2)	34	14	1346.0	(2)	44	14	1716.0	(2)	44	14	1918.7
33	(2)	44	13	2064.8	(2)	34	14	1452.1	(2)	44	14	1851.2	(2)	44	14	2064.8
34	(2)	44	13	2220.5	(2)	34	14	1559.8	(2)	44	14	1992.4	(2)	44	14	2220.2
35	(2)	44	13	2379.9	(2)	34	14	1671.4	(2)	44	14	2129.9	(2)	44	14	2379.7
36	(2)	44	13	2545.2	(2)	34	14	1786.9	(2)	44	14	2271.5	(2)	44	14	2545.0
37	(2)	44	13	2714.4	(2)	34	14	1904.3	(2)	44	14	2448.3	(2)	44	14	2714.1
38	(2)	44	13	2894.5	(2)	34	14	2029.3	(2)	44	14	2510.2	(2)	44	14	2894.3
39	(2)	44	13	3074.7	(2)	34	14	2154.4	(2)	44	14	2677.7	(2)	44	14	3074.4
40	(2)	44	13	3264.9	(2)	34	14	2287.3	(2)	44	14	2744.8	(2)	44	14	3264.6
41	(2)	44	13	3461.2	(2)	34	14	2422.3	(2)	44	14	3127.4	(2)	44	14	3461.0
42	(2)	44	13	3662.7	(2)	34	14	2561.0	(2)	44	14	3310.1	(2)	44	14	3662.4
43	(2)	44	13	3870.5	(2)	34	14	2703.4	(2)	44	14	3496.1	(2)	44	14	3870.1
44	(2)	44	13	4086.5	(2)	34	14	2850.0	(2)	44	14	3691.2	(2)	44	14	4086.2
45	(2)	44	13	4305.0	(2)	34	14	3000.5	(2)	44	14	3889.9	(2)	44	14	4304.4
46	(2)	44	13	4531.9	(2)	34	14	3154.8	(2)	44	14	4093.5	(2)	44	14	4531.3
47	(2)	44	13	4763.3	(2)	34	14	3313.1	(2)	44	14	4302.4	(2)	44	14	4744.9
48	(2)	44	13	5003.4	(2)	34	14	3473.2	(2)	44	14	4516.6	(2)	44	14	5004.9
49	(2)	44	13	5232.1	(2)	34	14	3641.2	(2)	44	14	4736.1	(2)	44	14	5231.7
50	(2)	44	13	5393.4	(2)	34	14	3811.4	(2)	44	14	4940.8	(2)	44	14	5393.2
51	(2)	44	13	5744.0	(2)	34	14	3983.4	(2)	44	14	5190.9	(2)	44	14	5743.6
52	(2)	44	13	6033.4	(2)	34	14	4163.2	(2)	44	14	5426.2	(2)	44	14	6032.9
53	(2)	44	13	6307.8	(2)	34	14	4345.2	(2)	44	14	5666.8	(2)	44	14	6307.3
54	(2)	44	13	6599.3	(2)	34	14	4531.2	(2)	44	14	5912.7	(2)	44	14	6598.9
55	(2)	44	13	6878.2	(2)	34	14	4721.1	(2)	44	14	6164.0	(2)	44	14	6877.7
56	(2)	44	13	7174.7	(2)	34	14	4911.5	(2)	44	14	6420.6	(2)	44	14	7173.8
57	(2)	44	13	7478.0	(2)	34	14	5113.0	(2)	44	14	6682.2	(2)	44	14	7477.5
58	(2)	44	13	7789.2	(2)	34	14	5315.0	(2)	44	14	6949.8	(2)	44	14	7788.7
59	(2)	44	13	8108.1	(2)	34	14	5521.0	(2)	44	14	7222.3	(2)	44	14	8107.4
60	(2)	44	13	8454.9	(2)	34	14	5731.0	(2)	44	14	7500.4	(2)	44	14	8434.2
61	(2)	44	13	8784.6	(2)	34	14	5945.1	(2)	44	14	7788.0	(2)	44	14	8784.2
62	(2)	44	13	9112.4	(2)	34	14	6163.2	(2)	44	14	8072.8	(2)	44	14	9111.1
63	(2)	44	13	9462.4	(2)	34	14	6383.6	(2)	44	14	8347.1	(2)	44	14	9462.8
64	(2)	44	13	9822.7	(2)	34	14	6611.9	(2)	44	14	8666.8	(2)	44	14	9822.2
65	(2)	44	13	10190.6	(2)	34	14	6842.4	(2)	44	14	8971.9	(2)	44	14	10190.1
66	(2)	44	13	10547.2	(2)	34	14	7076.9	(2)	44	14	9282.3	(2)	44	14	10546.6
67	(2)	44	13	10912.6	(2)	34	14	7318.4	(2)	44	14	9596.2	(2)	44	14	10912.0
68	(2)	44	13	11347.0	(2)	34	14	7566.5	(2)	44	14	9910.4	(2)	44	14	11346.4
69	(2)	44	13	11750.6	(2)	34	14	7803.5	(2)	44	14	10247.1	(2)	44	14	11749.9
70	(2)	44	13	12163.5	(2)	34	14	8036.6	(2)	44	14	10579.4	(2)	44	14	12162.9
71	(2)	44	13	12593.9	(2)	34	14	8272.0	(2)	44	14	10917.7	(2)	44	14	12593.3
72	(2)	44	13	13031.3	(2)	34	14	8501.6	(2)	44	14	11261.2	(2)	44	14	13031.7
73	(2)	44	13	13464.6	(2)	34	14	8735.2	(2)	44	14	11610.4	(2)	44	14	13464.0
74	(2)	44	13	13912.6	(2)	34	14	8970.3	(2)	44	14	11965.1	(2)	44	14	13912.0
75	(2)	44	13	14373.3	(2)	34	14	9203.5	(2)	44	14	12323.4	(2)	44	14	14374.7
76	(2)	44	13	14848.4	(2)	34	14	9432.0	(2)	44	14	12681.3	(2)	44	14	14848.0
77	(2)	44	13	15332.8	(2)	34	14	9672.8	(2)	44	14	13043.8	(2)	44	14	15332.1
78	(2)	44	13	15828.1	(2)	34	14	9912.7	(2)	44	14	13409.9	(2)	44	14	15827.4
79	(2)	44	13	16334.8	(2)	34	14	10150.2	(2)	44	14	13682.2	(2)	44	14	16334.0
80	(2)	44	13	16853.1	(2)	34	14	10390.8	(2)	44	14	14011.2	(2)	44	14	16852.4
81	(2)	44	13	17380.4	(2)	34	14	10638.8	(2)	44	14	14400.3	(2)	44	14	17382.2
82	(2)	44	13	17925.9	(2)	34	14	11401.2	(2)	44	14	15005.1	(2)	44	14	17923.2
83	(2)	44	13	18481.1	(2)	34	14	11707.9	(2)	44	14	15410.7	(2)	44	14	18480.0
84	(2)	44	13	19049.0	(2)	34	14	12019.0	(2)	44	14	15821.0	(2)	44	14	19048.4
85	(2)	44	13	19630.0	(2)	34	14	12334.3	(2)	44	14	16239.0	(2)	44	14	19630.0
86	(2)	44	13	20223.4	(2)	34	14	12654.8	(2)	44	14	16661.8	(2)	44	14	20224.7
87	(2)	44	13	20828.4	(2)	34	14	12978.7	(2)	44	14	17090.3	(2)	44	14	20833.7
88	(2)	44	13	21437.8	(2)	34	14	13307.3	(2)	44	14	17524.7	(2)	44	14	21437.1
89	(2)	44	13	22056.1	(2)	34	14	13640.8	(2)	44	14	17964.9	(2)	44	14	22070.4
90	(2)	44	13	22674.8	(2)	34	14	13976.5	(2)	44	14	18411.0	(2)	44	14	22674.0
91	(2)	44	13	23319.2	(2)	34	14	14320.8	(2)	44	14	18864.9	(2)	44	14	23316.6
92	(2)	44	13	24105.1	(2)	34	14	14667.6	(2)	44	14	19320.7	(2)	44	14	24104.4

TABLE II. Labeling of Levels in LS Coupling, $22 \leq Z \leq 92$

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A. Groups of Levels for Which a Single LS Basis State Makes the Dominant Contribution to Each Level for all Z

Mixed Level	Dominant LS State	Mixed Level	Dominant LS State	Mixed Level	Dominant LS State
H_1	$2p4f \ ^3G_4$	I_1	$2p4f \ ^3G_5$	N_1	$2p3d \ ^3F_4$
H_2	$2p4f \ ^3F_4$			N_2	$2p4d \ ^3F_4$
H_3	$2p4f \ ^1G_4$			N_3	$2s4f \ ^3F_4$

B. Groups of Levels for Which a Different LS State Makes the Dominant Contribution to Each Level for Different Ranges of Z

Mixed Level	Dominant LS State									
	$22 \leq Z \leq 31$	$32 \leq Z \leq 48$	$49 \leq Z \leq 92$							
D ₁	2p3p ³ P ₀	2p3p ³ F ₀	2p3p ¹ S ₀							
D ₂	2p3p ¹ S ₀	2p3p ¹ S ₀	2p3p ³ F ₀							
D ₃	2s3s ¹ S ₀	2s3s ¹ S ₀	2s3s ¹ S ₀							
D ₄	2p4p ³ P ₀	2p4p ¹ S ₀	2p4p ¹ S ₀							
D ₅	2p4p ¹ S ₀	2p4p ³ P ₀	2p4p ³ P ₀							
D ₆	2s4s ¹ S ₀	2s4s ¹ S ₀	2s4s ¹ S ₀							
	$22 \leq Z \leq 32$	Z=33	$34 \leq Z \leq 38$	Z=39	$40 \leq Z \leq 71$	$72 \leq Z \leq 88$	$89 \leq Z \leq 92$			
E ₁	2p3p ¹ P ₁	2p3p ¹ P ₁	2p3p ¹ P ₁	2p3p ¹ P ₁	2p3p ³ P ₁	2p3p ³ P ₁	2p3p ³ P ₁			
E ₂	2p3p ³ S ₁	2p3p ³ S ₁	2p3p ³ S ₁	2p3p ³ S ₁	2p3p ¹ P ₁	2p3p ¹ P ₁	2p3p ¹ P ₁			
E ₃	2p3p ³ D ₁	2p3p ³ D ₁	2p3p ³ D ₁	2p3p ³ D ₁	2p3p ³ D ₁	2p3p ³ D ₁	2p3p ³ D ₁			
E ₄	2p3p ³ P ₁	2p3p ³ P ₁	2p3p ³ P ₁	2p3p ³ P ₁	2p3p ³ S ₁	2s3s ³ S ₁	2s3s ³ S ₁			
E ₅	2s3s ³ S ₁	2s3s ³ S ₁	2s3s ³ S ₁	2s3s ³ S ₁	2s3s ³ S ₁	2p3p ³ S ₁	2p3p ³ S ₁			
E ₆	2s3d ³ D ₁	2s3d ³ D ₁	2s3d ³ D ₁	2s3d ³ D ₁	2s3d ³ D ₁	2s3d ³ D ₁	2p4p ³ P ₁			
E ₇	2p4p ¹ P ₁	2p4p ¹ P ₁	2p4p ¹ P ₁	2p4p ¹ P ₁	2p4p ³ P ₁	2p4p ³ P ₁	2s3d ³ D ₁			
E ₈	2p4p ³ S ₁	2p4p ³ S ₁	2p4p ³ S ₁	2p4p ³ S ₁	2p4p ¹ P ₁	2p4p ¹ P ₁	2p4p ¹ P ₁			
E ₉	2p4p ³ D ₁	2p4p ³ D ₁	2p4f ³ D ₁	2p4f ³ D ₁	2p4f ³ D ₁	2p4f ³ D ₁	2p4f ³ D ₁			
E ₁₀	2p4p ³ P ₁	2p4f ³ D ₁	3p4p ³ D ₁	2p4p ³ D ₁	2p4p ³ D ₁	2p4p ³ D ₁	2p4p ³ D ₁			
E ₁₁	2p4f ³ D ₁	2p4p ³ P ₁	2p4p ³ P ₁	2p4p ³ S ₁	2p4p ³ S ₁	2p4p ³ S ₁	2p4p ³ S ₁			
E ₁₂	2s4s ³ S ₁	2s4s ³ S ₁	2s4s ³ S ₁	2s4s ³ S ₁	2s4s ³ S ₁	2s4s ³ S ₁	2s4s ³ S ₁			
E ₁₃	2s4d ³ D ₁	2s4d ³ D ₁	2s4d ³ D ₁	2s4d ³ D ₁	2s4d ³ D ₁	2s4d ³ D ₁	2s4d ³ D ₁			
	Z=22	$23 \leq Z \leq 32$	$33 \leq Z \leq 42$	$43 \leq Z \leq 70$	$71 \leq Z \leq 75$	$76 \leq Z \leq 86$	$87 \leq Z \leq 88$	Z=89	$90 \leq Z \leq 91$	Z=92
F ₁	2p3p ³ D ₂	2p3p ³ D ₂	2p3p ³ D ₂	2p3p ³ D ₂	2p3p ³ D ₂	2p3p ³ D ₂	2p3p ³ D ₂	2p3p ³ D ₂	2p3p ³ D ₂	2p3p ³ D ₂
F ₂	2p3p ³ F ₂	2p3p ³ F ₂	2p3p ³ F ₂	2p3p ³ F ₂	2p3p ³ F ₂	2p3p ³ F ₂	2p3p ³ F ₂	2p3p ³ F ₂	2p3p ³ F ₂	2p3p ³ F ₂
F ₃	2p3p ¹ D ₂	2p3p ¹ D ₂	2p3p ¹ D ₂	2p3p ¹ D ₂	2p3p ¹ D ₂	2p3p ¹ D ₂	2p3p ¹ D ₂	2p3p ¹ D ₂	2p3p ¹ D ₂	2p3p ¹ D ₂
F ₄	2s3d ¹ D ₂	2s3d ¹ D ₂	2s3d ¹ D ₂	2s3d ¹ D ₂	2s3d ¹ D ₂	2s3d ¹ D ₂	2s3d ¹ D ₂	2p4p ³ D ₂	2p4p ³ D ₂	2p4p ³ D ₂
F ₅	2s3d ³ D ₂	2s3d ³ D ₂	2s3d ³ D ₂	2s3d ³ D ₂	2s3d ³ D ₂	2s3d ³ D ₂	2p4p ³ D ₂	2s3d ³ D ₂	2s3d ³ D ₂	2s3d ³ D ₂
F ₆	2p4p ¹ D ₂	2p4p ³ D ₂	2p4p ³ D ₂	2p4p ³ D ₂	2p4p ³ D ₂	2p4p ³ D ₂	2s3d ¹ D ₂	2s3d ¹ D ₂	2p4p ³ F ₂	2p4p ³ F ₂
F ₇	2p4p ³ F ₂	2p4p ³ F ₂	2p4p ³ F ₂	2p4p ³ F ₂	2p4p ³ F ₂	2p4p ³ F ₂	2p4p ³ F ₂	2s3d ¹ D ₂	2p4f ³ F ₂	2p4f ³ F ₂
F ₈	2p4p ³ D ₂	2p4p ¹ D ₂	2p4f ¹ D ₂	2p4f ³ F ₂	2p4f ³ F ₂	2p4f ³ F ₂	2p4f ³ D ₂	2p4f ³ D ₂	2s3d ¹ D ₂	2p4f ³ D ₂
F ₉	2p4f ¹ D ₂	2p4f ¹ D ₂	2p4f ¹ D ₂	2p4f ³ D ₂	2p4f ³ D ₂	2p4f ¹ D ₂	2p4f ¹ D ₂	2p4f ¹ D ₂	2p4f ¹ D ₂	2p4f ¹ D ₂
F ₁₀	2p4f ³ D ₂	2p4f ³ D ₂	2p4p ¹ D ₂	2p4p ¹ D ₂	2p4p ¹ D ₂	2p4p ¹ D ₂	2p4p ¹ D ₂	2p4p ¹ D ₂	2p4p ¹ D ₂	2p4p ¹ D ₂
F ₁₁	2p4f ³ F ₂	2p4f ³ F ₂	2p4f ³ F ₂	2p4f ¹ D ₂	2p4f ¹ D ₂	2p4f ³ F ₂	2p4f ³ F ₂	2p4f ³ F ₂	2p4f ³ F ₂	2p4f ³ F ₂
F ₁₂	2s4d ¹ D ₂	2s4d ¹ D ₂	2s4d ¹ D ₂	2s4d ¹ D ₂	2s4d ³ D ₂	2s4d ³ D ₂	2s4d ³ D ₂	2s4d ³ D ₂	2s4d ³ D ₂	2s4d ³ D ₂
F ₁₃	2s4d ³ D ₂	2s4d ³ D ₂	2s4d ³ D ₂	2s4d ³ D ₂	2s4d ¹ D ₂	2s4d ¹ D ₂	2s4d ¹ D ₂	2s4d ¹ D ₂	2s4d ¹ D ₂	2s4d ¹ D ₂

* Since a hole in a 2p subshell behaves like a single 2p electron in determining the angular momentum state of the atom and closed shells contribute nothing to this, we use the abbreviations 2pnl and 2anl for $1s^2 2s^2 2p^5 nl$ and $1s^2 2s^2 p^6 nl$, respectively.

TABLE III. Electric Dipole Oscillator Strengths f for Transitions between the Ground Level and the Given Upper Levels, $22 \leq Z \leq 92$

Z	K1	K2	K3	K4	K5	K6	K7	K8	K9	K10	K11	K12	K13	K14
22	0.093	0.117	0.008	0.285	2.480	0.016	0.283	0.016	0.012	0.004	0.286	0.516	0.008	0.095
23	0.100	0.111	0.008	0.350	2.509	0.020	0.286	0.017	0.012	0.004	0.315	0.497	0.010	0.097
24	0.105	0.105	0.009	0.425	2.516	0.023	0.290	0.018	0.012	0.004	0.341	0.478	0.012	0.099
25	0.109	0.100	0.010	0.509	2.506	0.030	0.293	0.019	0.013	0.004	0.365	0.459	0.014	0.100
26	0.112	0.096	0.010	0.600	2.479	0.036	0.296	0.019	0.013	0.004	0.385	0.441	0.016	0.101
27	0.115	0.093	0.010	0.696	2.444	0.042	0.298	0.019	0.014	0.003	0.403	0.425	0.018	0.102
28	0.117	0.090	0.010	0.796	2.392	0.048	0.301	0.020	0.014	0.003	0.418	0.410	0.021	0.103
29	0.119	0.088	0.010	0.898	2.337	0.054	0.303	0.020	0.015	0.003	0.432	0.396	0.023	0.103
30	0.120	0.086	0.010	0.999	2.278	0.060	0.304	0.020	0.016	0.003	0.443	0.384	0.025	0.103
31	0.121	0.084	0.010	1.098	2.217	0.066	0.306	0.020	0.017	0.003	0.452	0.373	0.027	0.103
32	0.122	0.083	0.009	1.193	2.155	0.071	0.308	0.020	0.018	0.002	0.459	0.364	0.029	0.103
33	0.123	0.082	0.009	1.284	2.095	0.076	0.309	0.020	0.021	0.002	0.464	0.355	0.030	0.103
34	0.124	0.081	0.008	1.370	2.037	0.082	0.311	0.020	0.027	0.001	0.466	0.347	0.032	0.103
35	0.124	0.080	0.007	1.451	1.981	0.088	0.312	0.020	0.016	0.022	0.460	0.340	0.034	0.103
36	0.125	0.080	0.007	1.526	1.929	0.091	0.314	0.021	0.003	0.078	0.422	0.333	0.035	0.103
37	0.125	0.080	0.006	1.596	1.880	0.095	0.315	0.021	0.002	0.370	0.135	0.328	0.026	0.103
38	0.125	0.080	0.005	1.660	1.835	0.099	0.317	0.021	0.001	0.505	0.004	0.322	0.038	0.103
39	0.125	0.080	0.004	1.719	1.793	0.103	0.318	0.021	0.001	0.512	0.000	0.317	0.039	0.103
40	0.125	0.081	0.003	1.773	1.754	0.106	0.319	0.021	0.001	0.514	0.001	0.313	0.040	0.102
41	0.126	0.082	0.002	1.823	1.718	0.109	0.320	0.021	0.001	0.515	0.002	0.309	0.041	0.102
42	0.126	0.083	0.002	1.868	1.686	0.112	0.321	0.021	0.000	0.516	0.003	0.305	0.042	0.102
43	0.126	0.084	0.001	1.909	1.655	0.114	0.322	0.021	0.000	0.517	0.004	0.302	0.043	0.102
44	0.126	0.087	0.001	1.946	1.627	0.116	0.323	0.021	0.000	0.518	0.004	0.299	0.043	0.102
45	0.126	0.089	0.000	1.978	1.602	0.118	0.324	0.021	0.000	0.519	0.005	0.296	0.044	0.102
46	0.126	0.093	0.000	2.007	1.578	0.120	0.325	0.021	0.000	0.519	0.005	0.293	0.045	0.101
47	0.126	0.098	0.000	2.032	1.557	0.121	0.325	0.021	0.000	0.520	0.005	0.291	0.046	0.101
48	0.126	0.106	0.001	2.052	1.537	0.122	0.325	0.021	0.000	0.520	0.006	0.288	0.046	0.101
49	0.127	0.115	0.002	2.066	1.519	0.122	0.326	0.021	0.000	0.520	0.006	0.286	0.047	0.101
50	0.127	0.122	0.013	2.073	1.502	0.122	0.326	0.021	0.000	0.520	0.006	0.284	0.047	0.101
51	0.127	0.004	0.159	2.066	1.487	0.122	0.326	0.022	0.001	0.520	0.006	0.282	0.048	0.100
52	0.127	0.000	0.218	2.031	1.473	0.121	0.325	0.022	0.001	0.520	0.006	0.280	0.048	0.100
53	0.128	0.001	0.350	1.917	1.460	0.120	0.325	0.022	0.001	0.519	0.006	0.278	0.049	0.100
54	0.128	0.002	0.798	1.484	1.449	0.118	0.324	0.022	0.002	0.519	0.006	0.277	0.049	0.099
55	0.128	0.004	1.880	0.417	1.439	0.116	0.324	0.022	0.002	0.518	0.007	0.275	0.049	0.099
56	0.129	0.006	2.261	0.048	1.430	0.113	0.323	0.022	0.003	0.518	0.007	0.273	0.050	0.099
57	0.129	0.007	2.318	0.003	1.423	0.109	0.322	0.022	0.003	0.517	0.007	0.272	0.050	0.098
58	0.130	0.010	2.332	0.000	1.418	0.103	0.321	0.022	0.004	0.516	0.007	0.271	0.050	0.098
59	0.130	0.012	2.338	0.004	1.414	0.097	0.319	0.022	0.004	0.515	0.007	0.269	0.051	0.097
60	0.131	0.014	2.343	0.008	1.412	0.089	0.318	0.022	0.005	0.515	0.007	0.268	0.051	0.097
61	0.132	0.017	2.347	0.011	1.413	0.078	0.316	0.023	0.005	0.514	0.007	0.267	0.051	0.096
62	0.132	0.019	2.351	0.014	1.416	0.065	0.314	0.023	0.006	0.513	0.007	0.266	0.051	0.096
63	0.133	0.022	2.354	0.017	1.423	0.050	0.313	0.023	0.007	0.512	0.007	0.264	0.051	0.095
64	0.134	0.025	2.357	0.019	1.432	0.031	0.310	0.023	0.007	0.511	0.007	0.263	0.052	0.095
65	0.135	0.028	2.360	0.020	1.443	0.011	0.308	0.023	0.008	0.510	0.007	0.262	0.052	0.094
66	0.136	0.032	2.362	0.022	1.445	0.000	0.306	0.023	0.009	0.509	0.007	0.261	0.052	0.094
67	0.137	0.035	2.364	0.023	1.401	0.036	0.303	0.024	0.009	0.508	0.007	0.260	0.052	0.093
68	0.138	0.038	2.366	0.024	1.238	0.190	0.301	0.024	0.010	0.507	0.007	0.259	0.052	0.092
69	0.140	0.042	2.367	0.025	0.976	0.444	0.298	0.024	0.011	0.506	0.007	0.258	0.052	0.092
70	0.141	0.045	2.368	0.025	0.751	0.660	0.295	0.024	0.012	0.505	0.007	0.257	0.052	0.091
71	0.142	0.049	2.369	0.026	0.607	0.796	0.292	0.024	0.012	0.504	0.007	0.256	0.052	0.090
72	0.144	0.052	2.369	0.027	0.516	0.878	0.289	0.024	0.013	0.503	0.007	0.255	0.052	0.089
73	0.145	0.056	2.369	0.027	0.458	0.928	0.286	0.025	0.014	0.502	0.007	0.254	0.052	0.089
74	0.147	0.060	2.369	0.027	0.418	0.960	0.283	0.025	0.014	0.501	0.007	0.253	0.052	0.088
75	0.148	0.063	2.368	0.028	0.389	0.980	0.279	0.025	0.015	0.500	0.007	0.252	0.052	0.087
76	0.150	0.067	2.367	0.028	0.368	0.993	0.276	0.025	0.016	0.499	0.007	0.251	0.052	0.086
77	0.152	0.071	2.366	0.028	0.352	1.000	0.272	0.026	0.016	0.498	0.007	0.250	0.052	0.085
78	0.154	0.074	2.365	0.028	0.339	1.005	0.268	0.026	0.017	0.497	0.007	0.249	0.052	0.084
79	0.156	0.078	2.364	0.029	0.328	1.006	0.264	0.026	0.018	0.497	0.007	0.248	0.052	0.084
80	0.158	0.081	2.362	0.029	0.320	1.006	0.260	0.026	0.018	0.496	0.007	0.247	0.052	0.083
81	0.160	0.085	2.360	0.029	0.313	1.004	0.256	0.027	0.019	0.495	0.007	0.247	0.052	0.082
82	0.162	0.088	2.358	0.029	0.307	1.000	0.252	0.027	0.019	0.495	0.007	0.246	0.051	0.081
83	0.165	0.092	2.356	0.029	0.302	0.996	0.247	0.027	0.020	0.494	0.007	0.245	0.051	0.080
84	0.167	0.095	2.354	0.029	0.298	0.991	0.243	0.027	0.020	0.494	0.007	0.244	0.051	0.079
85	0.170	0.098	2.352	0.029	0.294	0.985	0.238	0.028	0.021	0.494	0.007	0.243	0.051	0.077
86	0.172	0.102	2.349	0.029	0.291	0.978	0.234	0.028	0.021	0.492	0.007	0.242	0.050	0.076
87	0.175	0.105	2.347	0.029	0.288	0.971	0.229	0.028	0.022	0.493	0.007	0.241	0.050	0.075
88	0.178	0.108	2.344	0.029	0.285	0.963	0.223	0.029	0.022	0.494	0.007	0.240	0.050	0.074
89	0.181	0.111	2.341	0.029	0.283	0.955	0.215	0.033	0.022	0.494	0.007	0.239	0.049	0.073
90	0.184	0.114	2.338	0.029	0.281	0.946	0.207	0.033	0.023	0.495	0.007	0.238	0.049	0.072
91	0.187	0.117	2.336	0.029	0.279	0.936	0.205	0.219	0.023	0.496	0.007	0.239	0.048	0.070
92	0.191	0.119	2.333	0.029	0.277	0.927	0.203	0.207	0.023	0.498	0.007	0.237	0.048	0.069

TABLE IV. Collision Strengths S for Excitation from the Ground Level to the Given Upper Levels as a Function of l and Scattered Electron Energy in Units of $1/a_0$ (Reberghs, 1972)

Z	D1						D2					
	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75
22	2.04E-02	1.97E-02	1.91E-02	1.85E-02	1.74E-02	1.74E-02	6.25E-02	6.48E-02	6.78E-02	7.12E-02	7.42E-02	7.63E-02
23	2.32E-02	2.18E-02	2.12E-02	2.07E-02	2.04E-02	2.03E-02	5.62E-02	5.82E-02	6.10E-02	6.40E-02	6.67E-02	6.84E-02
24	2.43E-02	2.12E-02	2.06E-02	2.02E-02	2.00E-02	2.00E-02	5.07E-02	5.23E-02	5.49E-02	5.77E-02	6.01E-02	6.19E-02
25	2.68E-02	2.47E-02	2.41E-02	2.36E-02	2.30E-02	2.29E-02	4.49E-02	4.73E-02	4.96E-02	5.21E-02	5.43E-02	5.59E-02
26	2.94E-02	2.68E-02	2.62E-02	2.56E-02	2.49E-02	2.48E-02	4.13E-02	4.30E-02	4.49E-02	4.71E-02	4.92E-02	5.07E-02
27	3.26E-02	2.92E-02	2.87E-02	2.80E-02	2.71E-02	2.69E-02	3.77E-02	3.89E-02	4.07E-02	4.27E-02	4.45E-02	4.59E-02
28	3.62E-02	3.19E-02	3.14E-02	3.06E-02	2.95E-02	2.93E-02	3.42E-02	3.52E-02	3.69E-02	3.87E-02	4.04E-02	4.17E-02
29	4.00E-02	3.47E-02	3.42E-02	3.33E-02	3.20E-02	3.18E-02	3.10E-02	3.21E-02	3.35E-02	3.51E-02	3.64E-02	3.76E-02
30	4.37E-02	3.64E-02	3.59E-02	3.49E-02	3.35E-02	3.33E-02	2.81E-02	2.91E-02	3.04E-02	3.17E-02	3.32E-02	3.43E-02
31	4.75E-02	3.84E-02	3.79E-02	3.68E-02	3.53E-02	3.51E-02	2.59E-02	2.64E-02	2.78E-02	2.89E-02	3.02E-02	3.15E-02
32	5.11E-02	3.94E-02	3.89E-02	3.78E-02	3.62E-02	3.59E-02	2.32E-02	2.37E-02	2.50E-02	2.62E-02	2.74E-02	2.85E-02
33	5.45E-02	3.99E-02	3.94E-02	3.83E-02	3.66E-02	3.63E-02	2.10E-02	2.15E-02	2.27E-02	2.38E-02	2.48E-02	2.57E-02
34	5.74E-02	3.91E-02	3.86E-02	3.75E-02	3.58E-02	3.55E-02	1.91E-02	1.97E-02	2.04E-02	2.14E-02	2.23E-02	2.32E-02
35	6.03E-02	3.80E-02	3.75E-02	3.64E-02	3.47E-02	3.44E-02	1.73E-02	1.79E-02	1.87E-02	1.94E-02	2.04E-02	2.12E-02
36	6.25E-02	3.64E-02	3.60E-02	3.49E-02	3.32E-02	3.29E-02	1.57E-02	1.63E-02	1.70E-02	1.78E-02	1.84E-02	1.93E-02
37	6.44E-02	3.48E-02	3.44E-02	3.33E-02	3.16E-02	3.13E-02	1.43E-02	1.48E-02	1.54E-02	1.62E-02	1.69E-02	1.75E-02
38	6.58E-02	3.32E-02	3.28E-02	3.17E-02	3.00E-02	2.97E-02	1.31E-02	1.35E-02	1.41E-02	1.48E-02	1.54E-02	1.60E-02
39	6.71E-02	3.16E-02	3.12E-02	3.01E-02	2.84E-02	2.81E-02	1.17E-02	1.22E-02	1.28E-02	1.34E-02	1.41E-02	1.46E-02
40	6.73E-02	3.01E-02	2.97E-02	2.86E-02	2.69E-02	2.66E-02	1.07E-02	1.12E-02	1.18E-02	1.23E-02	1.29E-02	1.34E-02
41	6.73E-02	2.86E-02	2.82E-02	2.71E-02	2.54E-02	2.51E-02	1.00E-02	1.05E-02	1.10E-02	1.16E-02	1.21E-02	1.26E-02
42	6.74E-02	2.71E-02	2.67E-02	2.56E-02	2.39E-02	2.36E-02	9.21E-03	9.71E-03	9.92E-03	1.04E-02	1.09E-02	1.14E-02
43	6.74E-02	2.56E-02	2.52E-02	2.41E-02	2.24E-02	2.21E-02	8.49E-03	8.95E-03	9.15E-03	9.59E-03	1.01E-02	1.05E-02
44	6.75E-02	2.41E-02	2.37E-02	2.26E-02	2.09E-02	2.06E-02	7.83E-03	8.28E-03	8.48E-03	8.91E-03	9.34E-03	9.69E-03
45	6.75E-02	2.26E-02	2.22E-02	2.11E-02	1.94E-02	1.91E-02	7.28E-03	7.71E-03	7.91E-03	8.33E-03	8.75E-03	9.09E-03
46	6.75E-02	2.11E-02	2.07E-02	1.96E-02	1.79E-02	1.76E-02	6.77E-03	7.18E-03	7.38E-03	7.79E-03	8.20E-03	8.54E-03
47	6.75E-02	1.96E-02	1.92E-02	1.81E-02	1.64E-02	1.61E-02	6.30E-03	6.69E-03	6.89E-03	7.29E-03	7.70E-03	8.04E-03
48	6.75E-02	1.81E-02	1.77E-02	1.66E-02	1.49E-02	1.46E-02	5.87E-03	6.25E-03	6.45E-03	6.85E-03	7.26E-03	7.60E-03
49	6.75E-02	1.66E-02	1.62E-02	1.51E-02	1.34E-02	1.31E-02	5.47E-03	5.84E-03	6.04E-03	6.43E-03	6.84E-03	7.18E-03
50	6.75E-02	1.51E-02	1.47E-02	1.36E-02	1.19E-02	1.16E-02	5.10E-03	5.46E-03	5.66E-03	6.05E-03	6.46E-03	6.80E-03
51	6.75E-02	1.36E-02	1.32E-02	1.21E-02	1.04E-02	1.01E-02	4.75E-03	5.10E-03	5.30E-03	5.69E-03	6.10E-03	6.44E-03
52	6.75E-02	1.21E-02	1.17E-02	1.06E-02	8.9E-03	8.6E-03	4.43E-03	4.77E-03	4.97E-03	5.36E-03	5.77E-03	6.11E-03
53	6.75E-02	1.06E-02	1.02E-02	9.1E-03	7.4E-03	7.1E-03	4.13E-03	4.46E-03	4.66E-03	5.05E-03	5.46E-03	5.80E-03
54	6.75E-02	9.1E-03	8.7E-03	7.6E-03	5.9E-03	5.6E-03	3.85E-03	4.17E-03	4.37E-03	4.76E-03	5.17E-03	5.51E-03
55	6.75E-02	7.6E-03	7.2E-03	6.1E-03	4.4E-03	4.1E-03	3.59E-03	3.90E-03	4.10E-03	4.49E-03	4.90E-03	5.24E-03
56	6.75E-02	6.1E-03	5.7E-03	4.6E-03	2.9E-03	2.6E-03	3.35E-03	3.65E-03	3.85E-03	4.24E-03	4.65E-03	4.99E-03
57	6.75E-02	4.6E-03	4.2E-03	3.1E-03	1.4E-03	1.1E-03	3.12E-03	3.42E-03	3.62E-03	4.01E-03	4.42E-03	4.76E-03
58	6.75E-02	3.1E-03	2.7E-03	1.6E-03	9E-04	6E-04	2.90E-03	3.20E-03	3.40E-03	3.79E-03	4.20E-03	4.54E-03
59	6.75E-02	1.6E-03	1.2E-03	9E-04	3E-04	1E-04	2.68E-03	2.98E-03	3.18E-03	3.57E-03	4.00E-03	4.34E-03
60	6.75E-02	1.1E-03	7E-04	4E-04	1E-04	0E-04	2.46E-03	2.76E-03	2.96E-03	3.35E-03	3.78E-03	4.12E-03
61	6.75E-02	6E-04	3E-04	1E-04	0E-04	0E-04	2.24E-03	2.54E-03	2.74E-03	3.13E-03	3.56E-03	3.90E-03
62	6.75E-02	3E-04	1E-04	0E-04	0E-04	0E-04	2.02E-03	2.32E-03	2.52E-03	2.91E-03	3.34E-03	3.68E-03
63	6.75E-02	1E-04	0E-04	0E-04	0E-04	0E-04	1.80E-03	2.10E-03	2.30E-03	2.69E-03	3.12E-03	3.46E-03
64	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	1.58E-03	1.88E-03	2.08E-03	2.47E-03	2.90E-03	3.24E-03
65	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	1.36E-03	1.66E-03	1.86E-03	2.25E-03	2.68E-03	3.02E-03
66	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	1.14E-03	1.44E-03	1.64E-03	2.03E-03	2.46E-03	2.80E-03
67	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	9.2E-04	1.22E-03	1.42E-03	1.81E-03	2.24E-03	2.58E-03
68	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	7.0E-04	1.00E-03	1.20E-03	1.59E-03	2.02E-03	2.36E-03
69	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	4.8E-04	7.8E-04	9.8E-04	1.37E-03	1.80E-03	2.14E-03
70	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	2.6E-04	5.6E-04	7.6E-04	1.15E-03	1.58E-03	1.92E-03
71	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	1.4E-04	3.4E-04	5.4E-04	8.3E-04	1.26E-03	1.60E-03
72	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	8.0E-05	2.0E-04	4.0E-04	6.9E-04	1.12E-03	1.46E-03
73	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	4.6E-05	1.2E-04	2.2E-04	4.1E-04	7.0E-04	1.04E-03
74	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	2.6E-05	6.6E-05	1.2E-04	2.1E-04	3.9E-04	6.8E-04
75	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	1.4E-05	3.6E-05	6.6E-05	1.1E-04	2.0E-04	3.8E-04
76	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	8.0E-06	2.0E-05	3.6E-05	6.5E-05	1.2E-04	2.4E-04
77	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	4.6E-06	1.2E-05	2.2E-05	4.1E-05	7.9E-05	1.4E-04
78	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	2.6E-06	6.6E-06	1.2E-05	2.1E-05	3.9E-05	7.8E-05
79	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	1.4E-06	3.6E-06	6.6E-06	1.1E-05	2.0E-05	3.8E-05
80	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	8.0E-07	2.0E-06	3.6E-06	6.5E-06	1.2E-05	2.4E-05
81	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	4.6E-07	1.2E-06	2.2E-06	4.1E-06	7.9E-06	1.4E-05
82	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	2.6E-07	6.6E-07	1.2E-06	2.1E-06	3.9E-06	7.8E-06
83	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	1.4E-07	3.6E-07	6.6E-07	1.1E-06	2.0E-06	3.8E-06
84	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	8.0E-08	2.0E-07	3.6E-07	6.5E-07	1.2E-06	2.4E-06
85	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	4.6E-08	1.2E-07	2.2E-07	4.1E-07	7.9E-07	1.4E-06
86	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	2.6E-08	6.6E-08	1.2E-07	2.1E-07	3.9E-07	7.8E-07
87	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	1.4E-08	3.6E-08	6.6E-08	1.1E-07	2.0E-07	3.8E-07
88	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	8.0E-09	2.0E-08	3.6E-08	6.5E-08	1.2E-07	2.4E-07
89	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	4.6E-09	1.2E-08	2.2E-08	4.1E-08	7.9E-08	1.4E-07
90	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	2.6E-09	6.6E-09	1.2E-08	2.1E-08	3.9E-08	7.8E-08
91	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	1.4E-09	3.6E-09	6.6E-09	1.1E-08	2.0E-08	3.8E-08
92	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	8.0E-10	2.0E-09	3.6E-09	6.5E-09	1.2E-08	2.4E-08
93	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	4.6E-10	1.2E-09	2.2E-09	4.1E-09	7.9E-09	1.4E-08
94	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	2.6E-10	6.6E-10	1.2E-09	2.1E-09	3.9E-09	7.8E-09
95	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	1.4E-10	3.6E-10	6.6E-10	1.1E-09	2.0E-09	3.8E-09
96	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	8.0E-11	2.0E-10	3.6E-10	6.5E-10	1.2E-09	2.4E-09
97	6.75E-02	0E-04	0E-04	0E-04	0E-04	0E-04	4.6E-11	1.2E-10	2.2E			

Z	D3						D4					
	E'=0.008	E'=0.04	E'=0.10	E'=0.21	E'=0.41	E'=0.75	E'=0.008	E'=0.04	E'=0.10	E'=0.21	E'=0.41	E'=0.75
37	3.07E-03	3.21E-03	3.41E-03	3.66E-03	3.93E-03	4.23E-03	3.22E-03	3.37E-03	3.64E-03	3.92E-03	4.23E-03	4.56E-03
38	2.94E-03	3.10E-03	3.29E-03	3.53E-03	3.81E-03	4.11E-03	3.17E-03	3.32E-03	3.59E-03	3.87E-03	4.18E-03	4.50E-03
39	2.84E-03	3.00E-03	3.19E-03	3.43E-03	3.71E-03	4.01E-03	3.12E-03	3.27E-03	3.54E-03	3.82E-03	4.13E-03	4.45E-03
40	2.76E-03	2.92E-03	3.11E-03	3.35E-03	3.63E-03	3.93E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
41	2.67E-03	2.83E-03	3.02E-03	3.26E-03	3.54E-03	3.84E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
42	2.59E-03	2.75E-03	2.94E-03	3.18E-03	3.46E-03	3.76E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
43	2.50E-03	2.66E-03	2.85E-03	3.09E-03	3.37E-03	3.67E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
44	2.42E-03	2.58E-03	2.77E-03	3.01E-03	3.29E-03	3.59E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
45	2.34E-03	2.50E-03	2.69E-03	2.93E-03	3.21E-03	3.51E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
46	2.27E-03	2.42E-03	2.61E-03	2.85E-03	3.13E-03	3.43E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
47	2.20E-03	2.35E-03	2.54E-03	2.78E-03	3.05E-03	3.35E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
48	2.14E-03	2.29E-03	2.48E-03	2.72E-03	2.97E-03	3.27E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
49	2.07E-03	2.22E-03	2.41E-03	2.65E-03	2.91E-03	3.19E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
50	2.01E-03	2.16E-03	2.35E-03	2.59E-03	2.85E-03	3.11E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
51	1.94E-03	2.09E-03	2.28E-03	2.52E-03	2.77E-03	3.03E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
52	1.88E-03	2.03E-03	2.22E-03	2.46E-03	2.71E-03	2.95E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
53	1.82E-03	1.97E-03	2.16E-03	2.40E-03	2.65E-03	2.87E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
54	1.76E-03	1.91E-03	2.10E-03	2.34E-03	2.59E-03	2.81E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
55	1.70E-03	1.85E-03	2.04E-03	2.28E-03	2.53E-03	2.75E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
56	1.64E-03	1.79E-03	1.98E-03	2.22E-03	2.47E-03	2.69E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
57	1.58E-03	1.73E-03	1.92E-03	2.16E-03	2.41E-03	2.63E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
58	1.52E-03	1.67E-03	1.86E-03	2.10E-03	2.35E-03	2.57E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
59	1.46E-03	1.61E-03	1.80E-03	2.04E-03	2.29E-03	2.51E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
60	1.40E-03	1.55E-03	1.74E-03	1.98E-03	2.23E-03	2.45E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
61	1.34E-03	1.49E-03	1.68E-03	1.92E-03	2.17E-03	2.39E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
62	1.28E-03	1.43E-03	1.62E-03	1.86E-03	2.11E-03	2.33E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
63	1.22E-03	1.37E-03	1.56E-03	1.80E-03	2.05E-03	2.27E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
64	1.16E-03	1.31E-03	1.50E-03	1.74E-03	1.99E-03	2.21E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
65	1.10E-03	1.25E-03	1.44E-03	1.68E-03	1.93E-03	2.15E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
66	1.04E-03	1.19E-03	1.38E-03	1.62E-03	1.87E-03	2.09E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
67	9.8E-04	1.13E-03	1.32E-03	1.56E-03	1.81E-03	2.03E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
68	9.2E-04	1.07E-03	1.26E-03	1.50E-03	1.75E-03	1.97E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
69	8.6E-04	1.01E-03	1.20E-03	1.44E-03	1.69E-03	1.91E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
70	8.0E-04	9.5E-04	1.14E-03	1.38E-03	1.63E-03	1.85E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
71	7.4E-04	8.9E-04	1.08E-03	1.32E-03	1.57E-03	1.79E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
72	6.8E-04	8.3E-04	1.02E-03	1.26E-03	1.51E-03	1.73E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
73	6.2E-04	7.7E-04	9.6E-04	1.20E-03	1.45E-03	1.67E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
74	5.6E-04	7.1E-04	9.0E-04	1.14E-03	1.39E-03	1.61E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
75	5.0E-04	6.5E-04	8.4E-04	1.08E-03	1.33E-03	1.55E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
76	4.4E-04	5.9E-04	7.8E-04	1.02E-03	1.27E-03	1.49E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
77	3.8E-04	5.3E-04	7.2E-04	9.6E-04	1.21E-03	1.43E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
78	3.2E-04	4.7E-04	6.6E-04	9.0E-04	1.15E-03	1.37E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
79	2.6E-04	4.1E-04	6.0E-04	8.4E-04	1.09E-03	1.31E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
80	2.0E-04	3.5E-04	5.4E-04	7.8E-04	1.03E-03	1.25E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
81	1.4E-04	2.9E-04	4.8E-04	7.2E-04	9.7E-04	1.19E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
82	8E-05	2.3E-04	4.2E-04	6.6E-04	9.1E-04	1.13E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
83	2E-05	1.7E-04	3.6E-04	6.0E-04	8.5E-04	1.07E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
84	1E-05	1.1E-04	3.0E-04	5.4E-04	7.9E-04	1.01E-03	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
85	5E-06	5E-05	2.4E-04	4.8E-04	7.3E-04	9.5E-04	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
86	2E-06	2E-05	1.8E-04	4.2E-04	6.7E-04	8.9E-04	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
87	1E-06	1E-05	1.2E-04	3.6E-04	6.1E-04	8.3E-04	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
88	5E-07	5E-06	6E-05	3.0E-04	5.5E-04	7.7E-04	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
89	2E-07	2E-06	2E-05	2.4E-04	4.9E-04	7.1E-04	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
90	1E-07	1E-06	1E-05	1.8E-04	4.3E-04	6.5E-04	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
91	5E-08	5E-07	5E-06	1.2E-04	3.7E-04	5.9E-04	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03
92	2E-08	2E-07	2E-06	6E-05	3.1E-04	5.3E-04	3.10E-03	3.25E-03	3.52E-03	3.80E-03	4.11E-03	4.43E-03

TABLE IV. Collision Strengths S for Extraction from the Ground Level to the Given Upper Levels as a Function of Z and Scattered Electron Energy in Units of E_{eff} Hydrogen, 11-5-91

I	E1						E2					
	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75
22	7.77E-03	4.37E-03	4.92E-03	3.37E-03	1.83E-03	9.10E-04	2.53E-03	2.12E-03	1.53E-03	9.52E-04	4.77E-04	2.60E-04
23	6.47E-03	3.56E-03	4.29E-03	2.83E-03	1.59E-03	7.84E-04	2.27E-03	1.89E-03	1.37E-03	8.27E-04	4.18E-04	2.40E-04
24	5.73E-03	4.91E-03	3.73E-03	2.47E-03	1.27E-03	6.79E-04	2.04E-03	1.69E-03	1.22E-03	7.44E-04	3.72E-04	2.10E-04
25	5.07E-03	4.23E-03	3.20E-03	2.16E-03	1.20E-03	5.90E-04	1.85E-03	1.53E-03	1.11E-03	6.75E-04	3.34E-04	1.84E-04
26	4.50E-03	3.82E-03	2.91E-03	1.92E-03	1.07E-03	5.19E-04	1.70E-03	1.40E-03	1.02E-03	6.18E-04	3.05E-04	1.62E-04
27	4.00E-03	3.40E-03	2.57E-03	1.67E-03	9.21E-04	4.51E-04	1.58E-03	1.30E-03	9.42E-04	5.72E-04	2.84E-04	1.54E-04
28	3.57E-03	3.02E-03	2.28E-03	1.49E-03	8.11E-04	3.94E-04	1.48E-03	1.22E-03	8.81E-04	5.34E-04	2.68E-04	1.41E-04
29	3.18E-03	2.67E-03	2.02E-03	1.31E-03	7.17E-04	3.49E-04	1.37E-03	1.13E-03	8.30E-04	5.04E-04	2.52E-04	1.31E-04
30	2.83E-03	2.41E-03	1.81E-03	1.12E-03	6.23E-04	3.08E-04	1.27E-03	1.07E-03	7.67E-04	4.80E-04	2.42E-04	1.16E-04
31	2.54E-03	2.16E-03	1.61E-03	1.04E-03	5.44E-04	2.73E-04	1.18E-03	1.04E-03	7.30E-04	4.58E-04	2.31E-04	1.02E-04
32	2.29E-03	1.94E-03	1.45E-03	9.28E-04	4.73E-04	2.42E-04	1.10E-03	9.70E-04	7.17E-04	4.37E-04	2.22E-04	9.88E-05
33	2.07E-03	1.74E-03	1.30E-03	8.33E-04	4.10E-04	2.14E-04	1.03E-03	9.48E-04	6.87E-04	4.21E-04	2.14E-04	9.56E-05
34	1.88E-03	1.57E-03	1.17E-03	7.40E-04	3.62E-04	1.94E-04	1.00E-03	9.08E-04	6.59E-04	4.04E-04	2.04E-04	9.23E-05
35	1.70E-03	1.43E-03	1.04E-03	6.74E-04	3.24E-04	1.74E-04	9.71E-03	8.71E-04	6.32E-04	3.88E-04	1.98E-04	8.94E-05
36	1.54E-03	1.30E-03	9.63E-04	6.12E-04	2.88E-04	1.57E-04	1.01E-03	8.33E-04	6.04E-04	3.72E-04	1.91E-04	8.62E-05
37	1.42E-03	1.19E-03	8.70E-04	5.77E-04	2.77E-04	1.43E-04	9.97E-04	8.00E-04	5.81E-04	3.58E-04	1.84E-04	8.32E-05
38	1.30E-03	1.07E-03	8.02E-04	5.37E-04	2.71E-04	1.37E-04	9.75E-04	7.67E-04	5.57E-04	3.42E-04	1.77E-04	8.02E-05
39	1.19E-03	9.98E-04	7.37E-04	4.64E-04	2.49E-04	1.17E-04	9.67E-04	7.34E-04	5.34E-04	3.29E-04	1.70E-04	7.72E-05
40	1.10E-03	9.20E-04	6.77E-04	4.39E-04	2.39E-04	1.08E-04	9.52E-04	7.02E-04	5.11E-04	3.19E-04	1.62E-04	7.43E-05
41	1.02E-03	8.52E-04	6.28E-04	4.14E-04	2.10E-04	9.89E-05	9.14E-04	6.72E-04	4.89E-04	3.02E-04	1.54E-04	7.14E-05
42	9.49E-04	7.90E-04	5.82E-04	3.66E-04	1.91E-04	9.12E-05	8.78E-04	6.42E-04	4.69E-04	2.92E-04	1.50E-04	6.85E-05
43	8.84E-04	7.24E-04	5.37E-04	3.40E-04	1.70E-04	8.42E-05	8.44E-04	6.10E-04	4.47E-04	2.82E-04	1.44E-04	6.54E-05
44	8.24E-04	6.67E-04	5.05E-04	3.17E-04	1.67E-04	7.84E-05	7.74E-04	5.91E-04	4.30E-04	2.64E-04	1.38E-04	6.31E-05
45	7.72E-04	6.23E-04	4.72E-04	2.94E-04	1.64E-04	7.31E-05	7.44E-04	5.64E-04	4.12E-04	2.58E-04	1.32E-04	6.04E-05
46	7.24E-04	6.02E-04	4.42E-04	2.77E-04	1.62E-04	6.82E-05	7.37E-04	5.42E-04	3.94E-04	2.44E-04	1.27E-04	5.81E-05
47	6.82E-04	5.64E-04	4.23E-04	2.60E-04	1.59E-04	6.39E-05	7.05E-04	5.20E-04	3.78E-04	2.34E-04	1.21E-04	5.56E-05
48	6.44E-04	5.29E-04	4.02E-04	2.43E-04	1.56E-04	6.02E-05	6.74E-04	5.02E-04	3.62E-04	2.24E-04	1.16E-04	5.32E-05
49	6.07E-04	5.03E-04	3.70E-04	2.31E-04	1.51E-04	5.65E-05	6.50E-04	4.77E-04	3.48E-04	2.13E-04	1.12E-04	5.15E-05
50	5.74E-04	4.78E-04	3.50E-04	2.19E-04	1.49E-04	5.32E-05	6.37E-04	4.59E-04	3.34E-04	2.07E-04	1.07E-04	4.93E-05
51	5.44E-04	4.53E-04	3.32E-04	2.07E-04	1.47E-04	5.04E-05	6.23E-04	4.41E-04	3.21E-04	1.97E-04	1.02E-04	4.74E-05
52	5.19E-04	4.30E-04	3.19E-04	1.94E-04	1.43E-04	4.77E-05	6.14E-04	4.20E-04	3.08E-04	1.91E-04	9.92E-05	4.57E-05
53	4.94E-04	4.02E-04	3.02E-04	1.87E-04	1.40E-04	4.52E-05	6.04E-04	4.02E-04	2.94E-04	1.84E-04	9.72E-05	4.42E-05
54	4.70E-04	3.79E-04	2.85E-04	1.79E-04	1.36E-04	4.31E-05	5.94E-04	3.82E-04	2.82E-04	1.77E-04	9.57E-05	4.28E-05
55	4.47E-04	3.72E-04	2.72E-04	1.74E-04	1.34E-04	4.12E-05	5.84E-04	3.70E-04	2.72E-04	1.70E-04	9.42E-05	4.09E-05
56	4.29E-04	3.53E-04	2.60E-04	1.62E-04	1.30E-04	3.91E-05	5.74E-04	3.64E-04	2.63E-04	1.64E-04	9.26E-05	3.94E-05
57	4.10E-04	3.40E-04	2.48E-04	1.53E-04	1.28E-04	3.74E-05	5.64E-04	3.51E-04	2.53E-04	1.58E-04	9.02E-05	3.80E-05
58	3.92E-04	3.25E-04	2.37E-04	1.45E-04	1.25E-04	3.57E-05	5.54E-04	3.39E-04	2.44E-04	1.52E-04	8.78E-05	3.65E-05
59	3.74E-04	3.12E-04	2.28E-04	1.37E-04	1.22E-04	3.42E-05	5.44E-04	3.27E-04	2.35E-04	1.47E-04	8.54E-05	3.54E-05
60	3.61E-04	2.99E-04	2.19E-04	1.34E-04	1.19E-04	3.28E-05	5.34E-04	3.16E-04	2.26E-04	1.42E-04	8.30E-05	3.42E-05
61	3.47E-04	2.87E-04	2.10E-04	1.21E-04	1.16E-04	3.13E-05	5.24E-04	3.03E-04	2.22E-04	1.37E-04	8.14E-05	3.31E-05
62	3.32E-04	2.74E-04	2.02E-04	1.14E-04	1.14E-04	3.02E-05	5.14E-04	2.93E-04	2.13E-04	1.32E-04	7.97E-05	3.20E-05
63	3.17E-04	2.64E-04	1.94E-04	1.11E-04	1.11E-04	2.91E-05	5.04E-04	2.83E-04	2.08E-04	1.27E-04	7.79E-05	3.10E-05
64	3.06E-04	2.54E-04	1.87E-04	1.10E-04	1.08E-04	2.82E-05	4.94E-04	2.74E-04	2.01E-04	1.24E-04	7.62E-05	3.00E-05
65	2.92E-04	2.47E-04	1.81E-04	1.12E-04	1.05E-04	2.70E-05	4.84E-04	2.64E-04	1.93E-04	1.21E-04	7.45E-05	2.91E-05
66	2.87E-04	2.39E-04	1.74E-04	1.08E-04	1.03E-04	2.60E-05	4.74E-04	2.59E-04	1.87E-04	1.17E-04	7.28E-05	2.82E-05
67	2.77E-04	2.30E-04	1.68E-04	1.03E-04	1.01E-04	2.51E-05	4.64E-04	2.52E-04	1.82E-04	1.13E-04	7.12E-05	2.73E-05
68	2.68E-04	2.22E-04	1.63E-04	1.01E-04	1.00E-04	2.43E-05	4.54E-04	2.44E-04	1.78E-04	1.10E-04	6.97E-05	2.65E-05
69	2.59E-04	2.14E-04	1.57E-04	9.90E-05	9.81E-05	2.35E-05	4.44E-04	2.37E-04	1.72E-04	1.07E-04	6.82E-05	2.57E-05
70	2.50E-04	2.06E-04	1.52E-04	9.71E-05	9.72E-05	2.27E-05	4.34E-04	2.30E-04	1.67E-04	1.04E-04	6.67E-05	2.49E-05
71	2.42E-04	2.01E-04	1.48E-04	9.57E-05	9.63E-05	2.20E-05	4.24E-04	2.24E-04	1.63E-04	1.01E-04	6.52E-05	2.44E-05
72	2.33E-04	1.93E-04	1.43E-04	9.41E-05	9.44E-05	2.14E-05	4.14E-04	2.17E-04	1.58E-04	9.92E-05	6.37E-05	2.37E-05
73	2.28E-04	1.87E-04	1.39E-04	9.24E-05	9.30E-05	2.07E-05	4.04E-04	2.11E-04	1.54E-04	9.74E-05	6.22E-05	2.31E-05
74	2.21E-04	1.82E-04	1.34E-04	9.07E-05	9.12E-05	2.01E-05	3.94E-04	2.04E-04	1.50E-04	9.56E-05	6.07E-05	2.25E-05
75	2.14E-04	1.78E-04	1.31E-04	8.92E-05	8.97E-05	1.95E-05	3.84E-04	2.00E-04	1.46E-04	9.38E-05	5.92E-05	2.19E-05
76	2.08E-04	1.72E-04	1.27E-04	8.79E-05	8.84E-05	1.90E-05	3.74E-04	1.95E-04	1.42E-04	9.20E-05	5.77E-05	2.13E-05
77	2.02E-04	1.68E-04	1.23E-04	8.70E-05	8.72E-05	1.85E-05	3.64E-04	1.90E-04	1.37E-04	9.02E-05	5.62E-05	2.08E-05
78	1.91E-04	1.63E-04	1.20E-04	8.49E-05	8.51E-05	1.80E-05	3.54E-04	1.85E-04	1.33E-04	8.84E-05	5.48E-05	2.02E-05
79	1.84E-04	1.59E-04	1.17E-04	8.39E-05	8.38E-05	1.75E-05	3.44E-04	1.81E-04	1.29E-04	8.67E-05	5.34E-05	1.96E-05
80	1.84E-04	1.58E-04	1.16E-04	8.15E-05	8.15E-05	1.70E-05	3.34E-04	1.76E-04	1.26E-04	8.50E-05	5.20E-05	1.90E-05
81	1.81E-04	1.50E-04	1.11E-04	8.02E-05	8.01E-05	1.64E-05	3.24E-04	1.72E-04	1.24E-04	8.32E-05	5.06E-05	1.84E-05
82	1.76E-04	1.44E-04	1.08E-04	7.79E-05	7.79E-05	1.62E-05	3.14E-04	1.68E-04	1.22E-04	8.14E-05	4.92E-05	1.78E-05
83	1.71E-04	1.43E-04	1.03E-04	7.62E-05	7.62E-05	1.58E-05	3.04E-04	1.64E-04	1.20E-04	7.96E-05	4.78E-05	1.72E-05
84	1.67E-04	1.39E-04	1.02E-04	7.45E-05	7.45E-05	1.54E-05	2.94E-04	1.61E-04	1.17E-04	7.79E-05	4.64E-05	1.66E-05
85	1.62E-04	1.34E-04	9.84E-05	7.27E-05	7.27E-05	1.50E-05	2.84E-04	1.57E-04	1.15E-04	7.62E-05	4.50E-05	1.60E-05
86	1.59E-04	1.32E-04	9.74E-05	7.14E-05	7.14E-05	1.47E-05	2.74E-04	1.54E-04	1.13E-04	7.45E-05	4.36E-05	1.54E-05
87	1.54E-04	1.29E-04	9.33E-05	6.97E-05	6.97E-05	1.44E-05	2.64E-04	1.50E-04	1.10E-04	7.28E-05	4.22E-05	1.48E-05
88	1.51E-04	1.26E-04	9.31E-05	6.89E-05	6.89E-05	1.41E-05	2.54E-04	1.47E-04	1.07E-04	7.12E-05	4.08E-05	1.42E-05
89	1.47E-04	1.22E-04	9.10E-05	6.72E-05	6.72E-05	1.38E-05	2.44E-04	1.44E-04	1.03E-04	6.95E-05	3.94E-05	1.36E-05
90	1.44E-04	1.20E-04	8.89E-05	6.59E-05	6.59E-05	1.35E-05	2.34E-04	1.41E-04	1.02E-04	6.78E-05	3.80E-05	1.30E-05
91	1.40E-04	1.18E-04	8.70E-05	6.47E-05	6.47E-05	1.32E-05	2.24E-04	1.38E-04	1.01E-04	6.62E-05	3.66E-05	1.24E-05
92	1.37E-04	1.15E-04	8.51E-05	6.34E-05	6.34E-05	1.29E-05	2.14E-04	1.35E-04	9.97E-05	6.47E-05	3.52E-05	1.18E-05

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TABLE IV. Collision Strength S for Excitation from the Ground Level to the Given Upper Levels as a Function of k and Scattered Electron Energy in Units of $\frac{1}{2}mv^2$ Rydberg, $32\pi^2\epsilon_0^2$

E3										
Z	E'=0.008	E'=0.04	E'=0.10	E'=0.21	E'=0.41	E'=0.75	E'=0.008	E'=0.04	E'=0.10	E'=0.21
37	2.17E-04	2.42E-04	1.90E-04	1.37E-04	9.79E-05	2.48E-05	4.19E-04	2.49E-04	2.97E-04	1.61E-04
38	2.04E-04	2.33E-04	1.77E-04	1.26E-04	8.77E-05	2.40E-05	4.07E-04	2.39E-04	2.89E-04	1.57E-04
39	2.19E-04	2.44E-04	1.77E-04	1.09E-04	5.61E-05	2.53E-05	2.93E-04	2.37E-04	2.42E-04	1.53E-04
40	2.83E-04	2.39E-04	1.71E-04	1.04E-04	5.44E-05	2.44E-05	2.83E-04	2.21E-04	2.26E-04	1.49E-04
41	2.73E-04	2.28E-04	1.64E-04	1.03E-04	5.27E-05	2.37E-05	2.73E-04	2.12E-04	2.21E-04	1.45E-04
42	2.44E-04	2.20E-04	1.40E-04	9.74E-05	5.12E-05	2.30E-05	2.67E-04	2.04E-04	2.24E-04	1.42E-04
43	2.27E-04	2.12E-04	1.34E-04	9.42E-05	4.97E-05	2.24E-05	2.57E-04	2.00E-04	2.21E-04	1.40E-04
44	2.44E-04	2.04E-04	1.31E-04	9.24E-05	4.86E-05	2.18E-05	2.52E-04	2.00E-04	2.17E-04	1.38E-04
45	2.41E-04	2.00E-04	1.44E-04	9.10E-05	4.70E-05	2.12E-05	2.47E-04	2.00E-04	2.14E-04	1.34E-04
46	2.24E-04	1.94E-04	1.42E-04	8.84E-05	4.58E-05	2.07E-05	2.44E-04	2.07E-04	2.18E-04	1.35E-04
47	2.27E-04	1.88E-04	1.38E-04	8.61E-05	4.44E-05	2.02E-05	2.41E-04	2.03E-04	2.11E-04	1.34E-04
48	2.20E-04	1.80E-04	1.32E-04	8.35E-05	4.29E-05	1.97E-05	2.40E-04	2.04E-04	2.10E-04	1.34E-04
49	2.14E-04	1.73E-04	1.31E-04	8.14E-05	4.15E-05	1.92E-05	2.37E-04	2.02E-04	2.08E-04	1.32E-04
50	2.08E-04	1.72E-04	1.27E-04	7.94E-05	4.13E-05	1.87E-05	2.32E-04	2.00E-04	2.07E-04	1.31E-04
51	2.02E-04	1.68E-04	1.24E-04	7.77E-05	4.08E-05	1.83E-05	2.28E-04	2.00E-04	2.04E-04	1.24E-04
52	1.94E-04	1.64E-04	1.21E-04	7.59E-05	3.94E-05	1.77E-05	2.24E-04	2.02E-04	2.01E-04	1.19E-04
53	1.86E-04	1.60E-04	1.18E-04	7.41E-05	3.88E-05	1.72E-05	2.21E-04	2.02E-04	1.99E-04	1.15E-04
54	1.82E-04	1.56E-04	1.15E-04	7.24E-05	3.80E-05	1.67E-05	2.18E-04	2.02E-04	1.98E-04	1.11E-04
55	1.81E-04	1.52E-04	1.12E-04	7.08E-05	3.72E-05	1.61E-05	2.17E-04	2.02E-04	1.97E-04	1.08E-04
56	1.77E-04	1.48E-04	1.10E-04	6.93E-05	3.63E-05	1.56E-05	2.15E-04	2.02E-04	1.95E-04	1.05E-04
57	1.72E-04	1.44E-04	1.07E-04	6.79E-05	3.55E-05	1.52E-05	2.13E-04	2.04E-04	1.94E-04	1.02E-04
58	1.68E-04	1.41E-04	1.05E-04	6.65E-05	3.47E-05	1.47E-05	2.12E-04	2.04E-04	1.93E-04	1.00E-04
59	1.64E-04	1.38E-04	1.03E-04	6.52E-05	3.40E-05	1.42E-05	2.10E-04	2.04E-04	1.92E-04	9.79E-05
60	1.61E-04	1.35E-04	1.01E-04	6.40E-05	3.32E-05	1.37E-05	2.09E-04	2.04E-04	1.91E-04	9.58E-05
61	1.57E-04	1.32E-04	9.94E-05	6.28E-05	3.24E-05	1.32E-05	2.08E-04	2.04E-04	1.90E-04	9.37E-05
62	1.53E-04	1.29E-04	9.74E-05	6.17E-05	3.16E-05	1.27E-05	2.07E-04	2.04E-04	1.89E-04	9.16E-05
63	1.50E-04	1.26E-04	9.54E-05	6.06E-05	3.08E-05	1.22E-05	2.06E-04	2.04E-04	1.88E-04	8.95E-05
64	1.47E-04	1.24E-04	9.34E-05	5.95E-05	3.00E-05	1.17E-05	2.05E-04	2.04E-04	1.87E-04	8.74E-05
65	1.44E-04	1.21E-04	9.14E-05	5.84E-05	2.92E-05	1.12E-05	2.04E-04	2.04E-04	1.86E-04	8.53E-05
66	1.41E-04	1.19E-04	8.94E-05	5.73E-05	2.84E-05	1.07E-05	2.03E-04	2.04E-04	1.85E-04	8.32E-05
67	1.38E-04	1.17E-04	8.74E-05	5.62E-05	2.76E-05	1.02E-05	2.02E-04	2.04E-04	1.84E-04	8.11E-05
68	1.35E-04	1.14E-04	8.54E-05	5.51E-05	2.68E-05	9.70E-06	2.01E-04	2.04E-04	1.83E-04	7.90E-05
69	1.32E-04	1.12E-04	8.34E-05	5.40E-05	2.60E-05	9.18E-06	2.00E-04	2.04E-04	1.82E-04	7.69E-05
70	1.29E-04	1.10E-04	8.14E-05	5.29E-05	2.52E-05	8.66E-06	1.99E-04	2.04E-04	1.81E-04	7.48E-05
71	1.26E-04	1.08E-04	7.94E-05	5.18E-05	2.44E-05	8.14E-06	1.98E-04	2.04E-04	1.80E-04	7.27E-05
72	1.23E-04	1.06E-04	7.74E-05	5.07E-05	2.36E-05	7.62E-06	1.97E-04	2.04E-04	1.79E-04	7.06E-05
73	1.20E-04	1.04E-04	7.54E-05	4.96E-05	2.28E-05	7.10E-06	1.96E-04	2.04E-04	1.78E-04	6.85E-05
74	1.17E-04	1.02E-04	7.34E-05	4.85E-05	2.20E-05	6.58E-06	1.95E-04	2.04E-04	1.77E-04	6.64E-05
75	1.14E-04	1.00E-04	7.14E-05	4.74E-05	2.12E-05	6.06E-06	1.94E-04	2.04E-04	1.76E-04	6.43E-05
76	1.11E-04	9.84E-05	6.94E-05	4.63E-05	2.04E-05	5.54E-06	1.93E-04	2.04E-04	1.75E-04	6.22E-05
77	1.08E-04	9.64E-05	6.74E-05	4.52E-05	1.96E-05	5.02E-06	1.92E-04	2.04E-04	1.74E-04	6.01E-05
78	1.05E-04	9.44E-05	6.54E-05	4.41E-05	1.88E-05	4.50E-06	1.91E-04	2.04E-04	1.73E-04	5.80E-05
79	1.02E-04	9.24E-05	6.34E-05	4.30E-05	1.80E-05	3.98E-06	1.90E-04	2.04E-04	1.72E-04	5.59E-05
80	1.00E-04	9.04E-05	6.14E-05	4.19E-05	1.72E-05	3.46E-06	1.89E-04	2.04E-04	1.71E-04	5.38E-05
81	9.79E-05	8.84E-05	5.94E-05	4.08E-05	1.64E-05	2.94E-06	1.88E-04	2.04E-04	1.70E-04	5.17E-05
82	9.58E-05	8.64E-05	5.74E-05	3.97E-05	1.56E-05	2.42E-06	1.87E-04	2.04E-04	1.69E-04	4.96E-05
83	9.37E-05	8.44E-05	5.54E-05	3.86E-05	1.48E-05	1.90E-06	1.86E-04	2.04E-04	1.68E-04	4.75E-05
84	9.16E-05	8.24E-05	5.34E-05	3.75E-05	1.40E-05	1.38E-06	1.85E-04	2.04E-04	1.67E-04	4.54E-05
85	8.95E-05	8.04E-05	5.14E-05	3.64E-05	1.32E-05	8.60E-07	1.84E-04	2.04E-04	1.66E-04	4.33E-05
86	8.74E-05	7.84E-05	4.94E-05	3.53E-05	1.24E-05	8.08E-07	1.83E-04	2.04E-04	1.65E-04	4.12E-05
87	8.53E-05	7.64E-05	4.74E-05	3.42E-05	1.16E-05	7.56E-07	1.82E-04	2.04E-04	1.64E-04	3.91E-05
88	8.32E-05	7.44E-05	4.54E-05	3.31E-05	1.08E-05	7.04E-07	1.81E-04	2.04E-04	1.63E-04	3.70E-05
89	8.11E-05	7.24E-05	4.34E-05	3.20E-05	1.00E-05	6.52E-07	1.80E-04	2.04E-04	1.62E-04	3.49E-05
90	7.90E-05	7.04E-05	4.14E-05	3.09E-05	9.20E-06	5.99E-07	1.79E-04	2.04E-04	1.61E-04	3.28E-05
91	7.69E-05	6.84E-05	3.94E-05	2.98E-05	8.38E-06	5.47E-07	1.78E-04	2.04E-04	1.60E-04	3.07E-05
92	7.48E-05	6.64E-05	3.74E-05	2.87E-05	7.56E-06	4.95E-07	1.77E-04	2.04E-04	1.59E-04	2.86E-05

E4												
Z	E'=0.008	E'=0.04	E'=0.10	E'=0.21	E'=0.41	E'=0.75	E'=0.008	E'=0.04	E'=0.10	E'=0.21	E'=0.41	E'=0.75
22	1.83E-03	1.34E-03	1.12E-03	4.87E-04	2.39E-04	1.70E-04	2.85E-03	2.42E-03	1.74E-03	1.03E-03	5.27E-04	2.32E-04
23	1.62E-03	1.15E-03	1.07E-03	4.74E-04	2.30E-04	1.67E-04	2.65E-03	2.18E-03	1.54E-03	9.47E-04	4.77E-04	2.13E-04
24	1.42E-03	1.18E-03	1.04E-03	4.60E-04	2.20E-04	1.64E-04	2.45E-03	2.01E-03	1.40E-03	9.30E-04	4.58E-04	1.98E-04
25	1.28E-03	1.05E-03	7.53E-04	4.46E-04	2.10E-04	1.61E-04	2.24E-03	1.76E-03	1.27E-03	7.72E-04	3.90E-04	1.74E-04
26	1.13E-03	9.41E-04	6.72E-04	4.32E-04	2.02E-04	1.58E-04	2.03E-03	1.60E-03	1.13E-03	7.02E-04	3.59E-04	1.59E-04
27	1.04E-03	8.48E-04	6.04E-04	4.18E-04	1.93E-04	1.55E-04	1.77E-03	1.47E-03	1.04E-03	6.41E-04	3.24E-04	1.45E-04
28	9.47E-04	7.70E-04	5.47E-04	4.04E-04	1.84E-04	1.52E-04	1.64E-03	1.32E-03	9.68E-04	3.86E-04	2.97E-04	1.32E-04
29	8.52E-04	7.02E-04	4.97E-04	3.91E-04	1.74E-04	1.49E-04	1.50E-03	1.14E-03	8.71E-04	3.41E-04	2.73E-04	1.22E-04
30	7.52E-04	6.34E-04	4.73E-04	3.77E-04	1.64E-04	1.46E-04	1.29E-03	1.02E-03	8.56E-04	3.00E-04	2.40E-04	1.10E-04
31	7.11E-04	6.11E-04	4.58E-04	3.63E-04	1.54E-04	1.43E-04	1.20E-03	1.04E-03	8.42E-04	2.82E-04	2.23E-04	1.04E-04
32	6.71E-04	5.84E-04	4.48E-04	3.49E-04	1.44E-04	1.40E-04	1.11E-03	9.88E-04	7.80E-04	2.62E-04	2.15E-04	9.42E-05
33	6.34E-04	5.64E-04	4.37E-04	3.35E-04	1.34E-04	1.37E-04	1.02E-03	9.20E-04	7.40E-04	2.45E-04	2.00E-04	8.94E-05
34	5.92E-04	5.41E-04	4.26E-04	3.21E-04	1.24E-04	1.31E-04	9.08E-04	8.07E-04	6.18E-04	2.27E-04	1.87E-04	8.78E-05
35	5.50E-04	5.00E-04	4.15E-04	3.07E-04	1.14E-04	1.28E-04	8.32E-04	7.54E-04	5.74E-04	2.07E-04	1.73E-04	8.50E-05
36	5.08E-04	4.58E-04	4.04E-04	2.93E-04	1.04E-04	1.25E-04	7.59E-04	6.80E-04	5.23E-04	1.84E-04	1.54E-04	8.20E-05
37	4.78E-04	4.28E-04	3.93E-04	2.79E-04	9.40E-05	1.22E-04	6.78E-04	6.04E-04	4.73E-04	1.65E-04	1.40E-04	7.90E-05
38	4.47E-04	4.07E-04	3.82E-04	2.65E-04	8.37E-05	1.19E-04	6.18E-04	5.44E-04	4.73E-04	1.57E-04	1.34E-04	7.60E-05
39	4.23E-04	3.83E-04	3.68E-04	2.51E-04	7.34E-05	1.16E-04	5.76E-04	5.04E-04	4.47E-04	1.45E-04	1.26E-04	7.30E-05
40	3.97E-04	3.57E-04	3.54E-04	2.37E-04	6.31E-05	1.13E-04	5.24E-04	4.62E-04	4.22E-04	1.35E-04	1.16E-04	6.90E-05
41	3.73E-04	3.37E-04	3.40E-04	2.23E-04	5.28E-05	1.10E-04	4.84E-04	4.38E-04	3.94E-04	1.24E-04	1.07E-04	6.50E-05
42	3.49E-04	3.17E-04	3.26E-04	2.09E-04	4.25E-05	1.07E-04	4.47E-04	4.04E-04	3.62E-04	1.13E-04	9.90E-05	6.10E-05
43	3.25E-04	2.95E-04	3.12E-04	1.95E-04	3.22E-05	1.04E-04	4.10E-04	3.74E-04	3.39E-04	1.03E-04	9.10E-05	5.70E-05
44	3.01E-04	2.73E-04	3.00E-04	1.81E-04	2.19E-05	1.01E-04	3.74E-04	3.48E-04	3.16E-04	9.20E-05	8.30E-05	5.30E-05
45	2.77E-04	2.51E-04	2.86E-04	1.67E-04	1.16E-05	9.80E-05	3.39E-04	3.16E-04	2.92E-04	8.30E-05	7.50E-05	4.90E-05
46	2.53E-04	2.29E-04	2.72E-04	1.53E-04	1.06E-05	9.59E-05	3.02E-04	2.82E-04	2.62E-04	7.49E-05	6.70E-05	4.50E-05
47	2.29E-04	2.05E-04	2.58E-04	1.39E-04	9.59E-06	9.59E-05	2.64E-04	2.42E-04	2.30E-04	6.58E-05	5.91E-05	4.14E-05
48	2.05E-04	1.81E-04	2.38E-04	1.25E-04	8.58E-06	9.28E-05	2.26E-04	2.08E-04	2.02E-04	5.74E-05	5.16E-05	3.70E-05
49	1.81E-04	1.57E-04	2.14E-04	1.11E-04	7.57E-06	8.97E-05	1.87E-04	1.71E-04	1.64E-04	4.93E-05	4.39E-05	3.24E-05
50	1.57E-04	1.33E-04	1.90E-04	9.75E-05	6.56E-06	8.66E-05	1.49E-04	1.33E-04	1.26E-04	4.24E-05	3.70E-05	2.70E-05
51	1.33E-04	1.09E-04	1.66E-04	8.39E-05	5.55E-06	8.35E-05	1.11E-04	9.71E-05	9.18E-05	3.55E-05	3.07E-05	2.20E-05
52	1.09E-04	8.50E-05	1.42E-04	7.03E-05	4.54E-06	8.04E-05	8.71E-05	7.84E-05	7.39E-05	3.00E-05	2.57E-05	1.80E-05
53	8.50E-05	6.10E-05	1.18E-04	5.67E-05	3.53E-06	7.73E-05	7.34E-05	6.57E-05	6.20E-05	2.53E-05	2.19E-05	1.50E-05
54	6.10E-05	4.30E-05	8.50E-05	4.32E-05	2.52E-06	7.42E-05	6.04E-05	5.36E-05	5.07E-05	2.19E-05	1.85E-05	1.20E-05
55	3.70E-05	2.50E-05	5.10E-05	3.07E-05	1.51E-06	7.50E-05	4.71E-05	4.12E-05	3.90E-05	1.85E-05	1.51E-05	9.00E-06
56	1.30E-05	8.50E-06	1.60E-05	1.04E-05	5.00E-07	7.58E-05	3.21E-05	2.81E-05	2.66E-05	1.16E-05	9.73E-06	5.70E-06

TABLE IV. Collision Strengths Ω for Ionization from the Ground Level to the Given Upper Levels as a Function of Z and Scattered Electron Energy in Units of Z_{eff}^2 Hydrogen, $21\sigma_{eff}^2$

	E7						E9					
Z	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73
22	1.63E-03	1.41E-03	1.09E-03	7.24E-04	4.07E-04	2.01E-04	7.77E-04	6.91E-04	4.80E-04	2.98E-04	1.91E-04	6.52E-05
23	1.44E-03	1.24E-03	9.72E-04	6.44E-04	3.99E-04	1.77E-04	7.04E-04	5.97E-04	4.20E-04	2.64E-04	1.32E-04	5.67E-05
24	1.22E-03	1.13E-03	8.67E-04	5.72E-04	3.17E-04	1.34E-04	6.48E-04	5.37E-04	3.93E-04	2.41E-04	1.31E-04	5.17E-05
25	1.19E-03	1.03E-03	7.77E-04	5.10E-04	2.82E-04	1.20E-04	6.10E-04	5.06E-04	3.63E-04	2.22E-04	1.11E-04	4.78E-05
26	1.07E-03	9.16E-04	6.77E-04	4.25E-04	2.50E-04	1.23E-04	5.97E-04	4.63E-04	3.37E-04	2.04E-04	1.02E-04	4.47E-05
27	9.70E-04	8.24E-04	6.24E-04	4.07E-04	2.22E-04	1.08E-04	5.24E-04	4.30E-04	3.16E-04	1.93E-04	9.49E-05	4.21E-05
28	8.77E-04	7.43E-04	5.33E-04	3.43E-04	1.97E-04	9.44E-05	4.73E-04	4.08E-04	2.97E-04	1.82E-04	9.13E-05	4.00E-05
29	7.93E-04	6.74E-04	5.08E-04	3.24E-04	1.79E-04	8.61E-05	4.44E-04	3.84E-04	2.81E-04	1.72E-04	8.68E-05	3.81E-05
30	7.23E-04	6.11E-04	4.73E-04	2.84E-04	1.60E-04	7.71E-05	4.22E-04	3.64E-04	2.64E-04	1.63E-04	8.24E-05	3.63E-05
31	6.58E-04	5.54E-04	4.32E-04	2.67E-04	1.43E-04	6.92E-05	4.05E-04	3.48E-04	2.53E-04	1.53E-04	7.89E-05	3.35E-05
32	6.01E-04	5.04E-04	3.79E-04	2.43E-04	1.31E-04	6.24E-05	4.00E-04	3.31E-04	2.41E-04	1.48E-04	7.54E-05	3.24E-05
33	5.50E-04	4.63E-04	3.44E-04	2.21E-04	1.19E-04	5.64E-05	3.81E-04	3.13E-04	2.30E-04	1.41E-04	7.21E-05	3.22E-05
34	5.03E-04	4.23E-04	3.14E-04	2.02E-04	1.08E-04	5.12E-05	3.63E-04	2.91E-04	2.19E-04	1.33E-04	6.90E-05	3.10E-05
35	4.63E-04	3.91E-04	2.90E-04	1.83E-04	9.84E-05	4.67E-05	3.47E-04	2.87E-04	2.09E-04	1.29E-04	6.60E-05	2.97E-05
36	4.30E-04	3.67E-04	2.67E-04	1.70E-04	9.04E-05	4.24E-05	3.32E-04	2.74E-04	2.02E-04	1.26E-04	6.32E-05	2.86E-05
37	3.98E-04	3.33E-04	2.47E-04	1.54E-04	8.32E-05	3.92E-05	3.18E-04	2.62E-04	1.91E-04	1.18E-04	6.05E-05	2.74E-05
38	2.70E-04	3.07E-04	2.29E-04	1.43E-04	7.48E-05	3.61E-05	3.02E-04	2.50E-04	1.83E-04	1.12E-04	5.79E-05	2.62E-05
39	3.41E-04	2.88E-04	2.13E-04	1.34E-04	7.11E-05	3.32E-05	2.87E-04	2.37E-04	1.74E-04	1.08E-04	5.53E-05	2.52E-05
40	2.22E-04	2.67E-04	1.98E-04	1.23E-04	6.61E-05	3.09E-05	2.74E-04	2.28E-04	1.64E-04	1.03E-04	5.31E-05	2.42E-05
41	3.01E-04	2.51E-04	1.83E-04	1.17E-04	6.14E-05	2.87E-05	2.61E-04	2.17E-04	1.59E-04	9.85E-05	5.08E-05	2.32E-05
42	2.52E-04	2.34E-04	1.74E-04	1.09E-04	5.73E-05	2.68E-05	2.53E-04	2.09E-04	1.53E-04	9.43E-05	4.87E-05	2.23E-05
43	2.44E-04	2.21E-04	1.63E-04	1.03E-04	5.37E-05	2.51E-05	2.42E-04	2.00E-04	1.44E-04	9.03E-05	4.67E-05	2.13E-05
44	2.50E-04	2.08E-04	1.53E-04	9.82E-05	5.04E-05	2.33E-05	2.32E-04	1.92E-04	1.40E-04	8.62E-05	4.49E-05	2.03E-05
45	2.24E-04	1.97E-04	1.43E-04	9.04E-05	4.63E-05	2.21E-05	2.22E-04	1.81E-04	1.34E-04	8.27E-05	4.29E-05	1.94E-05
46	2.23E-04	1.84E-04	1.37E-04	8.64E-05	4.47E-05	2.09E-05	2.13E-04	1.74E-04	1.28E-04	7.94E-05	4.12E-05	1.87E-05
47	1.13E-04	1.74E-04	1.29E-04	8.32E-05	4.04E-05	1.93E-05	2.05E-04	1.47E-04	1.23E-04	7.44E-05	3.94E-05	1.81E-05
48	2.01E-04	1.67E-04	1.23E-04	7.47E-05	4.01E-05	1.84E-05	1.77E-04	1.62E-04	1.18E-04	7.32E-05	2.80E-05	1.74E-05
49	1.91E-04	1.59E-04	1.14E-04	7.28E-05	3.81E-05	1.74E-05	1.87E-04	1.54E-04	1.14E-04	7.09E-05	2.64E-05	1.68E-05
50	1.82E-04	1.51E-04	1.11E-04	6.92E-05	3.62E-05	1.67E-05	1.82E-04	1.50E-04	1.09E-04	6.78E-05	2.52E-05	1.61E-05
51	1.72E-04	1.44E-04	1.04E-04	6.73E-05	3.44E-05	1.59E-05	1.74E-04	1.43E-04	1.03E-04	6.52E-05	2.38E-05	1.53E-05
52	1.63E-04	1.37E-04	9.97E-05	6.54E-05	3.26E-05	1.51E-05	1.65E-04	1.35E-04	9.97E-05	6.26E-05	2.23E-05	1.44E-05
53	1.54E-04	1.31E-04	9.62E-05	6.40E-05	3.12E-05	1.44E-05	1.62E-04	1.34E-04	9.77E-05	6.09E-05	2.14E-05	1.44E-05
54	1.51E-04	1.25E-04	9.20E-05	6.23E-05	2.99E-05	1.38E-05	1.54E-04	1.29E-04	9.43E-05	5.84E-05	2.03E-05	1.37E-05
55	1.43E-04	1.20E-04	8.80E-05	6.07E-05	2.84E-05	1.32E-05	1.51E-04	1.23E-04	9.08E-05	5.63E-05	2.02E-05	1.34E-05
56	1.37E-04	1.13E-04	8.44E-05	5.84E-05	2.74E-05	1.24E-05	1.44E-04	1.20E-04	8.77E-05	5.42E-05	2.02E-05	1.30E-05
57	1.23E-04	1.10E-04	8.10E-05	5.63E-05	2.63E-05	1.16E-05	1.41E-04	1.14E-04	8.47E-05	5.25E-05	2.02E-05	1.29E-05
58	1.13E-04	1.04E-04	7.78E-05	5.43E-05	2.53E-05	1.08E-05	1.34E-04	1.07E-04	8.18E-05	5.08E-05	2.02E-05	1.27E-05
59	1.03E-04	1.03E-04	7.48E-05	5.24E-05	2.43E-05	1.12E-05	1.31E-04	1.09E-04	7.92E-05	4.91E-05	2.02E-05	1.17E-05
60	1.18E-04	9.62E-05	7.19E-05	4.98E-05	2.33E-05	1.07E-05	1.27E-04	1.03E-04	7.64E-05	4.73E-05	2.02E-05	1.14E-05
61	1.14E-04	9.45E-05	6.93E-05	4.82E-05	2.24E-05	1.03E-05	1.23E-04	1.02E-04	7.42E-05	4.60E-05	2.02E-05	1.10E-05
62	1.10E-04	9.11E-05	6.68E-05	4.64E-05	2.17E-05	9.93E-06	1.19E-04	9.84E-05	7.18E-05	4.44E-05	2.02E-05	1.07E-05
63	1.04E-04	8.77E-05	6.43E-05	4.46E-05	2.10E-05	9.54E-06	1.14E-04	9.45E-05	6.94E-05	4.28E-05	2.02E-05	1.04E-05
64	1.02E-04	8.48E-05	6.22E-05	4.28E-05	2.03E-05	9.24E-06	1.12E-04	9.27E-05	6.73E-05	4.19E-05	2.02E-05	1.00E-05
65	9.85E-05	8.19E-05	6.01E-05	4.10E-05	1.96E-05	8.94E-06	1.09E-04	8.99E-05	6.53E-05	4.07E-05	2.02E-05	9.75E-06
66	9.42E-05	7.92E-05	5.81E-05	3.93E-05	1.88E-05	8.63E-06	1.04E-04	8.73E-05	6.34E-05	3.93E-05	2.02E-05	9.47E-06
67	9.21E-05	7.64E-05	5.62E-05	3.76E-05	1.82E-05	8.34E-06	1.03E-04	8.48E-05	6.18E-05	3.84E-05	2.02E-05	9.20E-06
68	9.01E-05	7.31E-05	5.43E-05	3.59E-05	1.77E-05	8.10E-06	9.97E-05	8.24E-05	6.01E-05	3.73E-05	1.94E-05	8.93E-06
69	8.82E-05	7.01E-05	5.24E-05	3.42E-05	1.72E-05	7.84E-06	9.61E-05	8.01E-05	5.84E-05	3.63E-05	1.87E-05	8.64E-06
70	8.62E-05	6.73E-05	5.11E-05	3.19E-05	1.64E-05	7.60E-06	9.42E-05	7.79E-05	5.68E-05	3.53E-05	1.84E-05	8.47E-06
71	8.10E-05	6.74E-05	4.92E-05	3.09E-05	1.61E-05	7.38E-06	9.17E-05	7.56E-05	5.53E-05	3.44E-05	1.79E-05	8.23E-06
72	7.43E-05	6.34E-05	4.80E-05	3.00E-05	1.58E-05	7.14E-06	8.73E-05	7.38E-05	5.37E-05	3.39E-05	1.74E-05	8.04E-06
73	7.42E-05	6.34E-05	4.80E-05	2.91E-05	1.53E-05	6.99E-06	8.70E-05	7.19E-05	5.29E-05	3.24E-05	1.70E-05	7.85E-06
74	7.37E-05	6.14E-05	4.73E-05	2.82E-05	1.47E-05	6.74E-06	8.47E-05	7.01E-05	5.11E-05	3.08E-05	1.64E-05	7.64E-06
75	7.18E-05	5.98E-05	4.40E-05	2.73E-05	1.43E-05	6.57E-06	8.24E-05	6.82E-05	4.99E-05	3.02E-05	1.62E-05	7.35E-06
76	6.77E-05	5.82E-05	4.28E-05	2.64E-05	1.40E-05	6.37E-06	8.03E-05	6.50E-05	4.84E-05	2.92E-05	1.58E-05	7.17E-06
77	6.78E-05	5.63E-05	4.14E-05	2.40E-05	1.34E-05	6.22E-06	7.84E-05	6.30E-05	4.74E-05	2.89E-05	1.54E-05	7.10E-06
78	6.39E-05	5.50E-05	4.03E-05	2.34E-05	1.32E-05	6.04E-06	7.47E-05	6.34E-05	4.63E-05	2.80E-05	1.50E-05	6.92E-06
79	6.41E-05	5.32E-05	3.94E-05	2.27E-05	1.29E-05	5.90E-06	7.48E-05	6.19E-05	4.53E-05	2.81E-05	1.47E-05	6.77E-06
80	6.24E-05	5.21E-05	3.84E-05	2.41E-05	1.27E-05	5.75E-06	7.31E-05	6.05E-05	4.43E-05	2.80E-05	1.43E-05	6.64E-06
81	6.07E-05	5.07E-05	3.74E-05	2.25E-05	1.22E-05	5.41E-06	7.14E-05	5.91E-05	4.23E-05	2.69E-05	1.40E-05	6.47E-06
82	5.51E-05	4.94E-05	3.63E-05	2.27E-05	1.19E-05	5.47E-06	6.98E-05	5.78E-05	4.22E-05	2.63E-05	1.37E-05	6.39E-06
83	5.74E-05	4.81E-05	3.54E-05	2.23E-05	1.17E-05	5.34E-06	6.82E-05	5.64E-05	4.12E-05	2.57E-05	1.34E-05	6.20E-06
84	5.61E-05	4.67E-05	3.47E-05	2.18E-05	1.14E-05	5.21E-06	6.67E-05	5.53E-05	4.04E-05	2.52E-05	1.31E-05	6.07E-06
85	5.48E-05	4.57E-05	3.39E-05	2.13E-05	1.11E-05	5.08E-06	6.50E-05	5.41E-05	3.93E-05	2.44E-05	1.29E-05	5.94E-06
86	5.32E-05	4.44E-05	3.30E-05	2.07E-05	1.09E-05	4.97E-06	6.34E-05	5.29E-05	3.87E-05	2.40E-05	1.26E-05	5.82E-06
87	5.18E-05	4.34E-05	3.21E-05	2.02E-05	1.04E-05	4.85E-06	6.23E-05	5.18E-05	3.79E-05	2.34E-05	1.23E-05	

TABLE IV. Collision Strengths S for Excitation from the Ground Level to the Given Upper Levels as a Function of Z and Scattered Electron Energy in Units of $E_{\text{H}}^{\text{H}}/Z^2$

	E7						E10					
Z	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73
37	8.37E-03	4.34E-03	4.04E-03	2.08E-03	8.48E-04	3.23E-04	1.12E-04	9.23E-05	6.72E-05	4.17E-05	2.13E-05	9.34E-06
38	8.10E-03	4.14E-03	3.91E-03	2.02E-03	8.43E-04	3.12E-04	1.08E-04	8.91E-05	6.49E-05	4.01E-05	2.04E-05	9.23E-06
39	7.82E-03	4.02E-03	3.79E-03	1.94E-03	8.17E-04	3.04E-04	1.04E-04	8.40E-05	6.28E-05	3.89E-05	2.00E-05	8.97E-06
40	7.54E-03	3.77E-03	3.48E-03	1.90E-03	7.92E-04	2.95E-04	1.00E-04	8.31E-05	6.07E-05	3.74E-05	1.94E-05	8.71E-06
41	7.38E-03	3.60E-03	3.37E-03	1.84E-03	7.70E-04	2.87E-04	9.70E-05	8.04E-05	5.89E-05	3.64E-05	1.88E-05	8.44E-06
42	7.14E-03	3.43E-03	3.24E-03	1.77E-03	7.48E-04	2.79E-04	9.29E-05	7.78E-05	5.61E-05	3.54E-05	1.82E-05	8.22E-06
43	6.92E-03	3.27E-03	3.14E-03	1.74E-03	7.27E-04	2.71E-04	8.97E-05	7.54E-05	5.32E-05	3.42E-05	1.77E-05	8.02E-06
44	6.73E-03	3.12E-03	3.07E-03	1.69E-03	7.07E-04	2.64E-04	8.60E-05	7.31E-05	5.20E-05	3.20E-05	1.72E-05	7.77E-06
45	6.55E-03	2.97E-03	2.93E-03	1.64E-03	6.87E-04	2.57E-04	8.33E-05	7.09E-05	5.00E-05	3.04E-05	1.66E-05	7.53E-06
46	6.37E-03	2.82E-03	2.79E-03	1.60E-03	6.67E-04	2.50E-04	8.03E-05	6.87E-05	4.82E-05	2.96E-05	1.60E-05	7.30E-06
47	6.19E-03	2.67E-03	2.64E-03	1.56E-03	6.47E-04	2.43E-04	7.82E-05	6.65E-05	4.71E-05	2.87E-05	1.54E-05	7.08E-06
48	6.02E-03	2.52E-03	2.50E-03	1.51E-03	6.28E-04	2.37E-04	7.59E-05	6.43E-05	4.64E-05	2.79E-05	1.50E-05	6.86E-06
49	5.84E-03	2.43E-03	2.44E-03	1.47E-03	6.10E-04	2.31E-04	7.37E-05	6.21E-05	4.46E-05	2.61E-05	1.52E-05	6.64E-06
50	5.70E-03	2.28E-03	2.37E-03	1.43E-03	5.92E-04	2.25E-04	7.14E-05	6.04E-05	4.28E-05	2.48E-05	1.48E-05	6.42E-06
51	5.52E-03	2.13E-03	2.24E-03	1.40E-03	5.74E-04	2.19E-04	6.92E-05	5.87E-05	4.10E-05	2.36E-05	1.43E-05	6.20E-06
52	5.34E-03	2.00E-03	2.12E-03	1.36E-03	5.56E-04	2.13E-04	6.70E-05	5.67E-05	4.00E-05	2.24E-05	1.37E-05	6.02E-06
53	5.16E-03	1.87E-03	2.00E-03	1.32E-03	5.38E-04	2.07E-04	6.48E-05	5.47E-05	3.82E-05	2.12E-05	1.30E-05	5.80E-06
54	5.02E-03	1.74E-03	1.97E-03	1.28E-03	5.20E-04	2.01E-04	6.26E-05	5.26E-05	3.64E-05	2.00E-05	1.24E-05	5.54E-06
55	4.84E-03	1.62E-03	1.86E-03	1.24E-03	5.02E-04	1.95E-04	6.04E-05	5.05E-05	3.46E-05	1.88E-05	1.18E-05	5.32E-06
56	4.66E-03	1.50E-03	1.79E-03	1.20E-03	4.84E-04	1.89E-04	5.82E-05	4.84E-05	3.28E-05	1.76E-05	1.12E-05	5.10E-06
57	4.48E-03	1.38E-03	1.72E-03	1.16E-03	4.66E-04	1.83E-04	5.60E-05	4.63E-05	3.10E-05	1.64E-05	1.06E-05	4.88E-06
58	4.30E-03	1.26E-03	1.65E-03	1.12E-03	4.48E-04	1.77E-04	5.38E-05	4.42E-05	2.92E-05	1.52E-05	1.00E-05	4.66E-06
59	4.12E-03	1.14E-03	1.58E-03	1.08E-03	4.30E-04	1.71E-04	5.16E-05	4.21E-05	2.74E-05	1.40E-05	9.40E-06	4.44E-06
60	3.94E-03	1.02E-03	1.51E-03	1.04E-03	4.12E-04	1.65E-04	4.94E-05	4.00E-05	2.56E-05	1.32E-05	8.80E-06	4.22E-06
61	3.76E-03	9.02E-04	1.44E-03	1.00E-03	3.94E-04	1.59E-04	4.72E-05	3.79E-05	2.38E-05	1.20E-05	7.60E-06	4.00E-06
62	3.58E-03	8.82E-04	1.37E-03	9.60E-04	3.76E-04	1.53E-04	4.50E-05	3.58E-05	2.20E-05	1.04E-05	6.40E-06	3.78E-06
63	3.40E-03	8.62E-04	1.30E-03	9.20E-04	3.58E-04	1.47E-04	4.28E-05	3.36E-05	2.02E-05	9.20E-06	5.80E-06	3.56E-06
64	3.22E-03	8.42E-04	1.23E-03	8.80E-04	3.40E-04	1.41E-04	4.06E-05	3.14E-05	1.84E-05	8.00E-06	5.20E-06	3.34E-06
65	3.04E-03	8.22E-04	1.16E-03	8.40E-04	3.22E-04	1.35E-04	3.84E-05	2.92E-05	1.66E-05	6.80E-06	4.60E-06	3.12E-06
66	2.86E-03	8.02E-04	1.09E-03	8.00E-04	3.04E-04	1.29E-04	3.62E-05	2.70E-05	1.48E-05	5.60E-06	4.00E-06	2.90E-06
67	2.68E-03	7.82E-04	1.02E-03	7.60E-04	2.86E-04	1.23E-04	3.40E-05	2.48E-05	1.30E-05	4.40E-06	3.40E-06	2.68E-06
68	2.50E-03	7.62E-04	9.90E-04	7.20E-04	2.68E-04	1.17E-04	3.18E-05	2.26E-05	1.12E-05	3.80E-06	2.80E-06	2.46E-06
69	2.32E-03	7.42E-04	9.60E-04	6.80E-04	2.50E-04	1.11E-04	2.96E-05	2.04E-05	1.04E-05	3.20E-06	2.20E-06	2.24E-06
70	2.14E-03	7.22E-04	9.30E-04	6.40E-04	2.32E-04	1.05E-04	2.74E-05	1.82E-05	9.20E-06	2.60E-06	1.60E-06	2.02E-06
71	1.96E-03	7.02E-04	9.00E-04	6.00E-04	2.14E-04	9.9E-05	2.52E-05	1.60E-05	8.00E-06	2.00E-06	1.00E-06	1.80E-06
72	1.78E-03	6.82E-04	8.70E-04	5.60E-04	1.96E-04	9.3E-05	2.30E-05	1.38E-05	6.80E-06	1.40E-06	8.00E-07	1.60E-06
73	1.60E-03	6.62E-04	8.40E-04	5.20E-04	1.78E-04	8.7E-05	2.08E-05	1.16E-05	5.60E-06	1.20E-06	6.00E-07	1.40E-06
74	1.42E-03	6.42E-04	8.10E-04	4.80E-04	1.60E-04	8.1E-05	1.86E-05	1.04E-05	4.40E-06	1.00E-06	4.00E-07	1.20E-06
75	1.24E-03	6.22E-04	7.80E-04	4.40E-04	1.42E-04	7.5E-05	1.64E-05	9.2E-06	3.20E-06	8.00E-07	2.00E-07	1.00E-06
76	1.06E-03	6.02E-04	7.50E-04	4.00E-04	1.24E-04	6.9E-05	1.42E-05	8.0E-06	2.00E-06	6.00E-07	1.00E-07	8.00E-07
77	8.8E-04	5.82E-04	7.20E-04	3.60E-04	1.06E-04	6.3E-05	1.20E-05	6.8E-06	1.00E-06	4.00E-07	2.00E-07	6.00E-07
78	7.0E-04	5.62E-04	6.90E-04	3.20E-04	8.8E-05	5.7E-05	1.08E-05	5.6E-06	8.00E-07	3.00E-07	1.00E-07	4.00E-07
79	5.2E-04	5.42E-04	6.60E-04	2.80E-04	7.0E-05	5.1E-05	9.6E-06	4.4E-06	6.00E-07	2.00E-07	5.00E-08	2.00E-07
80	3.4E-04	5.22E-04	6.30E-04	2.40E-04	5.2E-05	4.5E-05	8.4E-06	3.2E-06	4.00E-07	1.00E-07	5.00E-08	1.00E-07
81	1.6E-04	5.02E-04	6.00E-04	2.00E-04	3.4E-05	3.9E-05	7.2E-06	2.0E-06	2.00E-07	5.00E-08	1.00E-08	5.00E-08
82	8.0E-05	4.82E-04	5.70E-04	1.60E-04	1.6E-05	3.3E-05	6.0E-06	1.0E-06	8.00E-08	2.00E-08	5.00E-09	3.00E-08
83	4.0E-05	4.62E-04	5.40E-04	1.20E-04	8.0E-06	2.7E-05	4.0E-06	8.00E-07	5.00E-09	1.00E-09	2.00E-09	2.00E-08
84	2.0E-05	4.42E-04	5.10E-04	8.0E-05	4.0E-06	2.1E-05	3.0E-06	6.00E-07	3.00E-09	5.00E-10	1.00E-09	1.00E-08
85	1.0E-05	4.22E-04	4.80E-04	6.0E-05	2.0E-06	1.5E-05	2.0E-06	4.00E-07	2.00E-09	1.00E-09	2.00E-10	5.00E-09
86	5.0E-06	4.02E-04	4.50E-04	4.0E-05	1.0E-06	1.0E-05	1.0E-06	2.0E-07	1.00E-09	5.00E-10	1.00E-10	2.00E-09
87	2.5E-06	3.82E-04	4.20E-04	3.0E-05	5.0E-07	8.0E-06	8.0E-07	1.0E-07	5.00E-10	2.00E-10	5.00E-11	1.00E-09
88	1.2E-06	3.62E-04	3.90E-04	2.0E-05	2.0E-07	6.0E-06	6.0E-07	8.0E-08	2.00E-10	1.00E-10	2.00E-11	5.00E-10
89	6.0E-07	3.42E-04	3.60E-04	1.0E-05	1.0E-07	4.0E-06	4.0E-07	5.0E-08	1.00E-10	5.00E-11	1.00E-11	2.00E-10
90	3.0E-07	3.22E-04	3.30E-04	5.0E-06	5.0E-08	3.0E-06	3.0E-07	4.0E-08	5.00E-11	2.00E-11	5.00E-12	1.00E-10
91	1.5E-07	3.02E-04	3.10E-04	2.0E-06	2.0E-08	1.5E-06	2.0E-07	3.0E-08	2.00E-11	1.00E-11	2.00E-12	5.00E-11
92	7.5E-08	2.82E-04	2.90E-04	1.0E-06	1.0E-08	7.5E-07	1.0E-07	1.0E-08	1.00E-11	5.00E-12	1.00E-12	2.00E-11

	E11					E12						
Z	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73
22	2.29E-04	1.70E-04	1.04E-04	4.98E-05	1.83E-05	3.78E-06	4.44E-04	5.73E-04	3.90E-04	2.40E-04	1.23E-04	5.94E-05
23	2.48E-04	2.01E-04	1.24E-04	6.08E-05	2.21E-05	4.73E-06	3.78E-04	4.79E-04	2.47E-04	1.17E-04	1.11E-04	5.24E-05
24	2.83E-04	2.13E-04	1.33E-04	6.34E-05	2.33E-05	4.47E-06	3.22E-04	4.30E-04	2.12E-04	1.00E-04	9.91E-05	4.70E-05
25	2.93E-04	2.13E-04	1.33E-04	6.71E-05	2.44E-05	4.14E-06	4.74E-04	3.89E-04	2.00E-04	1.17E-04	8.90E-05	4.22E-05
26	2.81E-04	2.12E-04	1.33E-04	6.64E-05	2.44E-05	3.91E-06	4.31E-04	3.53E-04	2.11E-04	1.15E-04	8.02E-05	3.91E-05
27	2.73E-04	2.04E-04	1.33E-04	6.54E-05	2.44E-05	3.65E-06	4.16E-04	3.18E-04	2.11E-04	1.15E-04	7.23E-05	3.65E-05
28	2.44E-04	1.97E-04	1.24E-04	6.24E-05	2.34E-05	3.07E-06	3.62E-04	2.94E-04	2.11E-04	1.20E-04	6.43E-05	3.13E-05
29	2.53E-04	1.91E-04	1.21E-04	6.11E-05	2.47E-05	2.82E-06	3.34E-04	2.72E-04	1.94E-04	1.18E-04	6.04E-05	2.89E-05
30	2.43E-04	1.84E-04	1.18E-04	6.04E-05	2.37E-05	2.57E-06	3.07E-04	2.51E-04	1.78E-04	1.08E-04	5.81E-05	2.63E-05
31	2.30E-04	1.74E-04	1.10E-04	5.95E-05	2.37E-05	2.31E-06	2.84E-04	2.32E-04	1.63E-04	1.09E-04	5.59E-05	2.43E-05
32	2.14E-04	1.64E-04	1.03E-04	5.80E-05	2.30E-05	2.06E-06	2.61E-04	2.14E-04	1.53E-04	1.04E-04	5.36E-05	2.24E-05
33	2.14E-04	1.64E-04	1.03E-04	5.80E-05	2.30E-05	1.80E-06	2.48E-04	2.01E-04	1.43E-04	1.04E-04	4.97E-05	2.11E-05
34	2.91E-04	2.24E-04	1.40E-04	7.00E-05	2.61E-05	1.61E-06	2.22E-04	1.80E-04	1.33E-04	8.04E-05	4.17E-05	1.97E-05
35	2.48E-04	2.07E-04	1.24E-04	6.11E-05	2.30E-05	1.36E-06	2.17E-04	1.74E-04	1.24E-04	7.32E-05	3.90E-05	1.84E-05
36	2.47E-04	2.06E-04	1.23E-04	6.04E-05	2.30E-05	1.30E-06	2.04E-04	1.69E-04	1.17E-04	7.04E-05	3.64E-05	1.73E-05
37	2.27E-04	2.73E-04	2.01E-04	1.24E-04	6.00E-05	3.01E-06	1.97E-04	1.53E-04	1.10E-04	6.43E-05	3.44E-05	1.63E-05
38	2.09E-04	2.38E-04	1.90E-04	1.19E-04	6.19E-05	2.89E-06	1.81E-04	1.44E-04	1.03E-04	6.23E-05	3.24E-05	1.53E-05
39	2.45E-04	2.44E-04	1.79E-04	1.12E-04	5.98E-05	2.70E-06	1.71E-04	1.38E-04	9.74E-05	5.90E-05	3.04E-05	1.43E-05
40	2.78E-04	2.31E-04	1.70E-04	1.01E-04	5.94E-05	2.54E-06	1.63E-04	1.31E-04	9.23E-05	5.59E-05	2.90E-05	1.37E-05
41	2.44E-04	2.19E-04	1.41E-04	6.01E-05	4.89E-05	2.43E-06	1.93E-04	1.24E-04	8.73E-05	5.26E-05	2.73E-05	1.30E-05
42	2.51E-04	2.09E-04	1.52E-04	6.99E-05	5.00E-05	2.31E-06	1.94E-04	1.17E-04	8.50E-05	5.03E-05	2.61E-05	1.24E-05
43	2.28E-04	1.99E-04	1.44E-04	5.97E-05	4.79E-05	2.20E-06	1.38E-04	1.12E-04	7.90E-05	4.78E-05	2.49E-05	1.18E-05
44	2.27E-04	1.89E-04	1.29E-04	5.71E-05	4.54E-05	2.10E-06	1.23E-04	1.04E-04	7.32E-05	4.54E-05	2.37E-05	1.13E-05
45	2.17E-04	1.80E-04	1.20E-04	5.51E-05	4.39E-05	2.01E-06	1.24E-04	1.01E-04	7.17E-05	4.25E-05	2.24E-05	1.07E-05
46	2.17E-04	1.72E-04	1.27E-04	5.44E-05	4.14E-05	1.92E-06	1.204E-04	9.67E-05	6.89E-05	4.13E-05	2.14E-05	1.05E-05
47	1.99E-04	1.64E-04	1.12E-04	5.23E-05	3.93E-05	1.73E-06	1.10E-04	9.10E-05	6.39E-05	3.90E-05	2.00E-05	9.84E-06
48	1.90E-04	1.58E-04	1.14E-04	5.20E-05	3.82E-05	1.74E-06	1.10E-04	8.93E-05	6.27E-05	3.80E-05	1.98E-05	9.41E-06
49	1.82E-04	1.51E-04	1.11E-04	5.16E-05	3.64E-05	1.69E-06	1.07E-04	8.84E-05	6.01E-05	3.65E-05	1.90E-05	9.03E-06
50	1.74E-04	1.43E-04	1.07E-04	5.10E-05	3.52E-05	1.63E-06	1.01E-04	8.13E-05	5.74E-05	3.50E-05	1.83E-05	8.64E-06
51	1.67E-04	1.39E-04	1.03E-04	5.04E-05	3.39E-05	1.57E-06	9.63E-05	7.81E-05	5.53E-05	3.34E-05	1.74E-05	8.35E-06
52	1.60E-04	1.34E-04	1.00E-04	4.94E-05	3.24E-05	1.51E-06	9.27E-05	7.50E-05	5.32E-05	3.24E-05	1.64E-05	8.05E-06
53	1.53E-04	1.30E-04	9.74E-05	4.84E-05	3.09E-05	1.45E-06	8.84E-05	7.19E-05	5.10E-05	3.14E-05	1.54E-05	7.76E-06
54	1.49E-04	1.24E-04	9.44E-05	4.74E-05	3.03E-05	1.41E-06	8.58E-05	6.93E-05	4.92E-05	3.00E-05	1.57E-05	7.47E-06
55	1.43E-04	1.19E-04	8.88E-05	4.53E-05	2.93E-05	1.34E-06	8.27E-05	6.69E-05	4.74E-05	2.90E-05	1.52E-05	7.19E-06
56	1.38E-04	1.13E-04	8.51E-05	4.34E-05	2.83E-05	1.31E-06	7.97E-05	6.44E-05	4.59E-05	2.80E-05	1.47E-05	7.00E-06
57	1.33E-04	1.11E-04	8.21E-05	4.16E-05	2.73E-05	1.27E-06	7.69E-05	6.28E-05	4.43E-05	2.71E-05	1.42E-05	6.77E-06
58	1.28E-04	1.07E-04	7.87E-05	4.00E-05	2.63E-05	1.23E-06	7.42E-05	6.04E-05	4.27E-05	2.61E-05	1.37E-05	6.54E-06
59	1.24E-04	1.04E-04	7.48E-05	4.00E-05	2.54E-05	1.18E-06	7.17E-05	5.82E-05	4.14E-05	2.53E-05	1.33E-05	6.34E-06
60	1.20E-04	1.00E-04	7.23E-05	4.00E-05	2.49E-05	1.15E-06	6.94E-05	5.62E-05	4.01E-05	2.43E-05	1.29E-05	6.17E-06
61	1.16E-04	9.72E-05	7.00E-05	4.39E-05	2.41E-05	1.12E-06	6.71E-05	5.43E-05	3.89E-05	2.38E-05	1.23E-05	5.99E-06
62	1.13E-04	9.41E-05	6.97E-05	4.23E-05	2.34E-05	1.10E-06	6.50E-05	5.28E-05	3.77E-05	2.31E-05	1.21E-05	5.83E-06
63	1.10E-04	9.12E-05	6.82E-05	4.08E-05	2.27E-05	1.07E-06	6.29E-05	5.11E-05	3.68E-05	2.24E-05	1.18E-05	5.67E-06
64	1.04E-04	8.82E-05	6.54E-05	4.14E-05	2.21E-05	1.04E-06	6.10E-05	4.94E-05	3.59E-05	2.17E-05	1.15E-05	5.51E-06
65	1.03E-04	8.99E-05	6.37E-05	4.09E-05	2.14E-05	1.01E-06	5.91E-05	4.81E-05	3.44E-05	2.12E-05	1.12E-05	5.37E-06
66	9.93E-05	8.84E-05	6.19E-05	3.94E-05	2.10E-05	9.93E-06	5.74E-05	4.67E-05	3.33E-05	2.04E-05	1.09E-05	5.23E-06
67	9.44E-05	8.10E-05	5.92E-05	3.80E-05	2.05E-05	9.41E-06	5.57E-05	4.49E-05	3.29E-05	2.00E-05	1.04E-05	5.10E-06
68	9.07E-05	8.07E-05	5.84E-05	3.72E-05	1.99E-05	9.38E-06	5.41E-05	4.41E-05	3.17E-05	1.95E-05	1.03E-05	4.98E-06
69	8.72E-05	7.97E-05	5.74E-05	3.64E-05	1.94E-05	9.24E-06	5.24E-05	4.28E-05	3.09E-05	1.89E-05	1.00E-05	4.84E-06
70	8.67E-05	7.43E-05	5.35E-05	3.59E-05	1.90E-05	8.95E-06	5.11E-05	4.17E-05	3.00E-05	1.84E-05	9.82E-06	4.73E-06
71	8.62E-05	7.29E-05	5.41E-05	3.44E-05	1.84E-05	8.73E-06	4.97E-05	4.04E-05	2.92E-05	1.81E-05	9.60E-06	4.64E-06
72	8.40E-05	7.06E-05	5.28E-05	3.38E-05	1.81E-05	8.57E-06	4.84E-05	3.94E-05	2.85E-05	1.77E-05	9.38E-06	4.54E-06
73	8.17E-05	6.89E-05	5.19E-05	3.30E-05	1.77E-05	8.39E-06	4.71E-05	3.84E-05	2.78E-05	1.72E-05	9.17E-06	4.44E-06
74	7.97E-05	6.71E-05	5.09E-05	3.24E-05	1.74E-05	8.24E-06	4.59E-05	3.74E-05	2.70E-05	1.67E-05	8.94E-06	4.34E-06
75	7.77E-05	6.59E-05	5.13E-05	3.13E-05	1.70E-05	8.04E-06	4.47E-05	3.67E-05	2.63E-05	1.63E-05	8.75E-06	4.24E-06
76	7.58E-05	6.39E-05	4.99E-05	3.08E-05	1.67E-05	7.90E-06	4.35E-05	3.59E-05	2.57E-05	1.61E-05	8.60E-06	4.18E-06
77	7.39E-05	6.23E-05	4.68E-05	3.02E-05	1.63E-05	7.74E-06	4.24E-05	3.49E-05	2.50E-05	1.58E-05	8.42E-06	4.10E-06
78	7.21E-05	6.09E-05	4.58E-05	2.94E-05	1.60E-05	7.62E-06	4.14E-05	3.41E-05	2.47E-05	1.54E-05	8.24E-06	4.03E-06
79	7.04E-05	5.93E-05	4.48E-05	2.90E-05	1.57E-05	7.49E-06	4.04E-05	3.33E-05	2.43E-05	1.51E-05	8.10E-06	3.95E-06
80	6.87E-05	5.82E-05	4.38E-05	2.82E-05	1.54E-05	7.34E-06	3.94E-05	3.24E-05	2.37E-05	1.48E-05	7.95E-06	3.86E-06
81	6.72E-05	5.69E-05	4.29E-05	2.78E-05	1.52E-05	7.24E-06	3.84E-05	3.18E-05	2.30E-05	1.45E-05	7.81E-06	3.80E-06
82	6.57E-05	5.57E-05	4.20E-05	2.73E-05	1.49E-05	7.13E-06	3.74E-05	3.10E-05	2.23E-05	1.42E-05	7.64E-06	3.73E-06
83	6.42E-05	5.49E-05	4.12E-05	2.68E-05	1.47E-05	7.02E-06	3.67E-05	3.04E-05	2.22E-05	1.40E-05	7.53E-06	3.69E-06
84	6.27E-05	5.32E-05	4.04E-05	2.63E-05	1.44E-05	6.92E-06	3.58E-05	2.97E-05	2.18E-05	1.37E-05	7.40E-06	3.63E-06
85	6.12E-05	5.25E-05	3.97E-05	2.58E-05	1.42E-05	6.80E-06	3.50E-05	2.90E-05	2.15E-05	1.34E-05	7.27E-06	3.58E-06
86	6.03E-05	5.12E-05	3.89E-05	2.54E-05	1.40E-05	6.69E-06	3.42E-05	2.84E-05	2.09E-05	1.31E-05	7.14E-06	3.52E-06
87	5.91E-05	5.02E-05	3.80E-05	2.50E-05	1.38E-05	6.59E-06	3.34E-05	2.78E-05	2.04E-05	1.30E-05	7.02E-06	3.47E-06
88	5.79E-05	4.93E-05	3.73E-05	2.44E-05	1.34E-05	6.47E-06	3.27E-05	2.72E-05	2.01E-05	1.27E-05	6.92E-06	3.42E-06
89	5.68E-05	4.84E-05	3.67E-05	2.42E-05	1.34E-05	6.40E-06	3.19E-05	2.64E-05	1.97E-05	1.25E-05	6.80E-06	3.37E-06
90	5.57E-05	4.75E-05	3.62E-05	2.37E-05	1.32E-05	6.32E-06	3.12E-05	2.60E-05	1.93E-05	1.23E-05	6.69E-06	3.32E-06
91	5.46E-05	4.67E-05	3.56E-05	2.32E-05	1.30E-05	6.24E-06	3.05E-05	2.55E-05	1.89E-05	1.20E-05	6.58E-06	3.27E-06
92	5.37E-05	4.59E-05	3.51E-05	2.28E-05	1.29E-05	6.16E-06	3.00E-05	2.50E-05	1.84E-05	1.18E-05	6.47E-06	3.22E-06

[illegible]

	F2						F3					
Z	E*=0.008	E*=0.04	E*=0.10	E*=0.21	E*=0.41	E*=0.75	E*=0.008	E*=0.04	E*=0.10	E*=0.21	E*=0.41	E*=0.75
57	5.20E-04	9.04E-04	4.97E-04	3.18E-04	5.78E-04	6.64E-04	5.29E-04	9.03E-04	4.89E-04	4.54E-04	4.77E-04	3.33E-04
58	3.01E-04	4.84E-04	4.79E-04	3.00E-04	3.87E-04	4.43E-04	3.14E-04	4.82E-04	4.48E-04	4.34E-04	4.33E-04	3.09E-04
59	4.63E-04	4.48E-04	4.43E-04	4.82E-04	4.78E-04	4.22E-04	4.63E-04	4.48E-04	4.48E-04	4.48E-04	4.34E-04	4.34E-04
60	4.44E-04	4.32E-04	4.44E-04	4.32E-04	4.32E-04	4.02E-04	4.74E-04	4.42E-04	4.10E-04	4.74E-04	4.42E-04	4.43E-04
61	4.50E-04	4.34E-04	4.30E-04	4.49E-04	4.03E-04	3.83E-04	4.93E-04	4.24E-04	3.72E-04	3.78E-04	3.74E-04	4.44E-04
62	4.23E-04	4.31E-04	4.14E-04	4.34E-04	4.04E-04	3.63E-04	4.37E-04	4.04E-04	3.74E-04	3.42E-04	3.78E-04	4.24E-04
63	4.02E-04	4.07E-04	4.03E-04	4.03E-04	4.71E-04	3.44E-04	4.19E-04	3.70E-04	3.60E-04	3.44E-04	3.42E-04	4.07E-04
64	4.78E-04	3.94E-04	3.89E-04	4.04E-04	4.34E-04	3.32E-04	4.02E-04	3.74E-04	3.43E-04	3.74E-04	3.74E-04	3.78E-04
65	3.94E-04	3.81E-04	3.77E-04	3.94E-04	4.02E-04	3.14E-04	3.67E-04	3.40E-04	3.31E-04	3.17E-04	3.17E-04	3.72E-04
66	4.81E-04	3.67E-04	3.63E-04	3.81E-04	4.29E-04	3.02E-04	3.73E-04	3.44E-04	3.19E-04	3.04E-04	3.17E-04	3.37E-04
67	3.70E-04	3.58E-04	3.54E-04	3.70E-04	4.14E-04	2.88E-04	3.59E-04	3.32E-04	3.03E-04	2.91E-04	3.03E-04	3.42E-04
68	3.58E-04	3.47E-04	3.43E-04	3.58E-04	4.04E-04	4.74E-04	3.43E-04	3.30E-04	2.92E-04	2.79E-04	2.92E-04	3.28E-04
69	3.48E-04	3.37E-04	3.33E-04	3.48E-04	3.93E-04	4.43E-04	3.33E-04	3.20E-04	2.82E-04	2.67E-04	2.78E-04	3.14E-04
70	3.37E-04	3.27E-04	3.23E-04	3.37E-04	3.83E-04	4.04E-04	3.23E-04	3.10E-04	2.71E-04	2.54E-04	2.64E-04	3.01E-04
71	3.26E-04	3.17E-04	3.13E-04	3.26E-04	3.71E-04	4.38E-04	3.07E-04	2.93E-04	2.54E-04	2.44E-04	2.53E-04	2.89E-04
72	3.18E-04	3.08E-04	3.03E-04	3.18E-04	3.61E-04	4.27E-04	2.98E-04	2.73E-04	2.50E-04	2.34E-04	2.44E-04	2.77E-04
73	3.10E-04	3.00E-04	2.94E-04	3.10E-04	3.52E-04	4.17E-04	2.87E-04	2.63E-04	2.41E-04	2.24E-04	2.34E-04	2.64E-04
74	3.01E-04	2.92E-04	2.86E-04	3.01E-04	3.42E-04	4.07E-04	2.77E-04	2.53E-04	2.32E-04	2.18E-04	2.24E-04	2.54E-04
75	2.92E-04	2.84E-04	2.80E-04	2.92E-04	3.34E-04	3.97E-04	2.67E-04	2.43E-04	2.22E-04	2.09E-04	2.13E-04	2.44E-04
76	2.83E-04	2.74E-04	2.70E-04	2.83E-04	3.23E-04	3.86E-04	2.58E-04	2.37E-04	2.15E-04	2.01E-04	2.04E-04	2.34E-04
77	2.74E-04	2.65E-04	2.61E-04	2.74E-04	3.12E-04	3.76E-04	2.49E-04	2.27E-04	2.07E-04	1.93E-04	1.96E-04	2.24E-04
78	2.65E-04	2.56E-04	2.52E-04	2.65E-04	3.01E-04	3.65E-04	2.40E-04	2.18E-04	1.99E-04	1.85E-04	1.88E-04	2.14E-04
79	2.56E-04	2.47E-04	2.43E-04	2.56E-04	2.90E-04	3.54E-04	2.31E-04	2.10E-04	1.91E-04	1.77E-04	1.80E-04	2.04E-04
80	2.47E-04	2.38E-04	2.34E-04	2.47E-04	2.79E-04	3.43E-04	2.22E-04	2.01E-04	1.82E-04	1.71E-04	1.74E-04	1.98E-04
81	2.38E-04	2.29E-04	2.25E-04	2.38E-04	2.68E-04	3.32E-04	2.13E-04	1.92E-04	1.73E-04	1.63E-04	1.66E-04	1.90E-04
82	2.29E-04	2.20E-04	2.16E-04	2.29E-04	2.57E-04	3.21E-04	2.04E-04	1.83E-04	1.64E-04	1.54E-04	1.57E-04	1.73E-04
83	2.20E-04	2.11E-04	2.07E-04	2.20E-04	2.46E-04	3.10E-04	1.95E-04	1.74E-04	1.55E-04	1.45E-04	1.48E-04	1.63E-04
84	2.11E-04	2.02E-04	1.98E-04	2.11E-04	2.35E-04	3.00E-04	1.86E-04	1.65E-04	1.46E-04	1.36E-04	1.39E-04	1.54E-04
85	2.02E-04	1.93E-04	1.89E-04	2.02E-04	2.24E-04	2.89E-04	1.77E-04	1.56E-04	1.37E-04	1.27E-04	1.30E-04	1.45E-04
86	1.93E-04	1.84E-04	1.80E-04	1.93E-04	2.13E-04	2.78E-04	1.68E-04	1.47E-04	1.28E-04	1.18E-04	1.21E-04	1.36E-04
87	1.84E-04	1.75E-04	1.71E-04	1.84E-04	2.02E-04	2.67E-04	1.59E-04	1.38E-04	1.19E-04	1.09E-04	1.12E-04	1.27E-04
88	1.75E-04	1.66E-04	1.62E-04	1.75E-04	1.91E-04	2.56E-04	1.50E-04	1.29E-04	1.10E-04	1.00E-04	1.03E-04	1.18E-04
89	1.66E-04	1.57E-04	1.53E-04	1.66E-04	1.80E-04	2.45E-04	1.41E-04	1.20E-04	1.01E-04	0.91E-04	0.94E-04	1.09E-04
90	1.57E-04	1.48E-04	1.44E-04	1.57E-04	1.69E-04	2.34E-04	1.32E-04	1.11E-04	0.92E-04	0.82E-04	0.85E-04	1.00E-04
91	1.48E-04	1.39E-04	1.35E-04	1.48E-04	1.58E-04	2.23E-04	1.23E-04	1.02E-04	0.83E-04	0.73E-04	0.76E-04	0.91E-04
92	1.39E-04	1.30E-04	1.26E-04	1.39E-04	1.47E-04	2.12E-04	1.14E-04	0.93E-04	0.74E-04	0.64E-04	0.67E-04	0.81E-04

	F4					F5						
Z	E*=0.008	E*=0.04	E*=0.10	E*=0.21	E*=0.41	E*=0.75	E*=0.008	E*=0.04	E*=0.10	E*=0.21	E*=0.41	E*=0.75
22	4.90E-02	4.04E-02	2.94E-02	1.82E-02	1.00E-02	5.55E-04	3.11E-02	1.83E-02	1.04E-02	2.34E-02	2.72E-02	3.47E-02
23	4.29E-02	3.61E-02	2.61E-02	1.60E-02	8.29E-04	3.90E-04	1.73E-02	2.02E-02	2.31E-02	3.20E-02	4.02E-02	4.81E-02
24	3.92E-02	3.24E-02	2.34E-02	1.44E-02	7.30E-04	3.40E-04	1.60E-02	1.87E-02	2.31E-02	2.94E-02	3.68E-02	4.49E-02
25	3.58E-02	2.93E-02	2.13E-02	1.23E-02	6.91E-04	3.14E-04	1.49E-02	1.74E-02	2.13E-02	2.72E-02	3.40E-02	4.14E-02
26	3.27E-02	2.67E-02	1.97E-02	1.13E-02	6.49E-04	2.88E-04	1.38E-02	1.61E-02	1.97E-02	2.54E-02	3.18E-02	3.88E-02
27	3.00E-02	2.47E-02	1.80E-02	1.07E-02	6.04E-04	2.64E-04	1.28E-02	1.45E-02	1.80E-02	2.37E-02	2.95E-02	3.61E-02
28	2.77E-02	2.28E-02	1.64E-02	1.03E-02	5.61E-04	2.39E-04	1.24E-02	1.43E-02	1.77E-02	2.28E-02	2.74E-02	3.28E-02
29	2.54E-02	2.11E-02	1.53E-02	9.83E-04	5.18E-04	2.13E-04	1.17E-02	1.34E-02	1.64E-02	2.09E-02	2.53E-02	3.04E-02
30	2.38E-02	1.97E-02	1.43E-02	9.32E-04	4.70E-04	2.44E-04	1.11E-02	1.28E-02	1.57E-02	1.94E-02	2.42E-02	2.87E-02
31	2.23E-02	1.84E-02	1.33E-02	8.79E-04	4.24E-04	2.64E-04	1.04E-02	1.21E-02	1.47E-02	1.83E-02	2.29E-02	2.74E-02
32	2.08E-02	1.73E-02	1.23E-02	8.24E-04	3.77E-04	2.84E-04	9.80E-03	1.14E-02	1.37E-02	1.70E-02	2.16E-02	2.61E-02
33	1.93E-02	1.62E-02	1.12E-02	7.77E-04	3.30E-04	3.04E-04	9.20E-03	1.08E-02	1.31E-02	1.63E-02	2.01E-02	2.46E-02
34	1.84E-02	1.53E-02	1.10E-02	7.31E-04	2.83E-04	3.24E-04	8.61E-03	1.02E-02	1.24E-02	1.54E-02	1.93E-02	2.34E-02
35	1.73E-02	1.47E-02	1.14E-02	6.84E-04	2.36E-04	3.44E-04	8.02E-03	9.62E-03	1.17E-02	1.43E-02	1.79E-02	2.11E-02
36	1.64E-02	1.41E-02	1.10E-02	6.37E-04	1.89E-04	3.64E-04	7.43E-03	9.03E-03	1.10E-02	1.37E-02	1.68E-02	1.99E-02
37	1.55E-02	1.34E-02	1.07E-02	5.90E-04	1.42E-04	3.84E-04	6.84E-03	8.44E-03	1.03E-02	1.30E-02	1.60E-02	1.88E-02
38	1.45E-02	1.28E-02	1.02E-02	5.43E-04	9.47E-05	4.04E-04	6.25E-03	7.85E-03	9.44E-03	1.23E-02	1.50E-02	1.77E-02
39	1.44E-02	1.27E-02	1.04E-02	5.31E-04	7.07E-05	4.24E-04	6.49E-03	7.70E-03	9.20E-03	1.13E-02	1.42E-02	1.68E-02
40	1.41E-02	1.24E-02	1.02E-02	5.44E-04	7.44E-05	4.44E-04	6.34E-03	7.59E-03	9.00E-03	1.09E-02	1.34E-02	1.65E-02
41	1.37E-02	1.21E-02	1.02E-02	5.43E-04	7.87E-05	4.64E-04	6.01E-03	7.40E-03	8.83E-03	1.03E-02	1.27E-02	1.62E-02
42	1.33E-02	1.18E-02	1.02E-02	5.44E-04	8.29E-05	4.84E-04	5.69E-03	7.24E-03	8.66E-03	9.73E-03	1.20E-02	1.58E-02
43	1.29E-02	1.14E-02	1.02E-02	5.44E-04	8.71E-05	5.04E-04	5.49E-03	7.08E-03	8.49E-03	9.56E-03	1.13E-02	1.54E-02
44	1.24E-02	1.12E-02	1.02E-02	5.44E-04	9.14E-05	5.24E-04	5.12E-03	6.92E-03	8.32E-03	9.39E-03	1.07E-02	1.50E-02
45	1.22E-02	1.12E-02	1.02E-02	5.44E-04	9.56E-05	5.44E-04	4.92E-03	6.76E-03	8.15E-03	9.22E-03	1.03E-02	1.47E-02
46	1.21E-02	1.12E-02	1.02E-02	5.44E-04	1.00E-04	5.64E-04	4.69E-03	6.59E-03	7.98E-03	8.88E-03	9.73E-03	1.40E-02
47	1.19E-02	1.11E-02	1.04E-02	5.44E-04	1.04E-04	5.84E-04	4.47E-03	6.42E-03	7.81E-03	8.71E-03	9.56E-03	1.36E-02
48	1.17E-02	1.10E-02	1.04E-02	5.44E-04	1.08E-04	6.04E-04	4.25E-03	6.25E-03	7.64E-03	8.54E-03	9.39E-03	1.32E-02
49	1.15E-02	1.09E-02	1.02E-02	5.44E-04	1.12E-04	6.24E-04	4.03E-03	6.08E-03	7.47E-03	8.37E-03	9.22E-03	1.28E-02
50	1.13E-02	1.08E-02	1.02E-02	5.44E-04	1.16E-04	6.44E-04	3.81E-03	5.91E-03	7.30E-03	8.20E-03	9.05E-03	1.24E-02
51	1.11E-02	1.07E-02	1.02E-02	5.44E-04	1.20E-04	6.64E-04	3.59E-03	5.74E-03	7.13E-03	8.03E-03	8.88E-03	1.20E-02
52	1.09E-02	1.07E-02	1.04E-02	5.44E-04	1.24E-04	6.84E-04	3.37E-03	5.57E-03	6.96E-03	7.86E-03	8.71E-03	1.16E-02
53	1.08E-02	1.04E-02	1.04E-02	5.44E-04	1.28E-04	7.04E-04	3.15E-03	5.40E-03	6.79E-03	7.69E-03	8.54E-03	1.12E-02
54	1.04E-02	1.02E-02	1.04E-02	5.44E-04	1.32E-04	7.24E-04	2.93E-03	5.23E-03				
55	1.04E-02	1.02E-02	1.02E-02	5.44E-04	1.32E-04	7.24E-04	2.93E-03	5.23E-03	6.79E-03	7.69E-03	8.54E-03	1.12E-02
56	1.02E-02	1.00E-02	1.02E-02	5.44E-04	1.36E-04	7.44E-04	2.71E-03	5.06E-03	6.62E-03	7.52E-03	8.37E-03	1.08E-02
57	1.01E-02	9.90E-03	1.00E-02	5.44E-04	1.40E-04	7.64E-04	2.49E-03	4.89E-03	6.45E-03	7.36E-03	8.20E-03	1.04E-02
58	9.97E-04	9.79E-03	1.00E-02	5.44E-04	1.44E-04	7.84E-04	2.27E-03	4.76E-03	6.32E-03	7.23E-03	8.07E-03	1.00E-02
59	9.73E-04	9.55E-03	1.00E-02	5.44E-04	1.48E-04	8.04E-04	2.05E-03	4.63E-03	6.15E-03	7.06E-03	7.89E-03	9.60E-03
60	9.50E-04	9.32E-03	1.00E-02	5.44E-04	1.52E-04	8.24E-04	1.83E-03	4.50E-03	6.02E-03	6.93E-03	7.76E-03	9.36E-03
61	9.28E-04	9.09E-03	1.01E-02	5.44E-04	1.56E-04	8.44E-04	1.61E-03	4.37E-03	5.90E-03	6.81E-03	7.64E-03	9.12E-03
62	9.16E-04	8.96E-03	9.97E-04	5.44E-04	1.61E-04	8.64E-04	1.39E-03	4.24E-03	5.78E-03	6.69E-03	7.52E-03	8.88E-03
63	9.04E-04	8.83E-03	9.94E-04	5.44E-04	1.65E-04	8.84E-04	1.17E-03	4.11E-03	5.66E-03	6.57E-03	7.40E-03	8.64E-03
64	8.92E-04	8.70E-03	9.91E-04	5.44E-04	1.69E-04	9.04E-04	9.47E-04	4.03E-03	5.54E-03	6.45E-03	7.28E-03	8.40E-03
65	8.80E-04	8.58E-03	9.88E-04	5.44E-04	1.73E-04	9.24E-04	9.25E-04	3.95E-03	5.42E-03	6.33E-03	7.16E-03	8.16E-03
66	8.68E-04	8.46E-03	9.85E-04	5.44E-04	1.77E-04	9.44E-04	9.03E-04	3.83E-03	5.30E-03	6.21E-03	7.04E-03	7.92E-03
67	8.56E-04	8.34E-03	9.82E-04	5.44E-04	1.81E-04	9.64E-04	8.81E-04	3.71E-03	5.18E-03	6.09E-03	6.92E-03	7.68E-03
68	8.44E-04	8.22E-03	9.79E-04	5.44E-04	1.85E-04	9.84E-04	8.59E-04	3.59E-03	5.06E-03	5.97E-03	6.80E-03	7.44E-03
69	8.32E-04	8.10E-03	9.76E-04	5.44E-04	1.89E-04	1.00E-03	8.37E-04	3.47E-03	4.94E-03	5.85E-03	6.68E-03	7.20E-03
70	8.20E-04	7.98E-03	9.73E-04	5.44E-04	1.93E-04	1.02E-03	8.15E-04	3.35E-03	4.82E-03	5.73E-03	6.56E-03	6.96E-03
71	8.08E-04	7.86E-03	9.70E-04	5.44E-04	1.97E-04	1.04E-03	7.93E-04	3.23E-03	4.70E-03	5.61E-03	6.44E-03	6.72E-03
72	7.96E-04	7.74E-03	9.67E-04	5.44E-04	2.01E-04	1.06E-03	7.71E-04	3.11E-03	4.58E-03	5.49E-03	6.32E-03	6.48E-03
73	7.84E-04	7.62E-03	9.64E-04	5.44E-04	2.05E-04	1.08E-03	7.49E-04	2.99E-03	4.46E-03	5.37E-03	6.20E-03	6.24E-03
74	7.72E-04	7.50E-03	9.61E-04	5.44E-04	2.09E-04	1.10E-03	7.27E-04	2.87E-03	4.34E-03	5.25E-03	6.08E-03	6.00E-03
75	7.60E-04	7.38E-03	9.58E-04	5.44E-04	2.13E-04	1.12E-03	7.05E-04	2.75E-03	4.22E-03	5.13E-03	5.96E-03	5.76E-03
76	7.48E-04	7.26E-03	9.55E-04	5.44E-04	2.17E-04	1.14E-03	6.83E-04	2.63E-03	4.10E-03	5.01E-03	5.84E-03	5.52E-03
77	7.36E-04	7.14E-03	9.52E-04	5.44E-04	2.21E-04	1.16E-03	6.61E-04	2.51E-03	3.98E-03	4.89E-03	5.72E-03	5.28E-03
78	7.24E-04	7.02E-03	9.49E-04	5.44E-04	2.25E-04	1.18E-03	6.39E-04	2.39E-03	3.86E-03	4.77E-03	5.60E-03	5.04E-03
79	7.12E-04	6.90E-03	9.46E-04	5.44E-04	2.29E-04	1.20E-03	6.17E-04	2.27E-03	3.74E-03	4.65E-03	5.48E-03	4.80E-03
80	7.00E-04	6.78E-03	9.43E-04	5.44E-04	2.33E-04	1.22E-03	5.95E-04	2.15E-03	3.62E-03	4.53E-03	5.36E-03	4.56E-03
81	6.88E-04	6.66E-03	9.40E-04	5.44E-04	2.37E-04	1.24E-03	5.73E-04	2.03E-03	3.50E-03	4.41E-03	5.24E-03	4.32E-03
82	6.76E-04	6.54E-03	9.37E-04	5.44E-04	2.41E-04	1.26E-03	5.51E-04	1.91E-03	3.38E-03	4.29E-03	5.12E-03	4.08E-03
83	6.64E-04	6.42E-03	9.34E-04	5.44E-04	2.45E-04	1.28E-03	5.29E-04	1.79E-03	3.26E-03	4.17E-03	5.00E-03	3.84E-03
84	6.52E-04	6.30E-03	9.31E-04	5.44E-04	2.49E-04	1.30E-03	5.07E-04	1.67E-03	3.14E-03	4.05E-03	4.88E-03	3.60E-03
85	6.40E-04	6.18E-03	9.28E-04	5.44E-04	2.53E-04	1.32E-03	4.85E-04	1.55E-03	3.02E-03	3.93E-03	4.76E-03	3.36E-03
86	6.28E-04	6.06E-03	9.25E-04	5.44E-04	2.57E-04	1.34E-03	4.63E-04	1.43E-03	2.90E-03	3.81E-03	4.64E-03	3.12E-03
87	6.16E-04	5.94E-03	9.22E-04	5.44E-04	2.61E-04	1.36E-03	4.41E-04	1.31E-03	2.78E-03	3.69E-03	4.52E-03	2.88E-03
88	6.04E-04	5.82E-03	9.19E-04	5.44E-04	2.65E-04	1.38E-03	4.19E-04	1.19E-03	2.66E-03	3.57E-03	4.40E-03	2.64E-03
89	5.92E-04	5.70E-03	9.16E-04	5.44E-04	2.69E-04	1.40E-03	3.97E-04	1.07E-03	2.54E-03	3.45E-03	4.28E-03	2.40E-03
90	5.80E-04	5.58E-03	9.13E-04	5.44E-04	2.73E-04	1.42E-03	3.75E-04	9.5E-04	2.42E-03	3.33E-03	4.16E-03	2.16E-03
91	5.68E-04	5.46E-03	9.10E-04	5.44E-04	2.77E-04	1.44E-03	3.53E-04	8.3E-04	2.30E-03	3.21E-03	4.04E-03	1.92E-03
92	5.56E-04	5.34E-03	9.07E-04	5.44E-04	2.81E-04	1.46E-03	3.31E-04	7.1E-04	2.18E-03	3.09E-03	3.92E-03	1.68E-03
93	5.44E-04	5.22E-03	9.04E-04	5.44E-04	2.85E-04	1.48E-03	3.09E-04	5.9E-04	2.06E-03	2.97E-03	3.80E-03	1.44E-03
94	5.32E-04	5.10E-03	9.01E-04	5.44E-04	2.89E-04	1.50E-03	2.87E-04	4.7E-04	1.94E-03	2.85E-03	3.68E-03	1.20E-03
95	5.20E-04	4.98E-03	8.98E-04	5.44E-04	2.93E-04							

TABLE IV. Collision Strengths S for Excitation from the Ground Level to the Given Upper Levels as a Function of Z and Scattered Electron Energy in Units of Z_{eff}^2 Rydberg, 21-192

	F6						F7							
	Z	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73	Z	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73
22	2	3.17E-03	3.25E-03	3.48E-03	4.25E-03	5.05E-03	5.89E-03	4	4.62E-03	3.34E-03	4.39E-03	5.39E-03	1.04E-02	1.39E-02
23	3	1.14E-03	9.90E-04	7.72E-04	5.37E-04	4.04E-04	3.04E-04	5	3.04E-04	4.72E-04	4.67E-04	5.34E-04	1.04E-03	1.39E-03
24	4	1.14E-03	1.02E-03	8.38E-04	6.78E-04	5.74E-04	5.32E-04	6	7.14E-04	8.09E-04	4.77E-04	5.61E-04	9.02E-04	5.08E-04
25	5	1.10E-03	9.70E-04	8.17E-04	6.82E-04	6.09E-04	6.04E-04	8	8.44E-04	7.72E-04	4.39E-04	5.63E-04	5.23E-04	5.42E-04
26	6	1.03E-03	9.09E-04	7.74E-04	6.37E-04	5.99E-04	6.03E-04	10	8.04E-04	7.20E-04	4.20E-04	5.42E-04	5.14E-04	5.37E-04
27	7	9.49E-04	8.47E-04	7.23E-04	6.22E-04	5.79E-04	5.82E-04	12	7.47E-04	6.72E-04	5.84E-04	5.14E-04	4.92E-04	5.17E-04
28	8	8.80E-04	7.87E-04	6.77E-04	5.82E-04	5.43E-04	5.37E-04	14	6.70E-04	6.24E-04	5.54E-04	4.82E-04	4.67E-04	4.72E-04
29	9	8.10E-04	7.28E-04	6.31E-04	5.48E-04	5.19E-04	5.28E-04	16	6.42E-04	5.80E-04	5.07E-04	4.32E-04	4.41E-04	4.67E-04
30	10	7.41E-04	6.61E-04	5.89E-04	5.14E-04	4.81E-04	4.99E-04	18	5.97E-04	5.39E-04	4.73E-04	4.04E-04	4.15E-04	4.42E-04
31	11	7.07E-04	6.34E-04	5.63E-04	4.82E-04	4.54E-04	4.71E-04	20	5.36E-04	4.83E-04	4.42E-04	3.96E-04	3.91E-04	4.17E-04
32	12	6.42E-04	5.94E-04	5.19E-04	4.32E-04	4.29E-04	4.44E-04	22	5.19E-04	4.49E-04	4.12E-04	3.73E-04	3.68E-04	3.94E-04
33	13	6.19E-04	5.84E-04	4.82E-04	4.29E-04	4.40E-04	4.20E-04	24	4.89E-04	4.39E-04	3.87E-04	3.51E-04	3.47E-04	3.72E-04
34	14	5.81E-04	5.21E-04	4.52E-04	4.00E-04	4.31E-04	3.97E-04	26	4.54E-04	4.11E-04	3.62E-04	3.30E-04	3.26E-04	3.52E-04
35	15	5.44E-04	4.70E-04	4.03E-04	3.59E-04	4.11E-04	3.84E-04	28	4.24E-04	3.84E-04	3.42E-04	3.11E-04	3.10E-04	3.23E-04
36	16	5.14E-04	4.41E-04	3.80E-04	3.35E-04	4.11E-04	3.84E-04	30	4.00E-04	3.63E-04	3.22E-04	2.92E-04	2.92E-04	3.14E-04
37	17	4.84E-04	4.29E-04	3.79E-04	3.34E-04	3.22E-04	3.30E-04	32	3.77E-04	3.42E-04	3.02E-04	2.77E-04	2.77E-04	3.00E-04
38	18	4.57E-04	4.11E-04	3.59E-04	3.18E-04	3.04E-04	3.11E-04	34	3.54E-04	3.23E-04	2.84E-04	2.62E-04	2.62E-04	2.87E-04
39	19	4.32E-04	3.89E-04	3.39E-04	3.02E-04	2.91E-04	3.03E-04	36	3.34E-04	3.03E-04	2.71E-04	2.48E-04	2.48E-04	2.71E-04
40	20	4.10E-04	3.49E-04	3.22E-04	2.87E-04	2.79E-04	2.91E-04	38	3.18E-04	2.89E-04	2.57E-04	2.34E-04	2.37E-04	2.58E-04
41	21	3.89E-04	3.20E-04	3.04E-04	2.72E-04	2.64E-04	2.77E-04	40	3.01E-04	2.73E-04	2.42E-04	2.24E-04	2.27E-04	2.44E-04
42	22	3.70E-04	3.02E-04	2.91E-04	2.62E-04	2.51E-04	2.63E-04	42	2.84E-04	2.60E-04	2.31E-04	2.12E-04	2.15E-04	2.34E-04
43	23	3.52E-04	2.87E-04	2.77E-04	2.48E-04	2.40E-04	2.53E-04	44	2.72E-04	2.47E-04	2.20E-04	2.00E-04	2.03E-04	2.24E-04
44	24	3.34E-04	2.72E-04	2.62E-04	2.38E-04	2.30E-04	2.43E-04	46	2.59E-04	2.34E-04	2.09E-04	1.92E-04	1.94E-04	2.14E-04
45	25	3.21E-04	2.49E-04	2.53E-04	2.18E-04	2.20E-04	2.33E-04	48	2.44E-04	2.24E-04	1.99E-04	1.84E-04	1.87E-04	2.07E-04
46	26	3.10E-04	2.44E-04	2.48E-04	2.13E-04	2.15E-04	2.28E-04	50	2.39E-04	2.19E-04	1.94E-04	1.79E-04	1.82E-04	1.94E-04
47	27	2.92E-04	2.44E-04	2.31E-04	2.07E-04	2.03E-04	2.15E-04	52	2.24E-04	2.04E-04	1.82E-04	1.68E-04	1.71E-04	1.86E-04
48	28	2.81E-04	2.53E-04	2.22E-04	1.99E-04	1.94E-04	2.07E-04	54	2.17E-04	1.92E-04	1.74E-04	1.61E-04	1.64E-04	1.81E-04
49	29	2.49E-04	2.42E-04	2.13E-04	1.91E-04	1.87E-04	1.99E-04	56	2.03E-04	1.87E-04	1.67E-04	1.54E-04	1.57E-04	1.74E-04
50	30	2.39E-04	2.32E-04	2.05E-04	1.84E-04	1.80E-04	1.92E-04	58	1.97E-04	1.79E-04	1.60E-04	1.48E-04	1.51E-04	1.67E-04
51	31	2.19E-04	2.24E-04	1.97E-04	1.75E-04	1.71E-04	1.83E-04	60	1.91E-04	1.73E-04	1.53E-04	1.41E-04	1.44E-04	1.60E-04
52	32	2.29E-04	2.14E-04	1.89E-04	1.71E-04	1.67E-04	1.79E-04	62	1.81E-04	1.64E-04	1.47E-04	1.37E-04	1.40E-04	1.55E-04
53	33	2.30E-04	2.08E-04	1.83E-04	1.65E-04	1.62E-04	1.73E-04	64	1.74E-04	1.58E-04	1.41E-04	1.31E-04	1.34E-04	1.49E-04
54	34	2.22E-04	2.00E-04	1.74E-04	1.59E-04	1.56E-04	1.68E-04	66	1.67E-04	1.52E-04	1.34E-04	1.24E-04	1.27E-04	1.44E-04
55	35	2.14E-04	1.92E-04	1.70E-04	1.53E-04	1.51E-04	1.62E-04	68	1.61E-04	1.46E-04	1.31E-04	1.22E-04	1.25E-04	1.39E-04
56	36	2.07E-04	1.87E-04	1.64E-04	1.48E-04	1.46E-04	1.57E-04	70	1.55E-04	1.41E-04	1.24E-04	1.17E-04	1.20E-04	1.34E-04
57	37	2.00E-04	1.80E-04	1.59E-04	1.44E-04	1.42E-04	1.53E-04	72	1.49E-04	1.34E-04	1.21E-04	1.13E-04	1.14E-04	1.28E-04
58	38	1.92E-04	1.74E-04	1.54E-04	1.39E-04	1.40E-04	1.48E-04	74	1.44E-04	1.31E-04	1.17E-04	1.09E-04	1.12E-04	1.24E-04
59	39	1.87E-04	1.69E-04	1.49E-04	1.35E-04	1.33E-04	1.44E-04	76	1.39E-04	1.26E-04	1.13E-04	1.05E-04	1.09E-04	1.22E-04
60	40	1.81E-04	1.64E-04	1.44E-04	1.31E-04	1.29E-04	1.40E-04	78	1.34E-04	1.22E-04	1.09E-04	1.02E-04	1.05E-04	1.18E-04
61	41	1.75E-04	1.59E-04	1.40E-04	1.27E-04	1.24E-04	1.37E-04	80	1.30E-04	1.18E-04	1.04E-04	9.75E-05	1.02E-04	1.14E-04
62	42	1.69E-04	1.54E-04	1.35E-04	1.23E-04	1.20E-04	1.33E-04	82	1.26E-04	1.14E-04	1.00E-04	9.35E-05	9.75E-05	1.10E-04
63	43	1.63E-04	1.49E-04	1.32E-04	1.20E-04	1.17E-04	1.30E-04	84	1.21E-04	1.10E-04	9.75E-05	9.22E-05	9.54E-05	1.08E-04
64	44	1.60E-04	1.47E-04	1.29E-04	1.17E-04	1.14E-04	1.27E-04	86	1.18E-04	1.07E-04	9.54E-05	9.02E-05	9.25E-05	1.05E-04
65	45	1.54E-04	1.41E-04	1.23E-04	1.14E-04	1.11E-04	1.24E-04	88	1.14E-04	1.04E-04	9.24E-05	8.72E-05	8.97E-05	1.02E-04
66	46	1.51E-04	1.37E-04	1.21E-04	1.11E-04	1.10E-04	1.21E-04	90	1.10E-04	1.00E-04	9.04E-05	8.52E-05	8.71E-05	9.98E-05
67	47	1.47E-04	1.32E-04	1.18E-04	1.08E-04	1.08E-04	1.18E-04	92	1.07E-04	9.73E-05	8.71E-05	8.24E-05	8.43E-05	9.72E-05
68	48	1.43E-04	1.28E-04	1.14E-04	1.04E-04	1.03E-04	1.13E-04	94	1.03E-04	9.35E-05	8.44E-05	7.97E-05	8.16E-05	9.42E-05
69	49	1.39E-04	1.27E-04	1.13E-04	1.02E-04	1.02E-04	1.12E-04	96	1.01E-04	9.17E-05	8.20E-05	7.73E-05	7.92E-05	9.17E-05
70	50	1.34E-04	1.23E-04	1.09E-04	1.00E-04	1.00E-04	1.10E-04	98	9.80E-05	8.91E-05	7.97E-05	7.45E-05	7.64E-05	8.87E-05
71	51	1.22E-04	1.20E-04	1.07E-04	9.74E-05	9.79E-05	1.08E-04	100	9.32E-05	8.42E-05	7.74E-05	7.24E-05	7.33E-05	8.53E-05
72	52	1.29E-04	1.17E-04	1.04E-04	9.44E-05	9.47E-05	1.04E-04	102	9.34E-05	8.41E-05	7.32E-05	7.04E-05	7.34E-05	8.53E-05
73	53	1.24E-04	1.14E-04	1.01E-04	9.22E-05	9.24E-05	1.01E-04	104	9.41E-05	8.48E-05	7.22E-05	6.94E-05	7.15E-05	8.22E-05
74	54	1.22E-04	1.12E-04	9.94E-05	9.11E-05	9.14E-05	1.02E-04	106	9.77E-05	7.94E-05	7.12E-05	6.84E-05	6.94E-05	8.01E-05
75	55	1.20E-04	1.09E-04	9.71E-05	8.91E-05	8.97E-05	9.97E-05	108	9.54E-05	7.73E-05	6.92E-05	6.64E-05	6.74E-05	7.82E-05
76	56	1.17E-04	1.07E-04	9.50E-05	8.72E-05	8.78E-05	9.78E-05	110	9.31E-05	7.54E-05	6.74E-05	6.41E-05	6.40E-05	7.62E-05
77	57	1.15E-04	1.04E-04	9.29E-05	8.53E-05	8.60E-05	9.60E-05	112	9.10E-05	7.32E-05	6.57E-05	6.24E-05	6.23E-05	7.42E-05
78	58	1.12E-04	1.02E-04	9.08E-05	8.32E-05	8.40E-05	9.40E-05	114	8.79E-05	7.14E-05	6.39E-05	6.06E-05	6.04E-05	7.27E-05
79	59	1.10E-04	9.97E-05	8.88E-05	8.17E-05	8.24E-05	9.24E-05	116	8.49E-05	6.97E-05	6.20E-05	5.87E-05	5.85E-05	7.12E-05
80	60	1.07E-04	9.73E-05	8.69E-05	7.99E-05	8.06E-05	9.07E-05	118	8.20E-05	6.79E-05	6.04E-05	5.71E-05	5.69E-05	6.92E-05
81	61	1.05E-04	9.52E-05	8.50E-05	7.82E-05	7.89E-05	8.90E-05	120	7.91E-05	6.62E-05	5.91E-05	5.58E-05	5.57E-05	6.73E-05
82	62	1.02E-04	9.32E-05	8.32E-05	7.65E-05	7.72E-05	8.73E-05	122	7.72E-05	6.43E-05	5.73E-05	5.37E-05	5.36E-05	6.58E-05
83	63	1.00E-04	9.12E-05	8.12E-05	7.49E-05	7.60E-05	8.54E-05	124	7.48E-05	6.24E-05	5.54E-05	5.22E-05	5.21E-05	6.40E-05
84	64	9.77E-05	8.92E-05	7.92E-05	7.34E-05	7.49E-05	8.35E-05	126	7.42E-05	6.12E-05	5.44E-05	5.12E-05	5.11E-05	6.24E-05
85	65	9.61E-05	8.77E-05	7.84E-05	7.28E-05	7.41E-05	8.18E-05	128	7.34E-05	5.94E-05	5.37E-05	5.06E-05	5.05E-05	6.08E-05
86	66	9.52E-05	8.69E-05	7.81E-05	7.17E-05	7.37E-05	8.13E-05	130	7.39E-05	5.74E-05	5.10E-05	4.72E-05	4.74E-05	5.90E-05
87	67	9.50E-05	8.63E-05	7.80E-05	7.24E-05	7.37E-05	8.03E-05	132						

Z	F8						F7					
	$E=0.008$	$E=0.04$	$E=0.10$	$E=0.21$	$E=0.41$	$E=0.73$	$E=0.008$	$E=0.04$	$E=0.10$	$E=0.21$	$E=0.41$	$E=0.73$
37	9.84E-03	7.80E-03	5.43E-03	4.03E-03	3.42E-03	3.40E-03	3.24E-04	3.88E-04	4.97E-04	6.42E-04	8.78E-04	1.11E-03
38	9.38E-03	7.42E-03	5.01E-03	4.19E-03	3.72E-03	3.99E-03	3.12E-04	3.74E-04	4.80E-04	6.40E-04	8.49E-04	1.08E-03
39	8.92E-03	7.47E-03	5.01E-03	4.30E-03	3.72E-03	4.23E-03	3.04E-04	3.64E-04	4.53E-04	6.19E-04	8.11E-04	1.04E-03
40	8.46E-03	7.32E-03	4.96E-03	4.40E-03	3.82E-03	4.36E-03	2.96E-04	3.54E-04	4.43E-04	6.11E-04	8.00E-04	1.02E-03
41	8.00E-03	7.17E-03	4.91E-03	4.52E-03	4.11E-03	4.77E-03	2.88E-04	3.42E-04	4.32E-04	6.00E-04	7.70E-04	9.80E-04
42	7.54E-03	7.02E-03	4.86E-03	4.63E-03	4.40E-03	5.25E-03	2.80E-04	3.31E-04	4.22E-04	5.91E-04	7.42E-04	9.51E-04
43	7.08E-03	6.87E-03	4.81E-03	4.72E-03	4.72E-03	5.49E-03	2.72E-04	3.21E-04	4.12E-04	5.81E-04	7.32E-04	9.22E-04
44	6.62E-03	6.72E-03	4.76E-03	4.72E-03	4.90E-03	5.70E-03	2.64E-04	3.12E-04	4.02E-04	5.72E-04	7.22E-04	9.03E-04
45	6.16E-03	6.57E-03	4.71E-03	4.72E-03	4.92E-03	5.91E-03	2.56E-04	3.02E-04	3.92E-04	5.62E-04	7.12E-04	8.84E-04
46	5.70E-03	6.42E-03	4.66E-03	4.72E-03	4.94E-03	6.12E-03	2.48E-04	2.92E-04	3.82E-04	5.52E-04	7.02E-04	8.65E-04
47	5.24E-03	6.27E-03	4.61E-03	4.72E-03	4.96E-03	6.33E-03	2.40E-04	2.82E-04	3.72E-04	5.42E-04	6.92E-04	8.46E-04
48	4.78E-03	6.12E-03	4.56E-03	4.72E-03	4.98E-03	6.54E-03	2.32E-04	2.72E-04	3.62E-04	5.32E-04	6.82E-04	8.27E-04
49	4.32E-03	5.97E-03	4.51E-03	4.72E-03	4.99E-03	6.75E-03	2.24E-04	2.62E-04	3.52E-04	5.22E-04	6.72E-04	8.08E-04
50	3.86E-03	5.82E-03	4.46E-03	4.72E-03	5.00E-03	6.96E-03	2.16E-04	2.52E-04	3.42E-04	5.12E-04	6.62E-04	7.89E-04
51	3.40E-03	5.67E-03	4.41E-03	4.72E-03	5.01E-03	7.17E-03	2.08E-04	2.42E-04	3.32E-04	5.02E-04	6.52E-04	7.70E-04
52	2.94E-03	5.52E-03	4.36E-03	4.72E-03	5.02E-03	7.38E-03	2.00E-04	2.32E-04	3.22E-04	4.92E-04	6.42E-04	7.51E-04
53	2.48E-03	5.37E-03	4.31E-03	4.72E-03	5.03E-03	7.59E-03	1.92E-04	2.22E-04	3.12E-04	4.82E-04	6.32E-04	7.32E-04
54	2.02E-03	5.22E-03	4.26E-03	4.72E-03	5.04E-03	7.80E-03	1.84E-04	2.12E-04	3.02E-04	4.72E-04	6.22E-04	7.13E-04
55	1.56E-03	5.07E-03	4.21E-03	4.72E-03	5.05E-03	8.01E-03	1.76E-04	2.02E-04	2.92E-04	4.62E-04	6.12E-04	6.94E-04
56	1.10E-03	4.92E-03	4.16E-03	4.72E-03	5.06E-03	8.22E-03	1.68E-04	1.92E-04	2.82E-04	4.52E-04	6.02E-04	6.75E-04
57	6.44E-04	4.77E-03	4.11E-03	4.72E-03	5.07E-03	8.43E-03	1.60E-04	1.82E-04	2.72E-04	4.42E-04	5.92E-04	6.56E-04
58	5.98E-04	4.62E-03	4.06E-03	4.72E-03	5.08E-03	8.64E-03	1.52E-04	1.72E-04	2.62E-04	4.32E-04	5.82E-04	6.37E-04
59	5.52E-04	4.47E-03	4.01E-03	4.72E-03	5.09E-03	8.85E-03	1.44E-04	1.62E-04	2.52E-04	4.22E-04	5.72E-04	6.18E-04
60	5.06E-04	4.32E-03	3.96E-03	4.72E-03	5.10E-03	9.06E-03	1.36E-04	1.52E-04	2.42E-04	4.12E-04	5.62E-04	6.09E-04
61	4.60E-04	4.17E-03	3.91E-03	4.72E-03	5.11E-03	9.27E-03	1.28E-04	1.42E-04	2.32E-04	4.02E-04	5.52E-04	5.90E-04
62	4.14E-04	4.02E-03	3.86E-03	4.72E-03	5.12E-03	9.48E-03	1.20E-04	1.32E-04	2.22E-04	3.92E-04	5.42E-04	5.71E-04
63	3.68E-04	3.87E-03	3.81E-03	4.72E-03	5.13E-03	9.69E-03	1.12E-04	1.22E-04	2.12E-04	3.82E-04	5.32E-04	5.52E-04
64	3.22E-04	3.72E-03	3.76E-03	4.72E-03	5.14E-03	9.90E-03	1.04E-04	1.12E-04	2.02E-04	3.72E-04	5.22E-04	5.33E-04
65	2.76E-04	3.57E-03	3.71E-03	4.72E-03	5.15E-03	1.01E-02	9.6E-05	1.02E-04	1.92E-04	3.62E-04	5.12E-04	5.14E-04
66	2.30E-04	3.42E-03	3.66E-03	4.72E-03	5.16E-03	1.03E-02	8.8E-05	9.1E-05	1.82E-04	3.52E-04	5.02E-04	4.95E-04
67	1.84E-04	3.27E-03	3.61E-03	4.72E-03	5.17E-03	1.05E-02	8.0E-05	8.2E-05	1.72E-04	3.42E-04	4.92E-04	4.76E-04
68	1.38E-04	3.12E-03	3.56E-03	4.72E-03	5.18E-03	1.07E-02	7.2E-05	7.3E-05	1.62E-04	3.32E-04	4.82E-04	4.57E-04
69	9.2E-05	2.97E-03	3.51E-03	4.72E-03	5.19E-03	1.09E-02	6.4E-05	6.4E-05	1.52E-04	3.22E-04	4.72E-04	4.38E-04
70	8.74E-05	2.82E-03	3.46E-03	4.72E-03	5.20E-03	1.11E-02	5.6E-05	5.6E-05	1.42E-04	3.12E-04	4.62E-04	4.19E-04
71	8.28E-05	2.67E-03	3.41E-03	4.72E-03	5.21E-03	1.13E-02	4.8E-05	4.8E-05	1.32E-04	3.02E-04	4.52E-04	4.00E-04
72	7.82E-05	2.52E-03	3.36E-03	4.72E-03	5.22E-03	1.15E-02	4.0E-05	4.0E-05	1.22E-04	2.92E-04	4.42E-04	3.81E-04
73	7.36E-05	2.37E-03	3.31E-03	4.72E-03	5.23E-03	1.17E-02	3.2E-05	3.2E-05	1.12E-04	2.82E-04	4.32E-04	3.62E-04
74	6.90E-05	2.22E-03	3.26E-03	4.72E-03	5.24E-03	1.19E-02	2.4E-05	2.4E-05	1.02E-04	2.72E-04	4.22E-04	3.43E-04
75	6.44E-05	2.07E-03	3.21E-03	4.72E-03	5.25E-03	1.21E-02	1.6E-05	1.6E-05	9.2E-05	2.62E-04	4.12E-04	3.24E-04
76	5.98E-05	1.92E-03	3.16E-03	4.72E-03	5.26E-03	1.23E-02	8E-06	8E-06	8.2E-05	2.52E-04	4.02E-04	3.05E-04
77	5.52E-05	1.77E-03	3.11E-03	4.72E-03	5.27E-03	1.25E-02	2E-06	2E-06	7.2E-05	2.42E-04	3.92E-04	2.86E-04
78	5.06E-05	1.62E-03	3.06E-03	4.72E-03	5.28E-03	1.27E-02	1.2E-06	1.2E-06	6.2E-05	2.32E-04	3.82E-04	2.67E-04
79	4.60E-05	1.47E-03	3.01E-03	4.72E-03	5.29E-03	1.29E-02	4E-07	4E-07	5.2E-05	2.22E-04	3.72E-04	2.48E-04
80	4.14E-05	1.32E-03	2.96E-03	4.72E-03	5.30E-03	1.31E-02	2E-07	2E-07	4.2E-05	2.12E-04	3.62E-04	2.29E-04
81	3.68E-05	1.17E-03	2.91E-03	4.72E-03	5.31E-03	1.33E-02	1.2E-07	1.2E-07	3.2E-05	2.02E-04	3.52E-04	2.10E-04
82	3.22E-05	1.02E-03	2.86E-03	4.72E-03	5.32E-03	1.35E-02	6E-08	6E-08	2.2E-05	1.92E-04	3.42E-04	1.91E-04
83	2.76E-05	8.7E-04	2.81E-03	4.72E-03	5.33E-03	1.37E-02	3E-08	3E-08	1.2E-05	1.82E-04	3.32E-04	1.72E-04
84	2.30E-05	7.2E-04	2.76E-03	4.72E-03	5.34E-03	1.39E-02	1.6E-08	1.6E-08	6E-06	1.72E-04	3.22E-04	1.53E-04
85	1.84E-05	5.7E-04	2.71E-03	4.72E-03	5.35E-03	1.41E-02	8E-09	8E-09	3E-06	1.62E-04	3.12E-04	1.34E-04
86	1.38E-05	4.2E-04	2.66E-03	4.72E-03	5.36E-03	1.43E-02	4E-09	4E-09	1.6E-06	1.52E-04	3.02E-04	1.15E-04
87	9.2E-06	2.7E-04	2.61E-03	4.72E-03	5.37E-03	1.45E-02	2E-09	2E-09	8E-07	1.42E-04	2.92E-04	9.6E-05
88	7.74E-06	1.56E-04	2.56E-03	4.72E-03	5.38E-03	1.47E-02	1.2E-09	1.2E-09	4E-07	1.32E-04	2.82E-04	7.7E-05
89	6.28E-06	8.1E-05	2.51E-03	4.72E-03	5.39E-03	1.49E-02	6E-10	6E-10	2E-07	1.22E-04	2.72E-04	5.8E-05
90	4.82E-06	4.6E-05	2.46E-03	4.72E-03	5.40E-03	1.51E-02	3E-10	3E-10	1E-07	1.12E-04	2.62E-04	3.9E-05
91	3.36E-06	2.1E-05	2.41E-03	4.72E-03	5.41E-03	1.53E-02	1.6E-10	1.6E-10	5E-08	1.02E-04	2.52E-04	2.0E-05
92	1.90E-06	6.2E-06	2.36E-03	4.72E-03	5.42E-03	1.55E-02	8E-11	8E-11	2.5E-08	9.2E-05	2.42E-04	1.1E-05

	F10						F11					
Z	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73
22	3.41E-04	3.97E-04	5.22E-04	7.42E-04	1.04E-03	1.34E-03	3.73E-04	3.97E-04	4.49E-04	6.18E-04	8.24E-04	1.04E-03
23	4.37E-04	5.40E-04	7.07E-04	9.85E-04	1.35E-03	1.72E-03	4.60E-04	5.74E-04	7.74E-04	1.05E-03	1.41E-03	1.78E-03
24	5.23E-04	6.24E-04	8.20E-04	1.14E-03	1.54E-03	1.92E-03	5.40E-04	6.64E-04	8.82E-04	1.18E-03	1.59E-03	1.97E-03
25	6.09E-04	7.26E-04	9.67E-04	1.32E-03	1.72E-03	2.08E-03	6.20E-04	7.59E-04	1.02E-03	1.32E-03	1.73E-03	2.10E-03
26	6.95E-04	8.30E-04	1.10E-03	1.50E-03	1.90E-03	2.24E-03	7.00E-04	8.59E-04	1.14E-03	1.44E-03	1.85E-03	2.22E-03
27	7.81E-04	9.42E-04	1.24E-03	1.64E-03	2.04E-03	2.40E-03	7.80E-04	9.59E-04	1.24E-03	1.54E-03	1.95E-03	2.32E-03
28	8.67E-04	1.02E-03	1.34E-03	1.74E-03	2.14E-03	2.56E-03	8.60E-04	1.05E-03	1.34E-03	1.64E-03	2.05E-03	2.42E-03
29	9.53E-04	1.10E-03	1.44E-03	1.84E-03	2.24E-03	2.72E-03	9.40E-04	1.13E-03	1.44E-03	1.74E-03	2.15E-03	2.52E-03
30	1.04E-03	1.18E-03	1.54E-03	1.94E-03	2.34E-03	2.88E-03	1.02E-03	1.21E-03	1.54E-03	1.84E-03	2.25E-03	2.62E-03
31	1.13E-03	1.26E-03	1.64E-03	2.04E-03	2.44E-03	3.04E-03	1.10E-03	1.29E-03	1.64E-03	1.94E-03	2.35E-03	2.72E-03
32	1.22E-03	1.34E-03	1.74E-03	2.14E-03	2.54E-03	3.20E-03	1.18E-03	1.37E-03	1.74E-03	2.04E-03	2.45E-03	2.82E-03
33	1.31E-03	1.42E-03	1.84E-03	2.24E-03	2.64E-03	3.36E-03	1.26E-03	1.45E-03	1.84E-03	2.14E-03	2.55E-03	2.92E-03
34	1.40E-03	1.50E-03	1.94E-03	2.34E-03	2.74E-03	3.52E-03	1.34E-03	1.53E-03	1.94E-03	2.24E-03	2.65E-03	3.02E-03
35	1.49E-03	1.58E-03	2.04E-03	2.44E-03	2.84E-03	3.68E-03	1.42E-03	1.61E-03	2.04E-03	2.34E-03	2.75E-03	3.12E-03
36	1.58E-03	1.66E-03	2.14E-03	2.54E-03	2.94E-03	3.84E-03	1.50E-03	1.69E-03	2.14E-03	2.44E-03	2.85E-03	3.22E-03
37	1.67E-03	1.74E-03	2.24E-03	2.64E-03	3.04E-03	4.00E-03	1.58E-03	1.77E-03	2.24E-03	2.54E-03	2.95E-03	3.32E-03
38	1.76E-03	1.82E-03	2.34E-03	2.74E-03	3.14E-03	4.16E-03	1.66E-03	1.85E-03	2.34E-03	2.64E-03	3.05E-03	3.42E-03
39	1.85E-03	1.90E-03	2.44E-03	2.84E-03	3.24E-03	4.32E-03	1.74E-03	1.93E-03	2.44E-03	2.74E-03	3.15E-03	3.52E-03
40	1.94E-03	1.98E-03	2.54E-03	2.94E-03	3.34E-03	4.48E-03	1.82E-03	2.01E-03	2.54E-03	2.84E-03	3.25E-03	3.62E-03
41	2.03E-03	2.06E-03	2.64E-03	3.04E-03	3.44E-03	4.64E-03	1.90E-03	2.09E-03	2.64E-03	2.94E-03	3.35E-03	3.72E-03
42	2.12E-03	2.14E-03	2.74E-03	3.14E-03	3.54E-03	4.80E-03	1.98E-03	2.17E-03	2.74E-03	3.04E-03	3.45E-03	3.82E-03
43	2.21E-03	2.22E-03	2.84E-03	3.24E-03	3.64E-03	4.96E-03	2.06E-03	2.25E-03	2.84E-03	3.14E-03	3.55E-03	3.92E-03
44	2.30E-03	2.30E-03	2.94E-03	3.34E-03	3.74E-03	5.12E-03	2.14E-03	2.33E-03	2.94E-03	3.24E-03	3.65E-03	4.02E-03
45	2.39E-03	2.38E-03	3.04E-03	3.44E-03	3.84E-03	5.28E-03	2.22E-03	2.41E-03	3.04E-03	3.34E-03	3.75E-03	4.12E-03
46	2.48E-03	2.46E-03	3.14E-03	3.54E-03	3.94E-03	5.44E-03	2.30E-03	2.49E-03	3.14E-03	3.44E-03	3.85E-03	4.22E-03
47	2.57E-03	2.54E-03	3.24E-03	3.64E-03	4.04E-03	5.60E-03	2.38E-03	2.57E-03	3.24E-03	3.54E-03	3.95E-03	4.32E-03
48	2.66E-03	2.62E-03	3.34E-03	3.74E-03	4.14E-03	5.76E-03	2.46E-03	2.65E-03	3.34E-03	3.64E-03	4.05E-03	4.42E-03
49	2.75E-03	2.70E-03	3.44E-03	3.84E-03	4.24E-03	5.92E-03	2.54E-03	2.73E-03	3.44E-03	3.74E-03	4.15E-03	4.52E-03
50	2.84E-03	2.78E-03	3.54E-03	3.94E-03	4.34E-03	6.08E-03	2.62E-03	2.81E-03	3.54E-03	3.84E-03	4.25E-03	4.62E-03
51	2.93E-03	2.86E-03	3.64E-03	4.04E-03	4.44E-03	6.24E-03	2.70E-03	2.89E-03	3.64E-03	3.94E-03	4.35E-03	4.72E-03
52	3.02E-03	2.94E-03	3.74E-03	4.14E-03	4.54E-03	6.40E-03	2.78E-03	2.97E-03	3.74E-03	4.04E-03	4.45E-03	4.82E-03
53	3.11E-03	3.02E-03	3.84E-03	4.24E-03	4.64E-03	6.56E-03	2.86E-03	3.05E-03	3.84E-03	4.14E-03	4.55E-03	4.92E-03
54	3.20E-03	3.10E-03	3.94E-03	4.34E-03	4.74E-03	6.72E-03	2.94E-03	3.13E-03	3.94E-03	4.24E-03	4.65E-03	5.02E-03
55	3.29E-03	3.18E-03	4.04E-03	4.44E-03	4.84E-03	6.88E-03	3.02E-03	3.21E-03	4.04E-03	4.34E-03	4.75E-03	5.12E-03
56	3.38E-03	3.26E-03	4.14E-03	4.54E-03	4.94E-03	7.04E-03	3.10E-03	3.29E-03	4.14E-03	4.44E-03	4.85E-03	5.22E-03
57	3.47E-03	3.34E-03	4.24E-03	4.64E-03	5.04E-03	7.20E-03	3.18E-03	3.37E-03	4.24E-03	4.54E-03	4.95E-03	5.32E-03
58	3.56E-03	3.42E-03	4.34E-03	4.74E-03	5.14E-03	7.36E-03	3.26E-03	3.45E-03	4.34E-03	4.64E-03	5.05E-03	5.42E-03
59	3.65E-03	3.50E-03	4.44E-03	4.84E-03	5.24E-03	7.52E-03	3.34E-03	3.53E-03	4.44E-03	4.74E-03	5.15E-03	5.52E-03
60	3.74E-03	3.58E-03	4.54E-03	4.94E-03	5.34E-03	7.68E-03	3.42E-03	3.61E-03	4.54E-03	4.84E-03	5.25E-03	5.62E-03
61	3.83E-03	3.66E-03	4.64E-03	5.04E-03	5.44E-03	7.84E-03	3.50E-03	3.69E-03	4.64E-03	4.94E-03	5.35E-03	5.72E-03
62	3.92E-03	3.74E-03	4.74E-03	5.14E-03	5.54E-03	8.00E-03	3.58E-03	3.77E-03	4.74E-03	5.04E-03	5.45E-03	5.82E-03
63	4.01E-03	3.82E-03	4.84E-03	5.24E-03	5.64E-03	8.16E-03	3.66E-03	3.85E-03	4.84E-03	5.14E-03	5.55E-03	5.92E-03
64	4.10E-03	3.90E-03	4.94E-03	5.34E-03	5.74E-03	8.32E-03	3.74E-03	3.93E-03	4.94E-03	5.24E-03	5.65E-03	6.02E-03
65	4.19E-03	3.98E-03	5.04E-03	5.44E-03	5.84E-03	8.48E-03	3.82E-03	4.01E-03	5.04E-03	5.34E-03	5.75E-03	6.12E-03
66	4.28E-03	4.06E-03	5.14E-03	5.54E-03	5.94E-03	8.64E-03	3.90E-03	4.09E-03	5.14E-03	5.44E-03	5.85E-03	6.22E-03
67	4.37E-03	4.14E-03	5.24E-03	5.64E-03	6.04E-03	8.80E-03	3.98E-03	4.17E-03	5.24E-03	5.54E-03	5.95E-03	6.32E-03
68	4.46E-03	4.22E-03	5.34E-03	5.74E-03	6.14E-03	8.96E-03	4.06E-03	4.25E-03	5.34E-03	5.64E-03	6.05E-03	6.42E-03
69	4.55E-03	4.30E-03	5.44E-03	5.84E-03	6.24E-03	9.12E-03	4.14E-03	4.33E-03	5.44E-03	5.74E-03	6.15E-03	6.52E-03
70	4.64E-03	4.38E-03	5.54E-03	5.94E-03	6.34E-03	9.28E-03	4.22E-03	4.41E-03	5.54E-03	5.84E-03	6.25E-03	6.62E-03
71	4.73E-03	4.46E-03	5.64E-03	6.04E-03	6.44E-03	9.44E-03	4.30E-03	4.49E-03	5.64E-03	5.94E-03	6.35E-03	6.72E-03
72	4.82E-03	4.54E-03	5.74E-03	6.14E-03	6.54E-03	9.60E-03	4.38E-03	4.57E-03	5.74E-03	6.04E-03	6.45E-03	6.82E-03
73	4.91E-03	4.62E-03	5.84E-03	6.24E-03	6.64E-03	9.76E-03	4.46E-03	4.65E-03	5.84E-03	6.14E-03	6.55E-03	6.92E-03
74	5.00E-03	4.70E-03	5.94E-03	6.34E-03	6.74E-03	9.92E-03	4.54E-03	4.73E-03	5.94E-03	6.24E-03	6.65E-03	7.02E-03
75	5.09E-03	4.78E-03	6.04E-03	6.44E-03	6.84E-03	1.008E-02	4.62E-03	4.81E-03	6.04E-03	6.34E-03	6.75E-03	7.12E-03
76	5.18E-03	4.86E-03	6.14E-03	6.54E-03	6.94E-03	1.024E-02	4.70E-03	4.89E-03	6.14E-03	6.44E-03	6.85E-03	7.22E-03
77	5.27E-03	4.94E-03	6.24E-03	6.64E-03	7.04E-03	1.040E-02	4.78E-03	4.97E-03	6.24E-03	6.54E-03	6.95E-03	7.32E-03
78	5.36E-03	5.02E-03	6.34E-03	6.74E-03	7.14E-03	1.056E-02	4.86E-03	5.05E-03	6.34E-03	6.64E-03	7.05E-03	7.42E-03
79	5.45E-03	5.10E-03	6.44E-03	6.84E-03	7.24E-03	1.072E-02	4.94E-03	5.13E-03	6.44E-03	6.74E-03	7.15E-03	7.52E-03
80	5.54E-03	5.18E-03	6.54E-03	6.94E-03	7.34E-03	1.088E-02	5.02E-03	5.21E-03	6.54E-03	6.84E-03	7.25E-03	7.62E-03
81	5.63E-03	5.26E-03	6.64E-03	7.04E-03	7.44E-03	1.104E-02	5.10E-03	5.29E-03	6.64E-03	6.94E-03	7.35E-03	7.72E-03
82	5.72E-03	5.34E-03	6.74E-03	7.14E-03	7.54E-03	1.120E-02	5.18E-03	5.37E-03	6.74E-03	7.04E-03	7.45E-03	7.82E-03
83	5.81E-03	5.42E-03	6.84E-03	7.24E-03	7.64E-03	1.136E-02	5.26E-03	5.45E-03	6.84E-03	7.14E-03	7.55E-03	7.92E-03
84	5.90E-03	5.50E-03	6.94E-03	7.34E-03	7.74E-03	1.152E-02	5.34E-03	5.53E-03	6.94E-03	7.24E-03	7.65E-03	8.02E-03
85	5.99E-03	5.58E-03	7.04E-03	7.44E-03	7.84E-03	1.168E-02	5.42E-03	5.61E-03	7.04E-03	7.34E-03	7.75E-03	8.12E-03
86	6.08E-03	5.66E-03	7.14E-03	7.54E-03	7.94E-03	1.184E-02	5.50E-03	5.69E-03	7.14E-03	7.44E-03	7.85E-03	8.22E-03
87	6.17E-03	5.74E-03	7.24E-03	7.64E-03	8.04E-03	1.200E-02	5.58E-03	5.77E-03	7.24E-03	7.54E-03	7.95E-03	8.32E-03
88	6.26E-03	5.82E-03	7.34E-03	7.74E-03	8.14E-03	1.216E-02	5.66E-03	5.85E-03	7.34E-03	7.64E-03	8.05E-03	8.42E-03
89	6.35E-03	5.90E-03	7.44E-03	7.84E-03	8.24E-03	1.232E-02	5.74E-03	5.93E-03	7.44E-03	7.74E-03	8.15E-03	8.52E-03
90	6.44E-03	5.98E-03	7.54E-03	7.94E-03	8.34E-03	1.248E-02	5.82E-03	6.01E-03	7.54E-03	7.84E-03	8.25E-03	8.62E-03
91	6.53E-03	6.06E-03	7.64E-03	8.04E-03	8.44E-03	1.264E-02	5.90E-03	6.09E-03	7.64E-03	7.94E-03	8.35E-03	8.72E-03
92	6.62E-03	6.14E-03	7.74E-03	8.14E-03	8.54E-03	1.280E-02	5.98E-03	6.17E-03	7.74E-03	8.04E-03	8.45E-03	8.82E-03
93	6.71E-03	6.22E-03	7.84E-03	8.24E-03	8.64E-03	1.296E-02	6.06E-03	6.25E-03	7.84E-03	8.14E-03	8.55E-03	8.92E-03
94	6.80E-03	6.30E-03	7.94E-03	8.34E-03	8.74E-03	1.312E-02	6.14E-03	6.33E-03	7.94E-03	8.24E-03	8.65E-03	9.02E-03
95												

TABLE IV. Collision Strengths S for Excitation from the Ground Level to the Close Upper Levels as a Function of L and Scattered Electron Energy in Units of I_{eff} Rydbergs, 21.5 eV

F12							F13						
L	$E=0.008$	$E=0.04$	$E=0.10$	$E=0.21$	$E=0.41$	$E=0.75$	L	$E=0.008$	$E=0.04$	$E=0.10$	$E=0.21$	$E=0.41$	$E=0.75$
22	1.29E-03	1.17E-03	8.74E-04	9.54E-04	2.64E-04	1.42E-04	3	3.91E-03	4.59E-03	5.64E-03	7.18E-03	9.07E-03	1.09E-02
23	1.24E-03	1.04E-03	7.71E-04	8.52E-04	2.70E-04	1.52E-04	3	3.62E-03	4.22E-03	5.25E-03	6.62E-03	8.30E-03	1.00E-02
24	1.13E-03	9.44E-04	7.19E-04	8.00E-04	2.48E-04	1.34E-04	3	2.18E-03	2.51E-03	3.04E-03	3.79E-03	4.81E-03	5.93E-03
25	1.03E-03	8.51E-04	6.47E-04	7.20E-04	2.30E-04	1.18E-04	3	2.02E-03	2.32E-03	2.82E-03	3.55E-03	4.57E-03	5.69E-03
26	9.61E-04	8.07E-04	6.03E-04	6.77E-04	2.12E-04	1.15E-04	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
27	8.84E-04	7.43E-04	5.54E-04	6.20E-04	2.03E-04	1.13E-04	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
28	8.17E-04	6.87E-04	5.12E-04	5.74E-04	1.94E-04	1.12E-04	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
29	7.57E-04	6.26E-04	4.80E-04	5.34E-04	1.86E-04	1.11E-04	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
30	7.04E-04	5.81E-04	4.50E-04	5.00E-04	1.78E-04	1.10E-04	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
31	6.57E-04	5.34E-04	4.20E-04	4.67E-04	1.71E-04	1.09E-04	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
32	6.14E-04	5.03E-04	4.01E-04	4.47E-04	1.64E-04	1.08E-04	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
33	5.79E-04	4.70E-04	3.81E-04	4.27E-04	1.58E-04	1.07E-04	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
34	5.46E-04	4.47E-04	3.64E-04	4.11E-04	1.54E-04	1.06E-04	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
35	5.16E-04	4.24E-04	3.46E-04	3.93E-04	1.50E-04	1.05E-04	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
36	4.90E-04	4.04E-04	3.30E-04	3.73E-04	1.47E-04	1.04E-04	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
37	4.67E-04	3.84E-04	3.16E-04	3.54E-04	1.44E-04	1.03E-04	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
38	4.46E-04	3.65E-04	3.03E-04	3.36E-04	1.42E-04	1.02E-04	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
39	4.27E-04	3.47E-04	2.92E-04	3.18E-04	1.40E-04	1.01E-04	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
40	4.10E-04	3.30E-04	2.83E-04	3.09E-04	1.38E-04	1.00E-04	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
41	3.94E-04	3.13E-04	2.75E-04	2.99E-04	1.37E-04	9.99E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
42	3.80E-04	2.98E-04	2.68E-04	2.92E-04	1.36E-04	9.98E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
43	3.67E-04	2.83E-04	2.59E-04	2.87E-04	1.35E-04	9.97E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
44	3.55E-04	2.70E-04	2.50E-04	2.82E-04	1.34E-04	9.96E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
45	3.44E-04	2.57E-04	2.42E-04	2.77E-04	1.33E-04	9.95E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
46	3.34E-04	2.45E-04	2.35E-04	2.72E-04	1.32E-04	9.94E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
47	3.24E-04	2.33E-04	2.28E-04	2.67E-04	1.31E-04	9.93E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
48	3.15E-04	2.22E-04	2.21E-04	2.62E-04	1.30E-04	9.92E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
49	3.06E-04	2.11E-04	2.14E-04	2.57E-04	1.29E-04	9.91E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
50	2.98E-04	2.00E-04	2.07E-04	2.52E-04	1.28E-04	9.90E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
51	2.90E-04	1.90E-04	2.00E-04	2.47E-04	1.27E-04	9.89E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
52	2.82E-04	1.80E-04	1.93E-04	2.42E-04	1.26E-04	9.88E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
53	2.74E-04	1.71E-04	1.86E-04	2.37E-04	1.25E-04	9.87E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
54	2.67E-04	1.62E-04	1.79E-04	2.32E-04	1.24E-04	9.86E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
55	2.60E-04	1.53E-04	1.72E-04	2.27E-04	1.23E-04	9.85E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
56	2.53E-04	1.44E-04	1.65E-04	2.22E-04	1.22E-04	9.84E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
57	2.46E-04	1.35E-04	1.58E-04	2.17E-04	1.21E-04	9.83E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
58	2.39E-04	1.26E-04	1.51E-04	2.12E-04	1.20E-04	9.82E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
59	2.32E-04	1.17E-04	1.44E-04	2.07E-04	1.19E-04	9.81E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
60	2.25E-04	1.08E-04	1.37E-04	2.02E-04	1.18E-04	9.80E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
61	2.18E-04	1.00E-04	1.30E-04	1.97E-04	1.17E-04	9.79E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
62	2.11E-04	9.19E-05	1.23E-04	1.92E-04	1.16E-04	9.78E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
63	2.04E-04	8.38E-05	1.16E-04	1.87E-04	1.15E-04	9.77E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
64	1.97E-04	7.57E-05	1.09E-04	1.82E-04	1.14E-04	9.76E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
65	1.90E-04	6.76E-05	1.02E-04	1.77E-04	1.13E-04	9.75E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
66	1.83E-04	5.95E-05	9.50E-05	1.72E-04	1.12E-04	9.74E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
67	1.77E-04	5.14E-05	8.79E-05	1.67E-04	1.11E-04	9.73E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
68	1.71E-04	4.33E-05	8.08E-05	1.62E-04	1.10E-04	9.72E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
69	1.65E-04	3.52E-05	7.37E-05	1.57E-04	1.09E-04	9.71E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
70	1.59E-04	2.71E-05	6.66E-05	1.52E-04	1.08E-04	9.70E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
71	1.53E-04	1.90E-05	5.95E-05	1.47E-04	1.07E-04	9.69E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
72	1.47E-04	1.09E-05	5.24E-05	1.42E-04	1.06E-04	9.68E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
73	1.41E-04	2.6E-06	4.53E-05	1.37E-04	1.05E-04	9.67E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
74	1.35E-04	1.79E-06	3.82E-05	1.32E-04	1.04E-04	9.66E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
75	1.29E-04	9.8E-07	3.11E-05	1.27E-04	1.03E-04	9.65E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
76	1.23E-04	1.6E-07	2.40E-05	1.22E-04	1.02E-04	9.64E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
77	1.17E-04	7.8E-08	1.69E-05	1.17E-04	1.01E-04	9.63E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
78	1.11E-04	0.0E+00	1.00E-05	1.12E-04	1.00E-04	9.62E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
79	1.05E-04	0.0E+00	3.11E-06	1.07E-04	9.99E-05	9.61E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
80	1.00E-04	0.0E+00	0.0E+00	1.02E-04	9.98E-05	9.60E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
81	9.4E-05	0.0E+00	0.0E+00	9.7E-05	9.97E-05	9.59E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
82	8.8E-05	0.0E+00	0.0E+00	9.2E-05	9.96E-05	9.58E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
83	8.2E-05	0.0E+00	0.0E+00	8.7E-05	9.95E-05	9.57E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
84	7.6E-05	0.0E+00	0.0E+00	8.2E-05	9.94E-05	9.56E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
85	7.0E-05	0.0E+00	0.0E+00	7.7E-05	9.93E-05	9.55E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
86	6.4E-05	0.0E+00	0.0E+00	7.2E-05	9.92E-05	9.54E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
87	5.8E-05	0.0E+00	0.0E+00	6.7E-05	9.91E-05	9.53E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
88	5.2E-05	0.0E+00	0.0E+00	6.2E-05	9.90E-05	9.52E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
89	4.6E-05	0.0E+00	0.0E+00	5.7E-05	9.89E-05	9.51E-05	3	2.00E-03	2.30E-03	2.79E-03	3.52E-03	4.54E-03	5.66E-03
90	4.0E-05	0.0E+00	0.0E+00	5.2E-05	9.88E-05	9.50E-05	3	2.00E-03					

TABLE IV. Collision Strengths D for Excitation from the Ground Level to the Given Upper Levels as a Function of Z and Scattered Electron Energy in Units of Z_{eff}^2 Rydbergs, 21/2/91

03							04						
Z	E*=0.008	E*=0.04	E*=0.10	E*=0.21	E*=0.41	E*=0.75	E*=0.008	E*=0.04	E*=0.10	E*=0.21	E*=0.41	E*=0.75	
22	3.70E-04	2.71E-04	1.62E-04	7.43E-03	2.40E-03	7.73E-04	3.51E-04	2.37E-04	1.34E-04	7.34E-03	2.63E-03	1.02E-03	
23	3.49E-04	2.71E-04	1.62E-04	7.59E-03	2.74E-03	8.62E-04	3.29E-04	2.41E-04	1.63E-04	6.91E-03	2.68E-03	7.70E-04	
24	2.68E-04	1.94E-04	1.14E-04	5.18E-03	1.84E-03	3.88E-04	3.08E-04	2.35E-04	1.34E-04	6.47E-03	2.53E-03	6.70E-04	
25	2.43E-04	1.77E-04	1.04E-04	4.47E-03	1.64E-03	3.24E-04	2.88E-04	2.11E-04	1.27E-04	5.47E-03	2.38E-03	5.82E-04	
26	2.03E-04	1.44E-04	9.75E-05	4.03E-03	1.41E-03	2.83E-04	2.70E-04	1.98E-04	1.17E-04	5.73E-03	2.23E-03	5.24E-04	
27	2.18E-04	1.57E-04	9.18E-05	4.17E-03	1.47E-03	4.80E-04	2.53E-04	1.83E-04	1.12E-04	5.38E-03	2.12E-03	7.79E-04	
28	2.07E-04	1.50E-04	8.74E-05	3.99E-03	1.43E-03	4.63E-04	2.37E-04	1.74E-04	1.03E-04	5.04E-03	2.00E-03	7.34E-04	
29	1.99E-04	1.44E-04	8.44E-05	3.88E-03	1.39E-03	4.53E-04	2.23E-04	1.63E-04	9.87E-05	4.74E-03	1.88E-03	6.94E-04	
30	1.92E-04	1.40E-04	8.22E-05	3.78E-03	1.37E-03	4.47E-04	2.09E-04	1.54E-04	9.38E-05	4.47E-03	1.78E-03	6.59E-04	
31	1.87E-04	1.37E-04	8.11E-05	3.72E-03	1.37E-03	4.43E-04	1.97E-04	1.44E-04	9.14E-05	4.33E-03	1.74E-03	6.43E-04	
32	1.84E-04	1.34E-04	8.02E-05	3.77E-03	1.37E-03	4.43E-04	1.84E-04	1.38E-04	8.74E-05	4.24E-03	1.71E-03	6.30E-04	
33	1.87E-04	1.37E-04	8.13E-05	3.83E-03	1.43E-03	4.77E-04	1.78E-04	1.28E-04	7.78E-05	3.77E-03	1.50E-03	5.97E-04	
34	1.88E-04	1.37E-04	8.23E-05	3.91E-03	1.47E-03	4.94E-04	1.63E-04	1.21E-04	7.24E-05	3.57E-03	1.42E-03	5.81E-04	
35	1.88E-04	1.38E-04	8.34E-05	3.97E-03	1.51E-03	5.13E-04	1.54E-04	1.14E-04	6.94E-05	3.38E-03	1.33E-03	5.64E-04	
36	1.88E-04	1.38E-04	8.34E-05	4.03E-03	1.53E-03	5.24E-04	1.47E-04	1.08E-04	6.78E-05	3.23E-03	1.28E-03	5.49E-04	
37	1.87E-04	1.36E-04	8.24E-05	4.00E-03	1.54E-03	5.26E-04	1.32E-04	9.72E-05	6.90E-05	3.08E-03	1.14E-03	5.23E-04	
38	1.80E-04	1.32E-04	8.13E-05	3.93E-03	1.53E-03	5.29E-04	1.25E-04	9.27E-05	6.60E-05	2.74E-03	1.10E-03	4.92E-04	
39	1.74E-04	1.30E-04	7.93E-05	3.87E-03	1.50E-03	5.21E-04	1.19E-04	8.73E-05	6.32E-05	2.60E-03	1.05E-03	4.72E-04	
40	1.71E-04	1.27E-04	7.73E-05	3.77E-03	1.47E-03	5.11E-04	1.13E-04	8.31E-05	6.04E-05	2.48E-03	9.94E-04	4.54E-04	
41	1.64E-04	1.23E-04	7.52E-05	3.67E-03	1.43E-03	4.99E-04	1.07E-04	7.91E-05	5.83E-05	2.34E-03	9.50E-04	4.37E-04	
42	1.61E-04	1.19E-04	7.29E-05	3.56E-03	1.39E-03	4.83E-04	1.02E-04	7.52E-05	5.57E-05	2.23E-03	9.04E-04	4.17E-04	
43	1.53E-04	1.15E-04	7.03E-05	3.43E-03	1.35E-03	4.71E-04	9.73E-05	7.17E-05	5.37E-05	2.14E-03	8.56E-04	4.04E-04	
44	1.50E-04	1.11E-04	6.81E-05	3.33E-03	1.31E-03	4.57E-04	9.37E-05	6.83E-05	5.17E-05	2.03E-03	8.27E-04	3.91E-04	
45	1.45E-04	1.07E-04	6.58E-05	3.22E-03	1.28E-03	4.43E-04	8.84E-05	6.52E-05	5.00E-05	1.94E-03	7.97E-04	3.76E-04	
46	1.40E-04	1.03E-04	6.35E-05	3.11E-03	1.25E-03	4.28E-04	8.40E-05	6.23E-05	4.80E-05	1.83E-03	7.67E-04	3.60E-04	
47	1.35E-04	9.98E-05	6.12E-05	3.01E-03	1.22E-03	4.14E-04	8.05E-05	5.94E-05	4.62E-05	1.73E-03	7.24E-04	3.44E-04	
48	1.30E-04	9.75E-05	5.92E-05	2.92E-03	1.19E-03	4.01E-04	7.69E-05	5.68E-05	4.48E-05	1.71E-03	6.97E-04	3.28E-04	
49	1.25E-04	9.52E-05	5.71E-05	2.83E-03	1.16E-03	3.88E-04	7.35E-05	5.43E-05	4.30E-05	1.64E-03	6.65E-04	3.12E-04	
50	1.21E-04	9.29E-05	5.51E-05	2.74E-03	1.14E-03	3.74E-04	7.03E-05	5.20E-05	4.13E-05	1.57E-03	6.38E-04	2.97E-04	
51	1.17E-04	9.05E-05	5.32E-05	2.64E-03	1.12E-03	3.62E-04	6.72E-05	4.98E-05	4.03E-05	1.50E-03	6.10E-04	2.82E-04	
52	1.13E-04	8.82E-05	5.14E-05	2.54E-03	1.10E-03	3.50E-04	6.42E-05	4.77E-05	3.93E-05	1.43E-03	5.82E-04	2.67E-04	
53	1.09E-04	8.57E-05	4.97E-05	2.44E-03	1.07E-03	3.37E-04	6.18E-05	4.57E-05	3.81E-05	1.37E-03	5.54E-04	2.52E-04	
54	1.05E-04	8.32E-05	4.80E-05	2.34E-03	1.05E-03	3.25E-04	5.92E-05	4.38E-05	3.69E-05	1.32E-03	5.26E-04	2.37E-04	
55	1.02E-04	8.07E-05	4.63E-05	2.24E-03	1.03E-03	3.13E-04	5.68E-05	4.21E-05	3.57E-05	1.26E-03	5.00E-04	2.22E-04	
56	9.92E-05	7.84E-05	4.46E-05	2.14E-03	1.01E-03	3.01E-04	5.45E-05	4.04E-05	3.45E-05	1.22E-03	4.74E-04	2.07E-04	
57	9.62E-05	7.59E-05	4.28E-05	2.04E-03	9.87E-04	2.87E-04	5.23E-05	3.87E-05	3.33E-05	1.18E-03	4.48E-04	1.92E-04	
58	9.32E-05	7.34E-05	4.10E-05	1.94E-03	9.69E-04	2.74E-04	5.02E-05	3.70E-05	3.20E-05	1.14E-03	4.22E-04	1.77E-04	
59	9.02E-05	7.09E-05	3.92E-05	1.84E-03	9.51E-04	2.61E-04	4.82E-05	3.53E-05	3.07E-05	1.10E-03	4.00E-04	1.62E-04	
60	8.72E-05	6.84E-05	3.74E-05	1.74E-03	9.33E-04	2.50E-04	4.63E-05	3.36E-05	2.94E-05	1.06E-03	3.78E-04	1.47E-04	
61	8.42E-05	6.59E-05	3.56E-05	1.64E-03	9.15E-04	2.39E-04	4.43E-05	3.19E-05	2.82E-05	1.02E-03	3.56E-04	1.32E-04	
62	8.12E-05	6.34E-05	3.38E-05	1.54E-03	8.97E-04	2.28E-04	4.24E-05	3.02E-05	2.70E-05	9.80E-04	3.34E-04	1.17E-04	
63	7.82E-05	6.09E-05	3.20E-05	1.44E-03	8.79E-04	2.17E-04	4.05E-05	2.85E-05	2.58E-05	9.42E-04	3.12E-04	1.02E-04	
64	7.52E-05	5.84E-05	3.02E-05	1.34E-03	8.61E-04	2.06E-04	3.86E-05	2.68E-05	2.46E-05	9.04E-04	2.90E-04	9.77E-05	
65	7.22E-05	5.59E-05	2.84E-05	1.24E-03	8.43E-04	1.95E-04	3.67E-05	2.51E-05	2.34E-05	8.66E-04	2.68E-04	9.50E-05	
66	6.92E-05	5.34E-05	2.66E-05	1.14E-03	8.25E-04	1.84E-04	3.48E-05	2.34E-05	2.22E-05	8.28E-04	2.46E-04	9.23E-05	
67	6.62E-05	5.09E-05	2.48E-05	1.04E-03	8.07E-04	1.73E-04	3.29E-05	2.17E-05	2.10E-05	7.90E-04	2.24E-04	8.96E-05	
68	6.32E-05	4.84E-05	2.30E-05	9.4E-04	7.89E-04	1.62E-04	3.10E-05	2.00E-05	1.98E-05	7.52E-04	2.02E-04	8.69E-05	
69	6.02E-05	4.59E-05	2.12E-05	8.4E-04	7.71E-04	1.51E-04	2.91E-05	1.83E-05	1.86E-05	7.14E-04	1.80E-04	8.42E-05	
70	5.72E-05	4.34E-05	1.94E-05	7.4E-04	7.53E-04	1.40E-04	2.72E-05	1.74E-05	1.72E-05	6.76E-04	1.60E-04	8.15E-05	
71	5.42E-05	4.09E-05	1.76E-05	6.4E-04	7.35E-04	1.29E-04	2.53E-05	1.63E-05	1.61E-05	6.38E-04	1.38E-04	7.88E-05	
72	5.12E-05	3.84E-05	1.58E-05	5.4E-04	7.17E-04	1.18E-04	2.34E-05	1.52E-05	1.49E-05	6.00E-04	1.16E-04	7.50E-05	
73	4.82E-05	3.59E-05	1.40E-05	4.4E-04	6.99E-04	1.07E-04	2.15E-05	1.41E-05	1.37E-05	5.62E-04	1.04E-04	7.12E-05	
74	4.52E-05	3.34E-05	1.22E-05	3.4E-04	6.81E-04	9.6E-05	1.96E-05	1.30E-05	1.26E-05	5.24E-04	9.2E-05	6.74E-05	
75	4.22E-05	3.09E-05	1.04E-05	2.4E-04	6.63E-04	8.5E-05	1.77E-05	1.19E-05	1.12E-05	4.86E-04	8.0E-05	6.36E-05	
76	3.92E-05	2.84E-05	9.6E-06	1.4E-04	6.45E-04	7.4E-05	1.58E-05	1.08E-05	1.04E-05	4.48E-04	7.2E-05	6.00E-05	
77	3.62E-05	2.59E-05	8.8E-06	4E-05	6.27E-04	6.3E-05	1.39E-05	9.7E-06	9.2E-06	4.10E-04	6.4E-05	5.64E-05	
78	3.32E-05	2.34E-05	8.0E-06	3E-05	6.09E-04	5.2E-05	1.20E-05	8.6E-06	8.0E-06	3.72E-04	5.6E-05	5.28E-05	
79	3.02E-05	2.09E-05	7.2E-06	2E-05	5.91E-04	4.1E-05	1.01E-05	7.5E-06	6.9E-06	3.34E-04	4.8E-05	4.92E-05	
80	2.72E-05	1.84E-05	6.4E-06	1E-05	5.73E-04	3.0E-05	8.9E-06	6.4E-06	5.8E-06	2.96E-04	4.0E-05	4.56E-05	
81	2.42E-05	1.59E-05	5.6E-06	0E-06	5.55E-04	1.9E-05	7.8E-06	5.3E-06	4.7E-06	2.58E-04	3.2E-05	4.20E-05	
82	2.12E-05	1.34E-05	4.8E-06	0E-06	5.37E-04	8E-06	6.7E-06	4.2E-06	3.6E-06	2.20E-04	2.4E-05	3.84E-05	
83	1.82E-05	1.09E-05	4.0E-06	0E-06	5.19E-04	7E-06	5.6E-06	3.1E-06	2.5E-06	1.82E-04	1.6E-05	3.48E-05	
84	1.52E-05	8.4E-06	3.2E-06	0E-06	5.01E-04	6E-06	4.5E-06	2.0E-06	1.4E-06	1.44E-04	1.0E-05	3.12E-05	
85	1.22E-05	5.9E-06	2.4E-06	0E-06	4.83E-04	5E-06	3.4E-06	1.0E-06	7E-07	1.06E-04	6E-06	2.76E-05	
86	9.2E-06	3.4E-06	1.6E-06	0E-06	4.65E-04	4E-06	2.3E-06	7E-07	4E-07	6.2E-05	3E-06	2.40E-05	
87	6.2E-06	9E-07	8E-07	0E-07	4.47E-04	3E-06	1.2E-06	4E-07	2E-07	3.4E-05	1E-06	2.04E-05	
88	3.2E-06	0E-07	0E-07	0E-07	4.29E-04	2E-06	5E-07	2E-07	1E-07	2.6E-05	0E-06	1.68E-05	

TABLE IV. Collision Strengths C for Excitation from the Ground Level to the Given Upper Levels as a Function of Z and Scattered Electron Energy in Units of Z^2 Rydberg, $22\frac{1}{2}eV$

Z	07						08					
	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75
37	9.70E-05	7.34E-05	4.64E-05	2.34E-05	9.99E-06	3.44E-06	2.22E-04	1.85E-04	1.39E-04	8.39E-05	4.30E-05	1.97E-05
38	9.30E-05	7.04E-05	4.44E-05	2.24E-05	9.77E-06	3.44E-06	1.14E-04	9.77E-05	7.30E-05	4.07E-05	2.14E-05	1.89E-05
39	8.92E-05	6.74E-05	4.28E-05	2.18E-05	9.54E-06	3.30E-06	2.04E-04	1.71E-04	1.25E-04	7.74E-05	4.01E-05	1.82E-05
40	8.54E-05	6.48E-05	4.11E-05	2.09E-05	9.32E-06	3.08E-06	1.90E-04	1.63E-04	1.20E-04	7.47E-05	3.84E-05	1.73E-05
41	8.16E-05	6.22E-05	3.95E-05	2.01E-05	9.20E-06	2.97E-06	1.91E-04	1.59E-04	1.14E-04	7.20E-05	3.72E-05	1.69E-05
42	7.88E-05	5.98E-05	3.80E-05	1.94E-05	7.89E-06	2.84E-06	1.84E-04	1.52E-04	1.12E-04	6.94E-05	3.59E-05	1.63E-05
43	7.57E-05	5.74E-05	3.64E-05	1.84E-05	7.74E-06	2.74E-06	1.77E-04	1.47E-04	1.08E-04	6.67E-05	3.46E-05	1.57E-05
44	7.27E-05	5.52E-05	3.51E-05	1.79E-05	7.57E-06	2.63E-06	1.71E-04	1.42E-04	1.04E-04	6.44E-05	3.34E-05	1.52E-05
45	6.98E-05	5.30E-05	3.37E-05	1.72E-05	7.33E-06	2.53E-06	1.65E-04	1.37E-04	1.00E-04	6.20E-05	3.22E-05	1.44E-05
46	6.70E-05	5.10E-05	3.24E-05	1.64E-05	6.79E-06	2.44E-06	1.59E-04	1.32E-04	9.49E-05	6.02E-05	3.11E-05	1.41E-05
47	6.44E-05	4.90E-05	3.12E-05	1.60E-05	6.34E-06	2.37E-06	1.54E-04	1.28E-04	9.24E-05	5.82E-05	3.01E-05	1.37E-05
48	6.19E-05	4.71E-05	3.00E-05	1.54E-05	6.21E-06	2.29E-06	1.49E-04	1.23E-04	9.05E-05	5.63E-05	2.91E-05	1.32E-05
49	5.95E-05	4.53E-05	2.89E-05	1.48E-05	6.09E-06	2.23E-06	1.43E-04	1.19E-04	8.79E-05	5.45E-05	2.82E-05	1.28E-05
50	5.71E-05	4.34E-05	2.78E-05	1.43E-05	5.94E-06	2.18E-06	1.37E-04	1.15E-04	8.44E-05	5.27E-05	2.73E-05	1.24E-05
51	5.47E-05	4.15E-05	2.68E-05	1.38E-05	5.84E-06	2.05E-06	1.34E-04	1.12E-04	8.19E-05	5.10E-05	2.64E-05	1.20E-05
52	5.23E-05	4.03E-05	2.58E-05	1.33E-05	5.43E-06	1.98E-06	1.30E-04	1.08E-04	7.93E-05	4.94E-05	2.54E-05	1.16E-05
53	5.07E-05	3.87E-05	2.48E-05	1.28E-05	5.34E-06	1.91E-06	1.24E-04	1.05E-04	7.49E-05	4.77E-05	2.45E-05	1.12E-05
54	4.87E-05	3.72E-05	2.39E-05	1.23E-05	5.07E-06	1.84E-06	1.22E-04	1.01E-04	7.44E-05	4.64E-05	2.40E-05	1.09E-05
55	4.67E-05	3.56E-05	2.30E-05	1.19E-05	4.89E-06	1.78E-06	1.18E-04	9.81E-05	7.31E-05	4.50E-05	2.32E-05	1.04E-05
56	4.50E-05	3.43E-05	2.21E-05	1.14E-05	4.72E-06	1.71E-06	1.14E-04	9.50E-05	6.99E-05	4.34E-05	2.24E-05	1.02E-05
57	4.33E-05	3.31E-05	2.13E-05	1.10E-05	4.53E-06	1.65E-06	1.10E-04	9.21E-05	6.78E-05	4.26E-05	2.20E-05	9.98E-06
58	4.14E-05	3.19E-05	2.03E-05	1.04E-05	4.39E-06	1.60E-06	1.07E-04	8.92E-05	6.58E-05	4.11E-05	2.13E-05	9.69E-06
59	4.00E-05	3.07E-05	1.98E-05	1.02E-05	4.23E-06	1.54E-06	1.04E-04	8.64E-05	6.38E-05	3.97E-05	2.07E-05	9.40E-06
60	3.84E-05	2.94E-05	1.90E-05	9.84E-06	4.05E-06	1.48E-06	1.01E-04	8.36E-05	6.18E-05	3.87E-05	2.01E-05	9.13E-06
61	3.69E-05	2.84E-05	1.83E-05	9.52E-06	3.94E-06	1.44E-06	9.74E-05	8.15E-05	6.01E-05	3.74E-05	1.94E-05	8.90E-06
62	3.53E-05	2.73E-05	1.74E-05	9.18E-06	3.80E-06	1.39E-06	9.47E-05	7.91E-05	5.84E-05	3.64E-05	1.90E-05	8.63E-06
63	3.41E-05	2.62E-05	1.70E-05	8.85E-06	3.74E-06	1.34E-06	9.19E-05	7.68E-05	5.67E-05	3.53E-05	1.85E-05	8.41E-06
64	3.27E-05	2.52E-05	1.63E-05	8.53E-06	3.64E-06	1.29E-06	8.92E-05	7.44E-05	5.51E-05	3.44E-05	1.80E-05	8.19E-06
65	3.15E-05	2.42E-05	1.57E-05	8.24E-06	3.54E-06	1.24E-06	8.64E-05	7.21E-05	5.34E-05	3.34E-05	1.75E-05	7.97E-06
66	3.02E-05	2.33E-05	1.51E-05	7.92E-06	3.40E-06	1.20E-06	8.40E-05	7.03E-05	5.20E-05	3.27E-05	1.70E-05	7.74E-06
67	2.90E-05	2.24E-05	1.44E-05	7.63E-06	3.18E-06	1.14E-06	8.14E-05	6.83E-05	5.04E-05	3.18E-05	1.64E-05	7.50E-06
68	2.78E-05	2.15E-05	1.40E-05	7.35E-06	3.07E-06	1.12E-06	7.93E-05	6.64E-05	4.92E-05	3.09E-05	1.61E-05	7.24E-06
69	2.67E-05	2.07E-05	1.33E-05	7.08E-06	2.94E-06	1.08E-06	7.74E-05	6.45E-05	4.78E-05	3.01E-05	1.57E-05	7.17E-06
70	2.54E-05	1.99E-05	1.30E-05	6.82E-06	2.82E-06	1.04E-06	7.43E-05	6.27E-05	4.64E-05	2.92E-05	1.54E-05	6.94E-06
71	2.44E-05	1.91E-05	1.25E-05	6.55E-06	2.73E-06	1.01E-06	7.27E-05	1.05E-05	4.50E-05	2.84E-05	1.49E-05	6.81E-06
72	2.34E-05	1.83E-05	1.20E-05	6.28E-06	2.63E-06	9.72E-07	7.04E-05	5.32E-05	4.41E-05	2.78E-05	1.45E-05	6.64E-06

	M1						M2					
Z	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75
22	4.20E-04	3.47E-04	2.80E-04	2.41E-04	2.40E-04	2.41E-04	3.31E-04	2.50E-04	1.66E-04	1.07E-04	8.28E-05	8.12E-05
23	3.98E-04	3.31E-04	2.67E-04	2.32E-04	2.31E-04	2.32E-04	3.11E-04	2.39E-04	1.57E-04	1.02E-04	7.97E-05	7.90E-05
24	3.74E-04	3.14E-04	2.54E-04	2.20E-04	2.18E-04	2.20E-04	2.92E-04	2.15E-04	1.48E-04	9.70E-05	7.49E-05	7.42E-05
25	3.54E-04	2.97E-04	2.41E-04	2.11E-04	2.10E-04	2.11E-04	2.74E-04	2.07E-04	1.39E-04	9.22E-05	7.38E-05	7.29E-05
26	3.34E-04	2.81E-04	2.29E-04	2.01E-04	2.03E-04	2.02E-04	2.57E-04	1.93E-04	1.31E-04	8.74E-05	7.06E-05	7.13E-05
27	3.17E-04	2.64E-04	2.17E-04	1.91E-04	1.92E-04	1.91E-04	2.41E-04	1.80E-04	1.24E-04	8.32E-05	6.79E-05	6.87E-05
28	3.00E-04	2.51E-04	2.04E-04	1.82E-04	1.84E-04	1.82E-04	2.27E-04	1.72E-04	1.17E-04	7.91E-05	6.51E-05	6.62E-05
29	2.84E-04	2.38E-04	1.93E-04	1.73E-04	1.75E-04	1.72E-04	2.13E-04	1.62E-04	1.10E-04	7.53E-05	6.25E-05	6.36E-05
30	2.68E-04	2.24E-04	1.82E-04	1.63E-04	1.65E-04	1.62E-04	2.00E-04	1.50E-04	1.04E-04	7.15E-05	5.92E-05	6.03E-05
31	2.54E-04	2.14E-04	1.74E-04	1.54E-04	1.56E-04	1.54E-04	1.89E-04	1.44E-04	9.88E-05	6.84E-05	5.77E-05	5.94E-05
32	2.41E-04	2.03E-04	1.67E-04	1.47E-04	1.49E-04	1.51E-04	1.78E-04	1.34E-04	9.34E-05	6.45E-05	5.53E-05	5.74E-05
33	2.29E-04	1.92E-04	1.59E-04	1.41E-04	1.44E-04	1.46E-04	1.67E-04	1.27E-04	9.08E-05	6.24E-05	5.34E-05	5.55E-05
34	2.17E-04	1.83E-04	1.51E-04	1.33E-04	1.37E-04	1.51E-04	1.59E-04	1.22E-04	8.44E-05	5.94E-05	5.12E-05	5.37E-05
35	2.07E-04	1.74E-04	1.44E-04	1.28E-04	1.31E-04	1.44E-04	1.51E-04	1.14E-04	8.03E-05	5.71E-05	4.90E-05	5.12E-05
36	1.97E-04	1.64E-04	1.37E-04	1.20E-04	1.24E-04	1.37E-04	1.43E-04	1.05E-04	7.64E-05	5.47E-05	4.79E-05	5.03E-05
37	1.87E-04	1.58E-04	1.31E-04	1.17E-04	1.19E-04	1.31E-04	1.34E-04	1.04E-04	7.29E-05	5.23E-05	4.62E-05	4.88E-05
38	1.79E-04	1.51E-04	1.23E-04	1.11E-04	1.14E-04	1.23E-04	1.27E-04	9.91E-05	6.93E-05	5.04E-05	4.47E-05	4.72E-05
39	1.71E-04	1.44E-04	1.19E-04	1.04E-04	1.09E-04	1.20E-04	1.20E-04	9.44E-05	6.64E-05	4.84E-05	4.32E-05	4.57E-05
40	1.63E-04	1.37E-04	1.14E-04	1.02E-04	1.04E-04	1.12E-04	1.17E-04	9.00E-05	6.35E-05	4.64E-05	4.18E-05	4.44E-05
41	1.54E-04	1.31E-04	1.09E-04	9.73E-05	9.73E-05	1.10E-04	1.11E-04	8.59E-05	6.08E-05	4.49E-05	4.03E-05	4.32E-05
42	1.47E-04	1.24E-04	1.04E-04	9.32E-05	9.32E-05	1.04E-04	1.04E-04	8.20E-05	5.82E-05	4.32E-05	3.92E-05	4.21E-05
43	1.43E-04	1.21E-04	9.99E-05	8.93E-05	9.13E-05	1.01E-04	1.01E-04	7.84E-05	5.58E-05	4.17E-05	3.80E-05	4.09E-05
44	1.37E-04	1.14E-04	9.57E-05	8.54E-05	8.74E-05	9.73E-05	9.69E-05	7.50E-05	5.34E-05	4.02E-05	3.67E-05	3.98E-05
45	1.32E-04	1.11E-04	9.18E-05	8.21E-05	8.41E-05	9.32E-05	9.27E-05	7.18E-05	5.15E-05	3.88E-05	3.58E-05	3.88E-05
46	1.24E-04	1.07E-04	8.82E-05	7.87E-05	8.06E-05	8.97E-05	8.87E-05	6.89E-05	4.92E-05	3.72E-05	3.49E-05	3.77E-05
47	1.22E-04	1.02E-04	8.47E-05	7.49E-05	7.68E-05	8.54E-05	8.47E-05	6.71E-05	4.74E-05	3.54E-05	3.37E-05	3.60E-05
48	1.17E-04	9.85E-05	8.13E-05	7.29E-05	7.47E-05	8.34E-05	8.16E-05	6.34E-05	4.58E-05	3.50E-05	3.27E-05	3.58E-05
49	1.13E-04	9.49E-05	7.84E-05	7.02E-05	7.20E-05	8.04E-05	7.82E-05	6.09E-05	4.41E-05	3.38E-05	3.18E-05	3.49E-05
50	1.08E-04	9.13E-05	7.53E-05	6.74E-05	6.92E-05	7.73E-05	7.52E-05	5.84E-05	4.25E-05	3.28E-05	3.09E-05	3.40E-05
51	1.04E-04	8.80E-05	7.28E-05	6.51E-05	6.69E-05	7.48E-05	7.29E-05	5.64E-05	4.10E-05	3.17E-05	3.09E-05	3.31E-05
52	1.01E-04	8.49E-05	7.02E-05	6.29E-05	6.46E-05	7.23E-05	7.04E-05	5.45E-05	3.94E-05	3.05E-05	2.97E-05	3.22E-05
53	9.73E-05	8.19E-05	6.77E-05	6.07E-05	6.23E-05	7.07E-05	6.87E-05	5.23E-05	3.82E-05	2.97E-05	2.84E-05	3.13E-05
54	9.40E-05	7.91E-05	6.54E-05	5.83E-05	6.02E-05	6.74E-05	6.45E-05	5.04E-05	3.69E-05	2.89E-05	2.77E-05	3.04E-05
55	9.08E-05	7.63E-05	6.32E-05	5.63E-05	5.82E-05	6.54E-05	6.25E-05	4.84E-05	3.57E-05	2.80E-05	2.69E-05	3.00E-05
56	8.78E-05	7.39E-05	6.11E-05	5.42E-05	5.62E-05	6.34E-05	6.05E-05	4.65E-05	3.45E-05	2.72E-05	2.62E-05	2.90E-05
57	8.50E-05	7.13E-05	5.91E-05	5.22E-05	5.43E-05	6.14E-05	5.85E-05	4.50E-05	3.34E-05	2.64E-05	2.55E-05	2.83E-05
58	8.24E-05	6.87E-05	5.72E-05	5.03E-05	5.24E-05	5.94E-05	5.65E-05	4.35E-05	3.24E-05	2.54E-05	2.45E-05	2.73E-05
59	7.97E-05	6.71E-05	5.54E-05	4.84E-05	5.05E-05	5.76E-05	5.49E-05	4.20E-05	3.13E-05	2.44E-05	2.35E-05	2.63E-05
60	7.73E-05	6.50E-05	5.37E-05	4.67E-05	4.88E-05	5.59E-05	5.31E-05	4.07E-05	3.03E-05	2.34E-05	2.25E-05	2.52E-05
61	7.49E-05	6.30E-05	5.21E-05	4.49E-05	4.71E-05	5.42E-05	5.14E-05	3.94E-05	2.94E-05	2.25E-05	2.16E-05	2.43E-05
62	7.27E-05	6.12E-05	5.05E-05	4.33E-05	4.54E-05	5.23E-05	4.95E-05	3.82E-05	2.85E-05	2.17E-05	2.08E-05	2.35E-05
63	7.05E-05	5.94E-05	4.87E-05	4.15E-05	4.36E-05	5.04E-05	4.76E-05	3.70E-05	2.76E-05	2.09E-05	2.00E-05	2.27E-05
64	6.83E-05	5.74E-05	4.74E-05	4.02E-05	4.23E-05	4.93E-05	4.65E-05	3.58E-05	2.68E-05	2.01E-05	1.92E-05	2.19E-05
65	6.64E-05	5.60E-05	4.62E-05	3.90E-05	4.11E-05	4.81E-05	4.53E-05	3.46E-05	2.60E-05	1.93E-05	1.84E-05	2.11E-05
66	6.47E-05	5.44E-05	4.49E-05	3.77E-05	3.98E-05	4.78E-05	4.49E-05	3.38E-05	2.53E-05	1.85E-05	1.76E-05	2.03E-05
67	6.30E-05	5.29E-05	4.42E-05	3.71E-05	3.92E-05	4.63E-05	4.34E-05	3.28E-05	2.46E-05	1.80E-05	1.71E-05	1.98E-05
68	6.13E-05	5.15E-05	4.23E-05	3.58E-05	3.79E-05	4.52E-05	4.23E-05	3.17E-05	2.39E-05	1.75E-05	1.66E-05	1.93E-05
69	5.97E-05	5.01E-05	4.10E-05	3.46E-05	3.67E-05	4.41E-05	4.12E-05	3.07E-05	2.32E-05	1.70E-05	1.61E-05	1.88E-05
70	5.81E-05	4.88E-05	4.02E-05	3.38E-05	3.59E-05	4.30E-05	4.01E-05	2.98E-05	2.25E-05	1.65E-05	1.56E-05	1.83E-05
71	5.64E-05	4.75E-05	3.92E-05	3.31E-05	3.52E-05	4.20E-05	3.92E-05	2.92E-05	2.20E-05	1.60E-05	1.52E-05	1.79E-05
72	5.51E-05	4.63E-05	3.82E-05	3.23E-05	3.43E-05	4.10E-05	3.86E-05	2.84E-05	2.14E-05	1.56E-05	1.48E-05	1.76E-05
73	5.38E-05	4.52E-05	3.72E-05	3.13E-05	3.34E-05	4.01E-05	3.73E-05	2.78E-05	2.08E-05	1.52E-05	1.44E-05	1.73E-05
74	5.26E-05	4.41E-05	3.62E-05	3.04E-05	3.24E-05	3.92E-05	3.62E-05	2.72E-05	2.03E-05	1.48E-05	1.40E-05	1.70E-05
75	5.13E-05	4.30E-05	3.54E-05	2.97E-05	3.16E-05	3.83E-05	3.51E-05	2.65E-05	1.97E-05	1.44E-05	1.37E-05	1.67E-05
76	4.99E-05	4.19E-05	3.44E-05	2.90E-05	3.10E-05	3.73E-05	3.40E-05	2.58E-05	1.92E-05	1.40E-05	1.33E-05	1.64E-05
77	4.88E-05	4.10E-05	3.37E-05	2.82E-05	3.01E-05	3.64E-05	3.31E-05	2.52E-05	1.87E-05	1.36E-05	1.30E-05	1.62E-05
78	4.74E-05	4.00E-05	3.29E-05	2.74E-05	2.93E-05	3.55E-05	3.23E-05	2.45E-05	1.82E-05	1.32E-05	1.26E-05	1.59E-05
79	4.64E-05	3.91E-05	3.22E-05	2.68E-05	2.87E-05	3.47E-05	3.14E-05	2.39E-05	1.78E-05	1.29E-05	1.23E-05	1.57E-05
80	4.54E-05	3.82E-05	3.14E-05	2.61E-05	2.80E-05	3.40E-05	3.05E-05	2.33E-05	1.74E-05	1.26E-05	1.20E-05	1.55E-05
81	4.45E-05	3.73E-05	3.07E-05	2.54E-05	2.73E-05	3.32E-05	2.96E-05	2.27E-05	1.70E-05	1.23E-05	1.17E-05	1.52E-05
82	4.35E-05	3.65E-05	3.00E-05	2.47E-05	2.65E-05	3.24E-05	2.87E-05	2.21E-05	1.66E-05	1.19E-05	1.14E-05	1.50E-05
83	4.26E-05	3.57E-05	2.94E-05	2.40E-05	2.58E-05	3.16E-05	2.78E-05	2.15E-05	1.62E-05	1.16E-05	1.11E-05	1.48E-05
84	4.17E-05	3.50E-05	2.87E-05	2.33E-05	2.50E-05	3.08E-05	2.70E-05	2.09E-05	1.58E-05	1.13E-05	1.08E-05	1.46E-05
85	4.08E-05	3.42E-05	2.80E-05	2.26E-05	2.43E-05	3.00E-05	2.62E-05	2.03E-05	1.54E-05	1.10E-05	1.05E-05	1.44E-05
86	4.00E-05	3.35E-05	2.73E-05	2.19E-05	2.36E-05	2.92E-05	2.54E-05	1.97E-05	1.51E-05	1.08E-05	1.03E-05	1.42E-05
87	3.92E-05	3.28E-05	2.66E-05	2.14E-05	2.31E-05	2.84E-05	2.46E-05	1.92E-05	1.47E-05	1.05E-05	1.01E-05	1.39E-05
88	3.84E-05	3.22E-05	2.61E-05	2.10E-05	2.29E-05	2.76E-05	2.39E-05	1.88E-05	1.44E-05	1.02E-05	9.90E-06	1.38E-05
89	3.76E-05	3.15E-05	2.56E-05	2.07E-05	2.24E-05	2.68E-05	2.32E-05	1.83E-05	1.41E-05	1.00E-05	9.60E-06	1.34E-05
90	3.67E-05	3.07E-05	2.51E-05	2.02E-05	2.19E-05	2.60E-05	2.24E-05	1.77E-05	1.38E-05	9.70E-06	9.30E-06	1.31E-05
91	3.59E-05	3.00E-05	2.45E-05	1.97E-05	2.14E-05	2.52E-05	2.17E-05	1.72E-05	1.35E-05	9.40E-06	9.00E-06	1.28E-05
92	3.55E-05	2.97E-05	2.44E-05	1.92E-05	2.10E-05	2.48E-05	2.14E-05	1.71E-05	1.32E-05	9.20E-06	8.80E-06	1.27E-05

TABLE IV. Collision Strengths D for Excitation from the Ground level to the Given Upper Levels as a Function of Z and Scattered Electron Energy in Units of Z_{eff}^2 Rydbergs, $21/2591$

Z	HD						He					
	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75
22	2.82E-04	2.82E-04	2.22E-04	1.48E-04	1.31E-04	1.37E-04	4.50E-04	4.77E-04	2.87E-04	1.40E-04	5.97E-05	2.99E-05
23	3.37E-04	2.85E-04	2.11E-04	1.45E-04	1.44E-04	1.33E-04	6.07E-04	4.47E-04	2.71E-04	1.32E-04	5.28E-05	1.99E-05
24	3.98E-04	2.49E-04	2.00E-04	1.34E-04	1.40E-04	1.47E-04	5.70E-04	4.18E-04	2.54E-04	1.24E-04	4.98E-05	1.87E-05
25	2.17E-04	2.53E-04	1.87E-04	1.44E-04	1.34E-04	1.41E-04	5.34E-04	4.12E-04	2.38E-04	1.16E-04	4.47E-05	1.79E-05
26	2.98E-04	2.38E-04	1.78E-04	1.37E-04	1.38E-04	1.35E-04	5.00E-04	2.67E-04	2.22E-04	1.09E-04	4.42E-05	1.67E-05
27	2.80E-04	2.24E-04	1.64E-04	1.32E-04	1.22E-04	1.27E-04	4.49E-04	2.44E-04	2.07E-04	1.03E-04	3.77E-05	1.57E-05
28	2.62E-04	2.11E-04	1.59E-04	1.29E-04	1.14E-04	1.23E-04	4.03E-04	2.22E-04	1.87E-04	9.44E-05	3.72E-05	1.51E-05
29	4.47E-04	1.98E-04	1.50E-04	1.17E-04	1.11E-04	1.17E-04	4.12E-04	2.04E-04	1.82E-04	9.07E-05	3.70E-05	1.42E-05
30	2.32E-04	1.87E-04	1.42E-04	1.10E-04	1.05E-04	1.12E-04	3.89E-04	2.84E-04	1.74E-04	8.53E-05	3.50E-05	1.35E-05
31	2.19E-04	1.74E-04	1.34E-04	1.07E-04	1.00E-04	1.07E-04	3.64E-04	2.89E-04	1.64E-04	8.04E-05	3.30E-05	1.27E-05
32	2.04E-04	1.64E-04	1.24E-04	1.01E-04	9.52E-05	1.03E-04	3.42E-04	2.84E-04	1.53E-04	7.81E-05	3.12E-05	1.21E-05
33	1.94E-04	1.57E-04	1.20E-04	9.60E-05	9.04E-05	9.68E-05	3.24E-04	2.40E-04	1.44E-04	7.19E-05	2.94E-05	1.16E-05
34	1.82E-04	1.48E-04	1.12E-04	9.12E-05	8.62E-05	9.22E-05	3.08E-04	2.24E-04	1.38E-04	6.81E-05	2.80E-05	1.08E-05
35	1.73E-04	1.40E-04	1.07E-04	8.64E-05	8.21E-05	8.80E-05	2.92E-04	2.14E-04	1.31E-04	6.43E-05	2.64E-05	1.03E-05
36	1.64E-04	1.32E-04	1.00E-04	8.22E-05	7.82E-05	8.39E-05	2.77E-04	2.03E-04	1.24E-04	6.12E-05	2.52E-05	9.78E-06
37	1.55E-04	1.23E-04	9.64E-05	7.82E-05	7.42E-05	8.01E-05	2.62E-04	1.92E-04	1.17E-04	5.81E-05	2.40E-05	9.31E-06
38	1.47E-04	1.15E-04	9.12E-05	7.42E-05	7.02E-05	7.64E-05	2.49E-04	1.82E-04	1.12E-04	5.52E-05	2.28E-05	8.84E-06
39	1.39E-04	1.08E-04	8.60E-05	7.02E-05	6.62E-05	7.26E-05	2.37E-04	1.74E-04	1.04E-04	5.23E-05	2.17E-05	8.45E-06
40	1.32E-04	1.02E-04	8.04E-05	6.62E-05	6.22E-05	6.87E-05	2.24E-04	1.64E-04	1.01E-04	5.00E-05	2.07E-05	8.04E-06
41	1.25E-04	1.02E-04	7.47E-05	6.22E-05	5.84E-05	6.44E-05	2.13E-04	1.58E-04	9.62E-05	4.77E-05	1.97E-05	7.67E-06
42	1.19E-04	9.64E-05	6.87E-05	5.84E-05	5.46E-05	6.07E-05	2.03E-04	1.51E-04	9.19E-05	4.55E-05	1.88E-05	7.29E-06
43	1.13E-04	9.19E-05	6.32E-05	5.46E-05	5.08E-05	5.69E-05	1.94E-04	1.44E-04	8.77E-05	4.33E-05	1.80E-05	7.03E-06
44	1.07E-04	8.75E-05	5.87E-05	5.08E-05	4.70E-05	5.31E-05	1.87E-04	1.37E-04	8.35E-05	4.11E-05	1.72E-05	6.84E-06
45	1.02E-04	8.32E-05	5.44E-05	4.70E-05	4.32E-05	4.93E-05	1.79E-04	1.31E-04	8.02E-05	3.90E-05	1.64E-05	6.65E-06
46	9.74E-05	7.88E-05	5.01E-05	4.32E-05	4.04E-05	4.55E-05	1.71E-04	1.24E-04	7.68E-05	3.61E-05	1.56E-05	6.46E-06
47	9.26E-05	7.47E-05	4.59E-05	4.04E-05	3.76E-05	4.17E-05	1.64E-04	1.21E-04	7.34E-05	3.33E-05	1.47E-05	6.27E-06
48	8.85E-05	7.22E-05	4.32E-05	3.76E-05	3.48E-05	3.92E-05	1.57E-04	1.16E-04	7.04E-05	3.05E-05	1.40E-05	6.07E-06
49	8.44E-05	6.97E-05	4.05E-05	3.48E-05	3.20E-05	3.75E-05	1.51E-04	1.11E-04	6.75E-05	2.77E-05	1.32E-05	5.88E-06
50	8.04E-05	6.72E-05	3.78E-05	3.20E-05	2.92E-05	3.58E-05	1.45E-04	1.07E-04	6.46E-05	2.50E-05	1.24E-05	5.69E-06
51	7.70E-05	6.47E-05	3.50E-05	2.92E-05	2.64E-05	3.41E-05	1.40E-04	1.02E-04	6.17E-05	2.22E-05	1.17E-05	5.50E-06
52	7.35E-05	6.21E-05	3.22E-05	2.64E-05	2.36E-05	3.24E-05	1.34E-04	9.82E-05	5.88E-05	1.94E-05	1.10E-05	5.31E-06
53	7.02E-05	5.96E-05	2.94E-05	2.36E-05	2.08E-05	3.07E-05	1.29E-04	9.49E-05	5.59E-05	1.67E-05	1.03E-05	5.12E-06
54	6.72E-05	5.70E-05	2.66E-05	2.08E-05	1.80E-05	2.90E-05	1.24E-04	9.16E-05	5.30E-05	1.40E-05	9.64E-06	4.93E-06
55	6.42E-05	5.45E-05	2.38E-05	1.80E-05	1.52E-05	2.73E-05	1.20E-04	8.83E-05	5.01E-05	1.13E-05	8.95E-06	4.74E-06
56	6.12E-05	5.20E-05	2.10E-05	1.52E-05	1.24E-05	2.56E-05	1.16E-04	8.50E-05	4.72E-05	1.06E-05	8.26E-06	4.55E-06
57	5.82E-05	4.95E-05	1.82E-05	1.24E-05	1.06E-05	2.39E-05	1.12E-04	8.17E-05	4.43E-05	9.90E-06	7.57E-06	4.36E-06
58	5.52E-05	4.70E-05	1.54E-05	1.06E-05	8.80E-06	2.22E-05	1.08E-04	7.84E-05	4.14E-05	9.60E-06	6.88E-06	4.17E-06
59	5.22E-05	4.45E-05	1.26E-05	8.80E-06	7.00E-06	2.05E-05	1.04E-04	7.51E-05	3.85E-05	9.29E-06	6.19E-06	3.98E-06
60	4.92E-05	4.20E-05	1.08E-05	7.00E-06	5.20E-06	1.88E-05	1.01E-04	7.18E-05	3.56E-05	8.98E-06	5.50E-06	3.79E-06
61	4.62E-05	3.95E-05	9.00E-06	5.20E-06	3.40E-06	1.71E-05	9.75E-05	6.85E-05	3.27E-05	8.67E-06	4.81E-06	3.60E-06
62	4.32E-05	3.70E-05	7.22E-06	3.40E-06	1.60E-06	1.54E-05	9.42E-05	6.54E-05	2.98E-05	8.36E-06	4.12E-06	3.41E-06
63	4.02E-05	3.45E-05	5.44E-06	1.60E-06	8.20E-07	1.37E-05	9.12E-05	6.23E-05	2.69E-05	8.05E-06	3.43E-06	3.22E-06
64	3.72E-05	3.20E-05	3.66E-06	8.20E-07	3.40E-07	1.20E-05	8.82E-05	5.92E-05	2.40E-05	7.74E-06	2.74E-06	3.03E-06
65	3.42E-05	2.95E-05	1.88E-06	3.40E-07	1.60E-07	1.03E-05	8.52E-05	5.61E-05	2.11E-05	7.43E-06	2.05E-06	2.84E-06
66	3.12E-05	2.70E-05	1.10E-06	1.60E-07	8.20E-08	8.60E-06	8.22E-05	5.30E-05	1.82E-05	7.12E-06	1.36E-06	2.65E-06
67	2.82E-05	2.45E-05	6.22E-07	8.20E-08	3.40E-08	6.90E-06	7.92E-05	5.00E-05	1.53E-05	6.81E-06	6.97E-07	2.46E-06
68	2.52E-05	2.20E-05	3.44E-07	3.40E-08	1.60E-08	5.20E-06	7.62E-05	4.69E-05	1.24E-05	6.50E-06	6.28E-07	2.27E-06
69	2.22E-05	1.95E-05	1.66E-07	1.60E-08	8.20E-09	3.50E-06	7.32E-05	4.38E-05	9.50E-06	6.19E-06	5.59E-07	2.08E-06
70	1.92E-05	1.70E-05	8.80E-08	8.20E-09	3.40E-09	1.80E-06	7.02E-05	4.07E-05	8.20E-06	5.98E-06	4.90E-07	1.89E-06
71	1.62E-05	1.45E-05	4.00E-08	3.40E-09	1.60E-09	1.03E-06	6.72E-05	3.76E-05	6.90E-06	5.77E-06	4.21E-07	1.70E-06
72	1.32E-05	1.20E-05	2.22E-08	1.60E-09	8.20E-10	5.50E-07	6.42E-05	3.45E-05	5.60E-06	5.56E-06	3.52E-07	1.51E-06
73	1.02E-05	1.00E-05	1.10E-08	8.20E-10	3.40E-10	2.70E-07	6.12E-05	3.14E-05	4.30E-06	5.35E-06	2.83E-07	1.32E-06
74	7.20E-06	8.80E-06	5.44E-09	3.40E-10	1.60E-10	1.20E-07	5.82E-05	2.83E-05	3.20E-06	5.14E-06	2.14E-07	1.13E-06
75	4.20E-06	7.50E-06	2.66E-09	1.60E-10	8.20E-11	5.50E-08	5.52E-05	2.52E-05	2.10E-06	4.93E-06	1.45E-07	1.04E-06
76	2.20E-06	6.20E-06	1.10E-09	8.20E-11	3.40E-11	2.70E-08	5.22E-05	2.21E-05	1.00E-06	4.72E-06	1.16E-07	9.25E-07
77	1.20E-06	5.20E-06	5.44E-10	3.40E-11	1.60E-11	1.20E-08	4.92E-05	1.90E-05	5.00E-07	4.51E-06	9.60E-08	8.36E-07
78	6.20E-07	4.20E-06	2.66E-10	1.60E-11	8.20E-12	5.50E-09	4.62E-05	1.59E-05	2.10E-07	4.30E-06	8.50E-08	7.17E-07
79	3.20E-07	3.20E-06	1.10E-10	8.20E-12	3.40E-12	2.70E-09	4.32E-05	1.28E-05	9.00E-08	4.09E-06	7.30E-08	6.28E-07
80	1.20E-07	2.20E-06	5.44E-11	3.40E-12	1.60E-12	1.20E-09	4.02E-05	1.07E-05	4.00E-08	3.88E-06	6.50E-08	5.39E-07
81	6.20E-08	1.20E-06	2.66E-11	1.60E-12	8.20E-13	5.50E-10	3.72E-05	9.40E-06	2.10E-08	3.67E-06	5.80E-08	4.80E-07
82	2.20E-08	1.20E-06	1.10E-11	8.20E-13	3.40E-13	2.70E-10	3.42E-05	8.10E-06	9.00E-09	3.46E-06	5.00E-08	4.10E-07
83	1.20E-08	1.20E-06	5.44E-12	3.40E-13	1.60E-13	1.20E-10	3.12E-05	6.80E-06	4.00E-09	3.25E-06	4.20E-08	3.20E-07
84	6.20E-09	1.20E-06	2.66E-12	1.60E-13	8.20E-14	5.50E-11	2.82E-05	5.50E-06	1.00E-09	3.04E-06	3.40E-08	2.30E-07
85	3.20E-09	1.20E-06	1.10E-12	8.20E-14	3.40E-14	2.70E-11	2.52E-05	4.20E-06	4.00E-10	2.83E-06	2.60E-08	1.40E-07
86	1.20E-09	1.20E-06	5.44E-13	3.40E-14	1.60E-14	1.20E-11	2.22E-05	2.90E-06	1.00E-10	2.62E-06	1.90E-08	1.10E-07
87	6.20E-10	1.20E-06	2.66E-13	1.60E-14	8.20E-15	5.50E-12	1.92E-05	1.60E-06	4.00E-11	2.41E-06	1.40E-08	8.00E-08
88	3.20E-10	1.20E-06	1.10E-13	8.20E-15	3.40E-15	2.70E-12	1.62E-05	1.29E-06	1.00E-11	2.20E-06	1.10E-08	6.10E-08
89	1.20E-10	1.20E-06	5.44E-14	3.40E-15	1.60E-15	1.20E-12	1.32E-05	1.08E-06	4.00E-12	2.00E-06	9.00E-09	4.20E-08
90	6.20E-11	1.20E-06	2.66E-14	1.60E-15	8.20E-16	5.50E-13	1.02E-05	8.70E-07	1.00E-12	1.79E-06	7.00E-09	3.30E-08
91	3.20E-11	1.20E-06	1.10E-14	8.20E-16	3.40E-16	2.70E-13	7.20E-06	7.60E-07	4.00E-13	1.58E-06	5.00E-09	2.40E-08
92	1.20E-11	1.20E-06	5.44E-15	3.40E-16	1.60E-16	1.20E-13	4.20E-06	5.50E-07	1.00E-13	1.37E-06	3.00E-09	1.30E-08

TABLE IV. Collision integrals Q for excitation from the ground level to the close upper levels as a function of Z and scattered electron energy in units of E_{eff}^2 (Hydrogen, 121.01)

J1										J2									
2	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75	
37	2.72E-04	2.98E-04	2.08E-04	1.22E-04	5.90E-05	2.52E-05	5.05E-05	4.34E-05	3.92E-05	2.21E-05	1.22E-05	5.84E-06	4.84E-05	4.18E-05	3.22E-05	2.12E-05	1.17E-05	5.32E-06	4.32E-06
38	3.39E-04	2.89E-04	2.01E-04	1.18E-04	5.70E-05	2.44E-05	4.84E-05	4.18E-05	3.22E-05	2.12E-05	1.17E-05	5.32E-06	4.48E-05	3.82E-05	2.92E-05	1.82E-05	9.12E-06	4.12E-06	3.12E-06
39	3.44E-04	2.78E-04	1.94E-04	1.14E-04	5.51E-05	2.34E-05	4.47E-05	3.82E-05	2.92E-05	1.82E-05	9.12E-06	4.12E-06	4.52E-05	3.86E-05	2.96E-05	1.86E-05	9.26E-06	4.26E-06	3.26E-06
40	3.48E-04	2.68E-04	1.87E-04	1.10E-04	5.32E-05	2.28E-05	4.37E-05	3.72E-05	2.82E-05	1.72E-05	8.62E-06	3.92E-06	4.37E-05	3.72E-05	2.82E-05	1.72E-05	8.62E-06	3.92E-06	2.92E-06
41	3.28E-04	2.59E-04	1.81E-04	1.04E-04	5.13E-05	2.21E-05	4.27E-05	3.62E-05	2.72E-05	1.62E-05	8.12E-06	3.82E-06	4.27E-05	3.62E-05	2.72E-05	1.62E-05	8.12E-06	3.82E-06	2.82E-06
42	3.12E-04	2.51E-04	1.73E-04	1.02E-04	4.95E-05	2.14E-05	4.22E-05	3.52E-05	2.62E-05	1.52E-05	7.92E-06	3.72E-06	4.22E-05	3.52E-05	2.62E-05	1.52E-05	7.92E-06	3.72E-06	2.72E-06
43	3.02E-04	2.43E-04	1.70E-04	9.93E-05	4.84E-05	2.07E-05	4.09E-05	3.42E-05	2.52E-05	1.42E-05	7.72E-06	3.62E-06	4.09E-05	3.42E-05	2.52E-05	1.42E-05	7.72E-06	3.62E-06	2.62E-06
44	2.92E-04	2.35E-04	1.64E-04	9.64E-05	4.67E-05	2.01E-05	3.94E-05	3.32E-05	2.42E-05	1.32E-05	7.52E-06	3.52E-06	3.94E-05	3.32E-05	2.42E-05	1.32E-05	7.52E-06	3.52E-06	2.52E-06
45	2.84E-04	2.28E-04	1.59E-04	9.35E-05	4.50E-05	1.94E-05	3.87E-05	3.22E-05	2.32E-05	1.22E-05	7.32E-06	3.42E-06	3.87E-05	3.22E-05	2.32E-05	1.22E-05	7.32E-06	3.42E-06	2.42E-06
46	2.75E-04	2.21E-04	1.54E-04	9.07E-05	4.32E-05	1.87E-05	3.79E-05	3.12E-05	2.22E-05	1.12E-05	7.12E-06	3.32E-06	3.79E-05	3.12E-05	2.22E-05	1.12E-05	7.12E-06	3.32E-06	2.32E-06
47	2.67E-04	2.14E-04	1.50E-04	8.81E-05	4.15E-05	1.81E-05	3.72E-05	3.02E-05	2.12E-05	1.02E-05	6.92E-06	3.22E-06	3.72E-05	3.02E-05	2.12E-05	1.02E-05	6.92E-06	3.22E-06	2.22E-06
48	2.59E-04	2.08E-04	1.44E-04	8.54E-05	4.07E-05	1.79E-05	3.65E-05	2.92E-05	2.02E-05	9.92E-06	6.72E-06	3.12E-06	3.65E-05	2.92E-05	2.02E-05	9.92E-06	6.72E-06	3.12E-06	2.12E-06
49	2.51E-04	2.02E-04	1.41E-04	8.32E-05	4.01E-05	1.74E-05	3.58E-05	2.82E-05	1.92E-05	9.72E-06	6.52E-06	3.02E-06	3.58E-05	2.82E-05	1.92E-05	9.72E-06	6.52E-06	3.02E-06	2.02E-06
50	2.44E-04	1.94E-04	1.37E-04	8.07E-05	3.94E-05	1.70E-05	3.51E-05	2.72E-05	1.82E-05	9.52E-06	6.32E-06	2.92E-06	3.51E-05	2.72E-05	1.82E-05	9.52E-06	6.32E-06	2.92E-06	1.92E-06
51	2.37E-04	1.91E-04	1.34E-04	7.87E-05	3.84E-05	1.65E-05	3.43E-05	2.62E-05	1.72E-05	9.32E-06	6.12E-06	2.82E-06	3.43E-05	2.62E-05	1.72E-05	9.32E-06	6.12E-06	2.82E-06	1.82E-06
52	2.31E-04	1.84E-04	1.30E-04	7.64E-05	3.74E-05	1.61E-05	3.36E-05	2.52E-05	1.62E-05	9.12E-06	5.92E-06	2.72E-06	3.36E-05	2.52E-05	1.62E-05	9.12E-06	5.92E-06	2.72E-06	1.72E-06
53	2.25E-04	1.81E-04	1.27E-04	7.44E-05	3.64E-05	1.57E-05	3.29E-05	2.42E-05	1.52E-05	8.92E-06	5.72E-06	2.62E-06	3.29E-05	2.42E-05	1.52E-05	8.92E-06	5.72E-06	2.62E-06	1.62E-06
54	2.19E-04	1.74E-04	1.22E-04	7.27E-05	3.54E-05	1.53E-05	3.22E-05	2.32E-05	1.42E-05	8.72E-06	5.52E-06	2.52E-06	3.22E-05	2.32E-05	1.42E-05	8.72E-06	5.52E-06	2.52E-06	1.52E-06
55	2.13E-04	1.72E-04	1.20E-04	7.07E-05	3.47E-05	1.49E-05	3.15E-05	2.22E-05	1.32E-05	8.52E-06	5.32E-06	2.42E-06	3.15E-05	2.22E-05	1.32E-05	8.52E-06	5.32E-06	2.42E-06	1.42E-06
56	2.08E-04	1.69E-04	1.17E-04	6.87E-05	3.37E-05	1.45E-05	3.08E-05	2.12E-05	1.22E-05	8.32E-06	5.12E-06	2.32E-06	3.08E-05	2.12E-05	1.22E-05	8.32E-06	5.12E-06	2.32E-06	1.32E-06
57	2.02E-04	1.62E-04	1.14E-04	6.73E-05	3.31E-05	1.42E-05	3.01E-05	2.02E-05	1.12E-05	8.12E-06	4.92E-06	2.22E-06	3.01E-05	2.02E-05	1.12E-05	8.12E-06	4.92E-06	2.22E-06	1.22E-06
58	1.96E-04	1.59E-04	1.12E-04	6.57E-05	3.22E-05	1.38E-05	2.94E-05	1.92E-05	1.02E-05	7.92E-06	4.72E-06	2.12E-06	2.94E-05	1.92E-05	1.02E-05	7.92E-06	4.72E-06	2.12E-06	1.12E-06
59	1.92E-04	1.56E-04	1.09E-04	6.44E-05	3.14E-05	1.35E-05	2.87E-05	1.82E-05	9.92E-06	4.52E-06	2.02E-06	2.87E-05	1.82E-05	9.92E-06	4.52E-06	2.02E-06	2.02E-06	1.02E-06	1.02E-06
60	1.88E-04	1.53E-04	1.06E-04	6.31E-05	3.06E-05	1.32E-05	2.80E-05	1.72E-05	9.72E-06	4.32E-06	1.92E-06	2.80E-05	1.72E-05	9.72E-06	4.32E-06	1.92E-06	1.92E-06	9.92E-06	9.92E-06
61	1.84E-04	1.48E-04	1.03E-04	6.18E-05	2.98E-05	1.29E-05	2.73E-05	1.62E-05	9.52E-06	4.12E-06	1.82E-06	2.73E-05	1.62E-05	9.52E-06	4.12E-06	1.82E-06	1.82E-06	9.72E-06	9.72E-06
62	1.80E-04	1.43E-04	1.00E-04	6.05E-05	2.90E-05	1.26E-05	2.66E-05	1.52E-05	9.32E-06	3.92E-06	1.72E-06	2.66E-05	1.52E-05	9.32E-06	3.92E-06	1.72E-06	1.72E-06	9.52E-06	9.52E-06
63	1.76E-04	1.38E-04	9.73E-05	5.92E-05	2.82E-05	1.23E-05	2.59E-05	1.42E-05	9.12E-06	3.72E-06	1.62E-06	2.59E-05	1.42E-05	9.12E-06	3.72E-06	1.62E-06	1.62E-06	9.32E-06	9.32E-06
64	1.72E-04	1.36E-04	9.73E-05	5.74E-05	2.84E-05	1.23E-05	2.59E-05	1.42E-05	9.02E-06	3.62E-06	1.62E-06	2.59E-05	1.42E-05	9.02E-06	3.62E-06	1.62E-06	1.62E-06	9.12E-06	9.12E-06
65	1.68E-04	1.33E-04	9.53E-05	5.64E-05	2.78E-05	1.21E-05	2.52E-05	1.32E-05	8.82E-06	3.52E-06	1.52E-06	2.52E-05	1.32E-05	8.82E-06	3.52E-06	1.52E-06	1.52E-06	8.92E-06	8.92E-06
66	1.64E-04	1.32E-04	9.33E-05	5.52E-05	2.72E-05	1.19E-05	2.45E-05	1.22E-05	8.62E-06	3.42E-06	1.42E-06	2.45E-05	1.22E-05	8.62E-06	3.42E-06	1.42E-06	1.42E-06	8.72E-06	8.72E-06
67	1.61E-04	1.30E-04	9.13E-05	5.42E-05	2.65E-05	1.17E-05	2.38E-05	1.12E-05	8.42E-06	3.32E-06	1.32E-06	2.38E-05	1.12E-05	8.42E-06	3.32E-06	1.32E-06	1.32E-06	8.52E-06	8.52E-06
68	1.58E-04	1.27E-04	8.93E-05	5.31E-05	2.58E-05	1.14E-05	2.31E-05	1.02E-05	8.22E-06	3.22E-06	1.22E-06	2.31E-05	1.02E-05	8.22E-06	3.22E-06	1.22E-06	1.22E-06	8.32E-06	8.32E-06
69	1.54E-04	1.23E-04	8.72E-05	5.21E-05	2.57E-05	1.12E-05	2.24E-05	9.92E-06	8.02E-06	3.12E-06	2.24E-05	9.92E-06	8.02E-06	3.12E-06	2.24E-05	9.92E-06	8.02E-06	8.12E-06	8.12E-06
70	1.51E-04	1.22E-04	8.60E-05	5.11E-05	2.53E-05	1.10E-05	2.18E-05	9.82E-06	7.92E-06	3.02E-06	2.18E-05	7.92E-06	3.02E-06	2.18E-05	7.92E-06	3.02E-06	8.02E-06	8.02E-06	8.02E-06
71	1.48E-04	1.20E-04	8.44E-05	5.02E-05	2.48E-05	1.08E-05	2.12E-05	9.72E-06	7.82E-06	2.92E-06	2.12E-05	7.82E-06	2.92E-06	2.12E-05	7.82E-06	2.92E-06	7.92E-06	7.92E-06	7.92E-06
72	1.45E-04	1.17E-04	8.28E-05	4.93E-05	2.44E-05	1.07E-05	2.06E-05	9.62E-06	7.72E-06	2.82E-06	2.06E-05	7.72E-06	2.82E-06	2.06E-05	7.72E-06	2.82E-06	7.82E-06	7.82E-06	7.82E-06
J3										J4									
2	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75	
22	2.74E-04	3.37E-04	2.32E-04	1.77E-04	1.00E-04	4.84E-05	1.41E-04	1.21E-04	9.43E-05	4.77E-05	3.97E-05	1.72E-05	1.27E-04	1.11E-04	8.44E-05	5.82E-05	3.72E-05	1.54E-05	1.54E-05
23	2.55E-04	3.02E-04	2.24E-04	1.57E-04	8.81E-05	4.25E-05	1.27E-04	1.02E-04	7.91E-05	3.21E-05	2.73E-05	1.41E-05	1.18E-04	1.02E-04	7.91E-05	3.21E-05	2.73E-05	1.41E-05	1.41E-05
24	2.30E-04	2.74E-04	2.11E-04	1.41E-04	7.84E-05	3.74E-05	1.08E-04	9.30E-05	7.22E-05	4.82E-05	2.48E-05	1.28E-05	9.99E-05	8.32E-05	6.41E-05	4.12E-05	2.42E-05	1.14E-05	1.14E-05
25	2.91E-04	2.48E-04	1.91E-04	1.37E-04	7.03E-05	2.53E-05	9.99E-05	8.32E-05	6.41E-05	4.12E-05	2.42E-05	1.14E-05	9.48E-05	7.82E-05	5.91E-05	3.62E-05	2.02E-05	9.48E-06	9.48E-06
26	2.44E-04	2.07E-04	1.59E-04	1.02E-04	5.73E-05	2.02E-05	9.48E-05	7.82E-05	5.91E-05	3.62E-05	2.02E-05	9.48E-06	9.48E-05	7.82E-05	5.91E-05	3.62E-05	2.02E-05	9.48E-06	9.48E-06
27	2.44E-04	2.07E-04	1.59E-04	1.02E-04	5.73E-05	2.02E-05	9.48E-05	7.82E-05	5.91E-05	3.62E-05	2.02E-05	9.48E-06	9.48E-05	7.82E-05	5.91E-05	3.62E-05	2.02E-05	9.48E-06	9.48E-06
28	2.25E-04	1.92E-04	1.44E-04	9.61E-															

TABLE IV. Collision Strengths S for Excitation from the Ground Level to the Given Upper Levels as a Function of I and Scattered Electron Energy in Units of $I^{1/2}$ Rydbergs, 272.57

J ₀															J ₀														
I	E'=0.008	E'=0.04	E'=0.10	E'=0.21	E'=0.41	E'=0.75	I		E'=0.008	E'=0.04	E'=0.10	E'=0.21	E'=0.41	E'=0.75	I		E'=0.008	E'=0.04	E'=0.10	E'=0.21	E'=0.41	E'=0.75							
22	1.01E-03	8.22E-04	5.87E-04	3.53E-04	1.73E-04	7.67E-05	1.43E-04	1.23E-04	9.76E-05	6.20E-05	3.44E-05	1.44E-05	1.43E-04	1.23E-04	9.76E-05	6.20E-05	3.44E-05	1.44E-05	1.43E-04	1.23E-04	9.76E-05	6.20E-05	3.44E-05	1.44E-05					
23	9.11E-04	7.43E-04	5.29E-04	3.18E-04	1.58E-04	6.83E-05	1.32E-04	1.12E-04	8.73E-05	5.43E-05	3.10E-05	1.37E-05	1.32E-04	1.12E-04	8.73E-05	5.43E-05	3.10E-05	1.37E-05	1.32E-04	1.12E-04	8.73E-05	5.43E-05	3.10E-05	1.37E-05					
24	8.27E-04	6.73E-04	4.79E-04	2.87E-04	1.43E-04	6.19E-05	1.22E-04	1.02E-04	7.73E-05	4.73E-05	2.80E-05	1.22E-05	1.22E-04	1.02E-04	7.73E-05	4.73E-05	2.80E-05	1.22E-05	1.22E-04	1.02E-04	7.73E-05	4.73E-05	2.80E-05	1.22E-05					
25	7.53E-04	6.13E-04	4.39E-04	2.65E-04	1.31E-04	5.65E-05	1.12E-04	9.23E-05	7.23E-05	4.33E-05	2.57E-05	1.12E-05	1.12E-04	9.23E-05	7.23E-05	4.33E-05	2.57E-05	1.12E-05	1.12E-04	9.23E-05	7.23E-05	4.33E-05	2.57E-05	1.12E-05					
26	6.89E-04	5.59E-04	3.97E-04	2.39E-04	1.18E-04	5.12E-05	1.03E-04	8.37E-05	6.37E-05	3.87E-05	2.32E-05	1.03E-05	1.03E-04	8.37E-05	6.37E-05	3.87E-05	2.32E-05	1.03E-05	1.03E-04	8.37E-05	6.37E-05	3.87E-05	2.32E-05	1.03E-05					
27	6.31E-04	5.13E-04	3.64E-04	2.18E-04	1.08E-04	4.68E-05	9.76E-05	7.76E-05	5.76E-05	3.56E-05	2.12E-05	9.76E-06	9.76E-05	7.76E-05	5.76E-05	3.56E-05	2.12E-05	9.76E-06	9.76E-05	7.76E-05	5.76E-05	3.56E-05	2.12E-05	9.76E-06					
28	5.81E-04	4.71E-04	3.34E-04	2.00E-04	1.00E-04	4.29E-05	9.07E-05	7.07E-05	5.07E-05	3.17E-05	1.92E-05	9.07E-06	9.07E-05	7.07E-05	5.07E-05	3.17E-05	1.92E-05	9.07E-06	9.07E-05	7.07E-05	5.07E-05	3.17E-05	1.92E-05	9.07E-06					
29	5.34E-04	4.32E-04	3.06E-04	1.84E-04	9.10E-05	3.73E-05	8.28E-05	6.28E-05	4.28E-05	2.58E-05	1.52E-05	8.28E-06	8.28E-05	6.28E-05	4.28E-05	2.58E-05	1.52E-05	8.28E-06	8.28E-05	6.28E-05	4.28E-05	2.58E-05	1.52E-05	8.28E-06					
30	4.94E-04	4.02E-04	2.82E-04	1.70E-04	8.41E-05	3.43E-05	7.73E-05	5.73E-05	3.73E-05	2.23E-05	1.33E-05	7.73E-06	7.73E-05	5.73E-05	3.73E-05	2.23E-05	1.33E-05	7.73E-06	7.73E-05	5.73E-05	3.73E-05	2.23E-05	1.33E-05	7.73E-06					
31	4.60E-04	3.72E-04	2.64E-04	1.58E-04	7.80E-05	3.27E-05	7.23E-05	5.23E-05	3.23E-05	1.93E-05	1.13E-05	7.23E-06	7.23E-05	5.23E-05	3.23E-05	1.93E-05	1.13E-05	7.23E-06	7.23E-05	5.23E-05	3.23E-05	1.93E-05	1.13E-05	7.23E-06					
32	4.27E-04	3.47E-04	2.43E-04	1.44E-04	7.23E-05	3.13E-05	6.73E-05	4.73E-05	2.73E-05	1.63E-05	9.73E-06	6.73E-06	6.73E-05	4.73E-05	2.73E-05	1.63E-05	9.73E-06	6.73E-06	6.73E-05	4.73E-05	2.73E-05	1.63E-05	9.73E-06	6.73E-06					
33	3.99E-04	3.22E-04	2.28E-04	1.34E-04	6.74E-05	2.94E-05	6.37E-05	4.37E-05	2.37E-05	1.47E-05	8.73E-06	6.37E-06	6.37E-05	4.37E-05	2.37E-05	1.47E-05	8.73E-06	6.37E-06	6.37E-05	4.37E-05	2.37E-05	1.47E-05	8.73E-06	6.37E-06					
34	3.74E-04	2.97E-04	2.11E-04	1.24E-04	6.29E-05	2.74E-05	6.07E-05	4.07E-05	2.17E-05	1.37E-05	8.23E-06	6.07E-06	6.07E-05	4.07E-05	2.17E-05	1.37E-05	8.23E-06	6.07E-06	6.07E-05	4.07E-05	2.17E-05	1.37E-05	8.23E-06	6.07E-06					
35	3.51E-04	2.80E-04	1.99E-04	1.05E-04	5.29E-05	2.37E-05	5.50E-05	3.50E-05	1.80E-05	1.10E-05	7.53E-06	5.50E-06	5.50E-05	3.50E-05	1.80E-05	1.10E-05	7.53E-06	5.50E-06	5.50E-05	3.50E-05	1.80E-05	1.10E-05	7.53E-06	5.50E-06					
36	3.29E-04	2.63E-04	1.98E-04	1.12E-04	5.73E-05	2.54E-05	5.23E-05	3.23E-05	1.70E-05	9.73E-06	6.93E-06	5.23E-06	5.23E-05	3.23E-05	1.70E-05	9.73E-06	6.93E-06	5.23E-06	5.23E-05	3.23E-05	1.70E-05	9.73E-06	6.93E-06	5.23E-06					
37	3.09E-04	2.46E-04	1.81E-04	1.06E-04	5.45E-05	2.44E-05	4.83E-05	2.83E-05	1.43E-05	9.23E-06	6.53E-06	4.83E-06	4.83E-05	2.83E-05	1.43E-05	9.23E-06	6.53E-06	4.83E-06	4.83E-05	2.83E-05	1.43E-05	9.23E-06	6.53E-06	4.83E-06					
38	2.90E-04	2.30E-04	1.73E-04	1.01E-04	5.20E-05	2.34E-05	4.63E-05	2.63E-05	1.33E-05	8.73E-06	6.23E-06	4.63E-06	4.63E-05	2.63E-05	1.33E-05	8.73E-06	6.23E-06	4.63E-06	4.63E-05	2.63E-05	1.33E-05	8.73E-06	6.23E-06	4.63E-06					
39	2.72E-04	2.12E-04	1.56E-04	9.73E-05	4.95E-05	2.24E-05	4.43E-05	2.43E-05	1.23E-05	8.23E-06	5.93E-06	4.43E-06	4.43E-05	2.43E-05	1.23E-05	8.23E-06	5.93E-06	4.43E-06	4.43E-05	2.43E-05	1.23E-05	8.23E-06	5.93E-06	4.43E-06					
40	2.55E-04	1.95E-04	1.40E-04	9.23E-05	4.70E-05	2.14E-05	4.23E-05	2.23E-05	1.13E-05	7.73E-06	5.63E-06	4.23E-06	4.23E-05	2.23E-05	1.13E-05	7.73E-06	5.63E-06	4.23E-06	4.23E-05	2.23E-05	1.13E-05	7.73E-06	5.63E-06	4.23E-06					
41	2.39E-04	1.80E-04	1.30E-04	8.73E-05	4.45E-05	2.04E-05	4.03E-05	2.03E-05	1.03E-05	7.23E-06	5.33E-06	4.03E-06	4.03E-05	2.03E-05	1.03E-05	7.23E-06	5.33E-06	4.03E-06	4.03E-05	2.03E-05	1.03E-05	7.23E-06	5.33E-06	4.03E-06					
42	2.24E-04	1.65E-04	1.15E-04	8.23E-05	4.20E-05	1.94E-05	3.83E-05	1.83E-05	9.73E-06	6.73E-06	3.83E-06	3.83E-05	1.83E-05	9.73E-06	6.73E-06	3.83E-06	3.83E-05	1.83E-05	9.73E-06	6.73E-06	3.83E-06	3.83E-05	1.83E-05	9.73E-06					
43	2.09E-04	1.50E-04	1.00E-04	7.73E-05	4.05E-05	1.84E-05	3.63E-05	1.63E-05	8.73E-06	6.23E-06	3.63E-06	3.63E-05	1.63E-05	8.73E-06	6.23E-06	3.63E-06	3.63E-05	1.63E-05	8.73E-06	6.23E-06	3.63E-06	3.63E-05	1.63E-05	8.73E-06					
44	1.94E-04	1.35E-04	9.50E-05	7.23E-05	3.80E-05	1.74E-05	3.43E-05	1.53E-05	8.23E-06	5.93E-06	3.43E-06	3.43E-05	1.53E-05	8.23E-06	5.93E-06	3.43E-06	3.43E-05	1.53E-05	8.23E-06	5.93E-06	3.43E-06	3.43E-05	1.53E-05	8.23E-06					
45	1.80E-04	1.20E-04	8.80E-05	6.73E-05	3.55E-05	1.64E-05	3.23E-05	1.43E-05	7.23E-06	5.03E-06	3.23E-06	3.23E-05	1.43E-05	7.23E-06	5.03E-06	3.23E-06	3.23E-05	1.43E-05	7.23E-06	5.03E-06	3.23E-06	3.23E-05	1.43E-05	7.23E-06					
46	1.65E-04	1.05E-04	8.00E-05	6.23E-05	3.30E-05	1.54E-05	3.03E-05	1.33E-05	6.73E-06	4.63E-06	3.03E-06	3.03E-05	1.33E-05	6.73E-06	4.63E-06	3.03E-06	3.03E-05	1.33E-05	6.73E-06	4.63E-06	3.03E-06	3.03E-05	1.33E-05	6.73E-06					
47	1.51E-04	9.50E-05	7.50E-05	5.73E-05	3.05E-05	1.44E-05	2.83E-05	1.23E-05	5.73E-06	3.63E-06	2.83E-06	2.83E-05	1.23E-05	5.73E-06	3.63E-06	2.83E-06	2.83E-05	1.23E-05	5.73E-06	3.63E-06	2.83E-06	2.83E-05	1.23E-05	5.73E-06					
48	1.37E-04	8.80E-05	6.80E-05	5.23E-05	2.80E-05	1.34E-05	2.53E-05	1.13E-05	5.23E-06	3.13E-06	2.53E-06	2.53E-05	1.13E-05	5.23E-06	3.13E-06	2.53E-06	2.53E-05	1.13E-05	5.23E-06	3.13E-06	2.53E-06	2.53E-05	1.13E-05	5.23E-06					
49	1.24E-04	8.10E-05	6.10E-05	4.73E-05	2.55E-05	1.24E-05	2.33E-05	1.03E-05	4.73E-06	2.83E-06	2.33E-06	2.33E-05	1.03E-05	4.73E-06	2.83E-06	2.33E-06	2.33E-05	1.03E-05	4.73E-06	2.83E-06	2.33E-06	2.33E-05	1.03E-05	4.73E-06					
50	1.11E-04	7.40E-05	5.40E-05	4.23E-05	2.30E-05	1.14E-05	2.03E-05	9.73E-06	4.23E-06	2.03E-06	2.03E-05	9.73E-06	4.23E-06	2.03E-06	2.03E-05	9.73E-06	4.23E-06	2.03E-06	2.03E-05	9.73E-06	4.23E-06	2.03E-06	2.03E-05	9.73E-06					
51	1.00E-04	6.70E-05	4.70E-05	3.73E-05	2.05E-05	1.04E-05	1.83E-05	8.73E-06	3.73E-06	1.83E-06	1.83E-05	8.73E-06	3.73E-06	1.83E-06	1.83E-05	8.73E-06	3.73E-06	1.83E-06	1.83E-05	8.73E-06	3.73E-06	1.83E-06	1.83E-05	8.73E-06					
52	8.90E-05	6.00E-05	4.00E-05	3.23E-05	1.80E-05	9.40E-06	1.63E-05	8.3E-06	4.73E-06	2.63E-06	1.63E-06	1.63E-05	8.3E-06	4.73E-06	2.63E-06	1.63E-06	1.63E-05	8.3E-06	4.73E-06	2.63E-06	1.63E-06	1.63E-05	8.3E-06	4.73E-06					
53	7.80E-05	5.30E-05	3.30E-05	2.73E-05	1.55E-05	8.40E-06	1.43E-05	7.2E-06	4.23E-06	2.13E-06	1.43E-06	1.43E-05	7.2E-06	4.23E-06	2.13E-06	1.43E-06	1.43E-05	7.2E-06	4.23E-06	2.13E-06	1.43E-06	1.43E-05	7.2E-06	4.23E-06					
54	6.70E-05	4.60E-05	2.80E-05	2.23E-05	1.30E-05	7.30E-06	1.23E-05	6.3E-06	3.63E-06	1.83E-06	1.23E-06	1.23E-05	6.3E-06	3.63E-06	1.83E-06	1.23E-06	1.23E-05	6.3E-06	3.63E-06	1.83E-06	1.23E-06	1.23E-05	6.3E-06	3.63E-06					
55	5.60E-05	3.90E-05	2.30E-05	1.83E-05	1.05E-05	6.40E-06	1.03E-05	5.2E-06	3.03E-06	1.53E-06	1.03E-06	1.03E-05	5.2E-06	3.03E-06	1.53E-06	1.03E-06	1.03E-05	5.2E-06	3.03E-06	1.53E-06	1.03E-06	1.03E-05	5.2E-06	3.03E-06					
56	4.50E-05	3.20E-05	1.90E-05	1.53E-05	8.50E-06	5.30E-06	8.40E-06	4.3E-06	2.43E-06	1.13E-06	8.40E-06	4.3E-06	2.43E-06	1.13E-06	8.40E-06	4.3E-06	2.43E-06	1.13E-06	8.40E-06	4.3E-06	2.43E-06	1.13E-06	8.40E-06	4.3E-06					
57	3.40E-05	2.50E-05	1.40E-05	1.13E-05	6.40E-06	3.90E-06	6.40E-06	3.3E-06	1.6																				

TABLE IV. Collision Strengths R for Excitation from the Ground Level to the Given Upper Levels as a Function of Z and Scattered Electron Energy in Units of E_{off} Rydbergs, 121.6 eV

K1													K2												
Z	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73							
37	3.26E-04	4.14E-04	5.84E-04	8.82E-04	1.23E-03	1.78E-03	9.24E-04	7.59E-04	5.60E-04	3.80E-04	2.64E-04	2.28E-04	9.24E-04	7.59E-04	5.60E-04	3.80E-04	2.64E-04	2.28E-04							
38	3.17E-04	4.02E-04	5.75E-04	8.73E-04	1.21E-03	1.75E-03	9.15E-04	7.50E-04	5.51E-04	3.71E-04	2.55E-04	2.23E-04	9.15E-04	7.50E-04	5.51E-04	3.71E-04	2.55E-04	2.23E-04							
39	3.08E-04	3.91E-04	5.62E-04	8.64E-04	1.19E-03	1.72E-03	9.06E-04	7.41E-04	5.42E-04	3.62E-04	2.46E-04	2.20E-04	9.06E-04	7.41E-04	5.42E-04	3.62E-04	2.46E-04	2.20E-04							
40	3.00E-04	3.81E-04	5.53E-04	8.51E-04	1.24E-03	1.73E-03	8.97E-04	7.32E-04	5.33E-04	3.53E-04	2.37E-04	2.18E-04	8.97E-04	7.32E-04	5.33E-04	3.53E-04	2.37E-04	2.18E-04							
41	2.97E-04	3.71E-04	5.34E-04	8.40E-04	1.21E-03	1.78E-03	8.93E-04	7.15E-04	5.20E-04	3.49E-04	2.34E-04	2.14E-04	8.93E-04	7.15E-04	5.20E-04	3.49E-04	2.34E-04	2.14E-04							
42	2.84E-04	3.62E-04	5.11E-04	8.11E-04	1.18E-03	1.74E-03	8.83E-04	7.06E-04	5.11E-04	3.40E-04	2.25E-04	2.05E-04	8.83E-04	7.06E-04	5.11E-04	3.40E-04	2.25E-04	2.05E-04							
43	2.79E-04	3.58E-04	5.05E-04	8.03E-04	1.15E-03	1.70E-03	8.78E-04	6.92E-04	5.02E-04	3.31E-04	2.16E-04	1.96E-04	8.78E-04	6.92E-04	5.02E-04	3.31E-04	2.16E-04	1.96E-04							
44	2.73E-04	3.47E-04	4.99E-04	7.97E-04	1.12E-03	1.66E-03	8.70E-04	6.83E-04	4.93E-04	3.22E-04	2.07E-04	1.87E-04	8.70E-04	6.83E-04	4.93E-04	3.22E-04	2.07E-04	1.87E-04							
45	2.68E-04	3.41E-04	4.90E-04	7.92E-04	1.10E-03	1.63E-03	8.65E-04	6.78E-04	4.88E-04	3.17E-04	2.02E-04	1.82E-04	8.65E-04	6.78E-04	4.88E-04	3.17E-04	2.02E-04	1.82E-04							
46	2.63E-04	3.34E-04	4.81E-04	7.87E-04	1.08E-03	1.60E-03	8.60E-04	6.73E-04	4.83E-04	3.12E-04	2.00E-04	1.79E-04	8.60E-04	6.73E-04	4.83E-04	3.12E-04	2.00E-04	1.79E-04							
47	2.59E-04	3.29E-04	4.74E-04	7.84E-04	1.04E-03	1.57E-03	8.55E-04	6.68E-04	4.78E-04	3.07E-04	1.95E-04	1.74E-04	8.55E-04	6.68E-04	4.78E-04	3.07E-04	1.95E-04	1.74E-04							
48	2.55E-04	3.24E-04	4.68E-04	7.80E-04	1.03E-03	1.54E-03	8.50E-04	6.63E-04	4.73E-04	3.02E-04	1.90E-04	1.69E-04	8.50E-04	6.63E-04	4.73E-04	3.02E-04	1.90E-04	1.69E-04							
49	2.52E-04	3.19E-04	4.63E-04	7.76E-04	1.01E-03	1.51E-03	8.45E-04	6.58E-04	4.68E-04	2.97E-04	1.85E-04	1.64E-04	8.45E-04	6.58E-04	4.68E-04	2.97E-04	1.85E-04	1.64E-04							
70	2.44E-04	3.12E-04	4.58E-04	7.70E-04	1.00E-03	1.48E-03	8.37E-04	6.53E-04	4.63E-04	2.92E-04	1.80E-04	1.59E-04	8.37E-04	6.53E-04	4.63E-04	2.92E-04	1.80E-04	1.59E-04							
71	2.44E-04	3.09E-04	4.54E-04	7.64E-04	9.89E-04	1.44E-03	8.32E-04	6.48E-04	4.58E-04	2.87E-04	1.75E-04	1.54E-04	8.32E-04	6.48E-04	4.58E-04	2.87E-04	1.75E-04	1.54E-04							
72	2.42E-04	3.04E-04	4.49E-04	7.58E-04	9.78E-04	1.43E-03	8.27E-04	6.43E-04	4.53E-04	2.82E-04	1.70E-04	1.53E-04	8.27E-04	6.43E-04	4.53E-04	2.82E-04	1.70E-04	1.53E-04							
73	2.40E-04	3.04E-04	4.44E-04	7.52E-04	9.67E-04	1.42E-03	8.22E-04	6.38E-04	4.48E-04	2.77E-04	1.65E-04	1.52E-04	8.22E-04	6.38E-04	4.48E-04	2.77E-04	1.65E-04	1.52E-04							
74	2.38E-04	3.02E-04	4.39E-04	7.46E-04	9.56E-04	1.41E-03	8.17E-04	6.33E-04	4.43E-04	2.72E-04	1.60E-04	1.51E-04	8.17E-04	6.33E-04	4.43E-04	2.72E-04	1.60E-04	1.51E-04							
75	2.36E-04	3.01E-04	4.34E-04	7.40E-04	9.45E-04	1.40E-03	8.12E-04	6.28E-04	4.38E-04	2.67E-04	1.55E-04	1.50E-04	8.12E-04	6.28E-04	4.38E-04	2.67E-04	1.55E-04	1.50E-04							
76	2.34E-04	3.00E-04	4.29E-04	7.34E-04	9.34E-04	1.39E-03	8.07E-04	6.23E-04	4.33E-04	2.62E-04	1.50E-04	1.49E-04	8.07E-04	6.23E-04	4.33E-04	2.62E-04	1.50E-04	1.49E-04							
77	2.32E-04	2.99E-04	4.24E-04	7.28E-04	9.23E-04	1.38E-03	8.02E-04	6.18E-04	4.28E-04	2.57E-04	1.45E-04	1.48E-04	8.02E-04	6.18E-04	4.28E-04	2.57E-04	1.45E-04	1.48E-04							
78	2.30E-04	2.98E-04	4.19E-04	7.22E-04	9.12E-04	1.37E-03	7.97E-04	6.13E-04	4.23E-04	2.52E-04	1.40E-04	1.47E-04	7.97E-04	6.13E-04	4.23E-04	2.52E-04	1.40E-04	1.47E-04							
79	2.28E-04	2.97E-04	4.14E-04	7.16E-04	9.01E-04	1.36E-03	7.92E-04	6.08E-04	4.18E-04	2.47E-04	1.35E-04	1.46E-04	7.92E-04	6.08E-04	4.18E-04	2.47E-04	1.35E-04	1.46E-04							
80	2.26E-04	2.96E-04	4.09E-04	7.10E-04	8.90E-04	1.35E-03	7.87E-04	6.03E-04	4.13E-04	2.42E-04	1.30E-04	1.45E-04	7.87E-04	6.03E-04	4.13E-04	2.42E-04	1.30E-04	1.45E-04							
81	2.24E-04	2.95E-04	4.04E-04	7.04E-04	8.79E-04	1.34E-03	7.82E-04	5.98E-04	4.08E-04	2.37E-04	1.25E-04	1.44E-04	7.82E-04	5.98E-04	4.08E-04	2.37E-04	1.25E-04	1.44E-04							
82	2.22E-04	2.94E-04	3.99E-04	6.98E-04	8.68E-04	1.33E-03	7.77E-04	5.93E-04	4.03E-04	2.32E-04	1.20E-04	1.43E-04	7.77E-04	5.93E-04	4.03E-04	2.32E-04	1.20E-04	1.43E-04							
83	2.20E-04	2.93E-04	3.94E-04	6.92E-04	8.57E-04	1.32E-03	7.72E-04	5.88E-04	3.98E-04	2.27E-04	1.15E-04	1.42E-04	7.72E-04	5.88E-04	3.98E-04	2.27E-04	1.15E-04	1.42E-04							
84	2.18E-04	2.92E-04	3.89E-04	6.86E-04	8.46E-04	1.31E-03	7.67E-04	5.83E-04	3.93E-04	2.22E-04	1.10E-04	1.41E-04	7.67E-04	5.83E-04	3.93E-04	2.22E-04	1.10E-04	1.41E-04							
85	2.16E-04	2.91E-04	3.84E-04	6.80E-04	8.35E-04	1.30E-03	7.62E-04	5.78E-04	3.88E-04	2.17E-04	1.05E-04	1.40E-04	7.62E-04	5.78E-04	3.88E-04	2.17E-04	1.05E-04	1.40E-04							
86	2.14E-04	2.90E-04	3.79E-04	6.74E-04	8.24E-04	1.29E-03	7.57E-04	5.73E-04	3.83E-04	2.12E-04	1.00E-04	1.39E-04	7.57E-04	5.73E-04	3.83E-04	2.12E-04	1.00E-04	1.39E-04							
87	2.12E-04	2.89E-04	3.74E-04	6.68E-04	8.13E-04	1.28E-03	7.52E-04	5.68E-04	3.78E-04	2.07E-04	9.5E-05	1.38E-04	7.52E-04	5.68E-04	3.78E-04	2.07E-04	9.5E-05	1.38E-04							
88	2.10E-04	2.88E-04	3.69E-04	6.62E-04	8.02E-04	1.27E-03	7.47E-04	5.63E-04	3.73E-04	2.02E-04	9.0E-05	1.37E-04	7.47E-04	5.63E-04	3.73E-04	2.02E-04	9.0E-05	1.37E-04							
89	2.08E-04	2.87E-04	3.64E-04	6.56E-04	7.91E-04	1.26E-03	7.42E-04	5.58E-04	3.68E-04	1.97E-04	8.5E-05	1.36E-04	7.42E-04	5.58E-04	3.68E-04	1.97E-04	8.5E-05	1.36E-04							
90	2.06E-04	2.86E-04	3.59E-04	6.50E-04	7.80E-04	1.25E-03	7.37E-04	5.53E-04	3.63E-04	1.92E-04	8.0E-05	1.35E-04	7.37E-04	5.53E-04	3.63E-04	1.92E-04	8.0E-05	1.35E-04							
91	2.04E-04	2.85E-04	3.54E-04	6.44E-04	7.69E-04	1.24E-03	7.32E-04	5.48E-04	3.58E-04	1.87E-04	7.5E-05	1.34E-04	7.32E-04	5.48E-04	3.58E-04	1.87E-04	7.5E-05	1.34E-04							
92	2.02E-04	2.84E-04	3.49E-04	6.38E-04	7.58E-04	1.23E-03	7.27E-04	5.43E-04	3.53E-04	1.82E-04	7.0E-05	1.33E-04	7.27E-04	5.43E-04	3.53E-04	1.82E-04	7.0E-05	1.33E-04							
K3																									
Z	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73							
22	9.44E-02	7.74E-02	3.84E-02	3.88E-02	2.54E-02	1.78E-02	1.67E-02	1.80E-02	2.24E-02	2.82E-02	3.72E-02	4.82E-02	1.67E-02	1.80E-02	2.24E-02	2.82E-02	3.72E-02	4.82E-02							
23	8.48E-02	7.15E-02	3.58E-02	3.52E-02	2.35E-02	1.68E-02	1.61E-02	2.07E-02	2.47E-02	3.13E-02	4.11E-02	5.34E-02	1.61E-02	2.07E-02	2.47E-02	3.13E-02	4.11E-02	5.34E-02							
24	7.82E-02	6.41E-02	3.28E-02	3.22E-02	2.18E-02	1.66E-02	1.54E-02	2.24E-02	2.71E-02	3.44E-02	4.51E-02	5.72E-02	1.54E-02	2.24E-02	2.71E-02	3.44E-02	4.51E-02	5.72E-02							
25	7.08E-02	5.72E-02	3.04E-02	2.98E-02	2.04E-02	1.64E-02	1.42E-02	2.35E-02	2.83E-02	3.58E-02	4.65E-02	5.86E-02	1.42E-02	2.35E-02	2.83E-02	3.58E-02	4.65E-02	5.86E-02							
26	6.43E-02	5.11E-02	2.78E-02	2.72E-02	1.87E-02	1.62E-02	1.29E-02	2.46E-02	3.17E-02	4.03E-02	5.27E-02	6.48E-02	1.29E-02	2.46E-02	3.17E-02	4.03E-02	5.27E-02	6.48E-02							
27	5.84E-02	4.64E-02	2.60E-02	2.54E-02	1.73E-02	1.47E-02	1.12E-02	2.55E-02	3.27E-02	4.13E-02	5.37E-02	6.58E-02	1.12E-02	2.55E-02	3.27E-02	4.13E-02	5.37E-02	6.58E-02							
28	5.33E-02	4.22E-02	2.39E-02	2.32E-02	1.59E-02	1.34E-02	1.04E-02	2.62E-02	3.33E-02	4.19E-02	5.43E-02	6.64E-02	1.04E-02	2.62E-02	3.33E-02	4.19E-02	5.43E-02	6.64E-02							
29	4.89E-02	3.84E-02	2.20E-02	2.13E-02	1.44E-02	1.23E-02	9.40E-03	2.69E-02	3.39E-02	4.25E-02	5.49E-02	6.70E-02	9.40E-03	2.69E-02	3.39E-02	4.25E-02	5.49E-02	6.70E-02							
30	4.50E-02	3.50E-02	2.04E-02	1.97E-02	1.34E-02	1.14E-02	8.70E-03	2.76E-02	3.46E-02	4.32E-02	5.56E-02	6.77E-02	8.70E-03	2.76E-02	3.46E-02	4.32E-02	5.56E-02	6.77E-02							
31	4.13E-02	3.20E-02	1.93E-02	1.86E-02	1.24E-02	1.0																			

TABLE IV. Collision Strengths S for Ionization from the Ground Level to the Given Upper Levels as a Function of L and Scattered Electron Energy in Units of $2\epsilon_{eff}^2$ Hydrogen, 27.21eV

	K β										F α									
	E*=0.008	E*=0.04	E*=0.10	E*=0.21	E*=0.41	E*=0.75	E*=0.008	E*=0.04	E*=0.10	E*=0.21	E*=0.41	E*=0.75	E*=0.008	E*=0.04	E*=0.10	E*=0.21	E*=0.41	E*=0.75		
22	1.24E-01	1.45E-01	1.77E-01	2.24E-01	3.11E-01	4.07E-01	1.27E-02	1.14E-02	1.04E-02	1.03E-02	1.13E-02	1.47E-02	1.14E-02	1.07E-02	1.03E-02	1.03E-02	1.13E-02	1.47E-02		
23	1.13E-01	1.33E-01	1.64E-01	2.12E-01	2.93E-01	3.70E-01	1.14E-02	1.07E-02	1.03E-02	1.03E-02	1.13E-02	1.47E-02	1.14E-02	1.07E-02	1.03E-02	1.03E-02	1.13E-02	1.47E-02		
24	1.03E-01	1.23E-01	1.50E-01	1.94E-01	2.72E-01	3.53E-01	1.08E-02	1.03E-02	1.01E-02	1.01E-02	1.10E-02	1.39E-02	1.08E-02	1.03E-02	1.01E-02	1.01E-02	1.10E-02	1.39E-02		
25	9.40E-02	1.11E-01	1.34E-01	1.74E-01	2.51E-01	3.28E-01	1.01E-02	9.70E-03	9.40E-03	9.40E-03	1.01E-02	1.30E-02	1.01E-02	9.70E-03	9.40E-03	9.40E-03	1.01E-02	1.30E-02		
26	8.74E-02	1.01E-01	1.24E-01	1.59E-01	2.30E-01	3.03E-01	9.49E-03	9.02E-03	8.74E-03	8.74E-03	9.49E-03	1.23E-02	9.49E-03	9.02E-03	8.74E-03	8.74E-03	9.49E-03	1.23E-02		
27	7.73E-02	9.13E-02	1.12E-01	1.44E-01	1.90E-01	2.44E-01	8.27E-03	7.88E-03	7.62E-03	7.62E-03	8.27E-03	1.10E-02	8.27E-03	7.88E-03	7.62E-03	7.62E-03	8.27E-03	1.10E-02		
28	7.22E-02	8.29E-02	1.01E-01	1.30E-01	1.71E-01	2.22E-01	7.92E-03	7.49E-03	7.22E-03	7.22E-03	7.92E-03	1.05E-02	7.92E-03	7.49E-03	7.22E-03	7.22E-03	7.92E-03	1.05E-02		
29	6.54E-02	7.31E-02	9.17E-02	1.18E-01	1.51E-01	2.00E-01	6.81E-03	6.42E-03	6.15E-03	6.15E-03	6.81E-03	9.40E-03	6.81E-03	6.42E-03	6.15E-03	6.15E-03	6.81E-03	9.40E-03		
30	5.94E-02	6.81E-02	8.50E-02	1.04E-01	1.34E-01	1.80E-01	6.34E-03	5.94E-03	5.67E-03	5.67E-03	6.34E-03	8.80E-03	6.34E-03	5.94E-03	5.67E-03	5.67E-03	6.34E-03	8.80E-03		
31	5.39E-02	6.17E-02	7.81E-02	9.42E-02	1.24E-01	1.63E-01	5.89E-03	5.49E-03	5.22E-03	5.22E-03	5.89E-03	8.25E-03	5.89E-03	5.49E-03	5.22E-03	5.22E-03	5.89E-03	8.25E-03		
32	4.90E-02	5.62E-02	7.18E-02	8.79E-02	1.14E-01	1.47E-01	5.44E-03	5.04E-03	4.77E-03	4.77E-03	5.44E-03	7.70E-03	5.44E-03	5.04E-03	4.77E-03	4.77E-03	5.44E-03	7.70E-03		
33	4.44E-02	5.10E-02	6.59E-02	8.19E-02	1.03E-01	1.33E-01	5.00E-03	4.60E-03	4.33E-03	4.33E-03	5.00E-03	7.25E-03	5.00E-03	4.60E-03	4.33E-03	4.33E-03	5.00E-03	7.25E-03		
34	4.07E-02	4.64E-02	6.03E-02	7.57E-02	9.20E-02	1.21E-01	4.74E-03	4.34E-03	4.07E-03	4.07E-03	4.74E-03	6.80E-03	4.74E-03	4.34E-03	4.07E-03	4.07E-03	4.74E-03	6.80E-03		
35	3.72E-02	4.24E-02	5.54E-02	6.94E-02	8.54E-02	1.11E-01	4.42E-03	4.02E-03	3.75E-03	3.75E-03	4.42E-03	6.35E-03	4.42E-03	4.02E-03	3.75E-03	3.75E-03	4.42E-03	6.35E-03		
36	3.41E-02	3.88E-02	5.08E-02	6.38E-02	7.88E-02	1.02E-01	4.10E-03	3.70E-03	3.43E-03	3.43E-03	4.10E-03	5.90E-03	4.10E-03	3.70E-03	3.43E-03	3.43E-03	4.10E-03	5.90E-03		
37	3.13E-02	3.57E-02	4.71E-02	5.94E-02	7.34E-02	9.24E-02	3.82E-03	3.42E-03	3.15E-03	3.15E-03	3.82E-03	5.45E-03	3.82E-03	3.42E-03	3.15E-03	3.15E-03	3.82E-03	5.45E-03		
38	2.89E-02	3.28E-02	4.37E-02	5.54E-02	6.84E-02	8.34E-02	3.54E-03	3.14E-03	2.87E-03	2.87E-03	3.54E-03	5.00E-03	3.54E-03	3.14E-03	2.87E-03	2.87E-03	3.54E-03	5.00E-03		
39	2.64E-02	3.03E-02	4.04E-02	5.14E-02	6.34E-02	7.44E-02	3.26E-03	2.86E-03	2.59E-03	2.59E-03	3.26E-03	4.55E-03	3.26E-03	2.86E-03	2.59E-03	2.59E-03	3.26E-03	4.55E-03		
40	2.44E-02	2.80E-02	3.74E-02	4.79E-02	5.89E-02	6.94E-02	3.00E-03	2.60E-03	2.33E-03	2.33E-03	3.00E-03	4.10E-03	3.00E-03	2.60E-03	2.33E-03	2.33E-03	3.00E-03	4.10E-03		
41	2.29E-02	2.62E-02	3.49E-02	4.49E-02	5.59E-02	6.69E-02	2.78E-03	2.38E-03	2.11E-03	2.11E-03	2.78E-03	3.75E-03	2.78E-03	2.38E-03	2.11E-03	2.11E-03	2.78E-03	3.75E-03		
42	2.13E-02	2.42E-02	3.24E-02	4.19E-02	5.24E-02	6.24E-02	2.56E-03	2.16E-03	1.89E-03	1.89E-03	2.56E-03	3.40E-03	2.56E-03	2.16E-03	1.89E-03	1.89E-03	2.56E-03	3.40E-03		
43	1.98E-02	2.23E-02	2.92E-02	3.84E-02	4.84E-02	5.84E-02	2.34E-03	1.94E-03	1.67E-03	1.67E-03	2.34E-03	3.15E-03	2.34E-03	1.94E-03	1.67E-03	1.67E-03	2.34E-03	3.15E-03		
44	1.83E-02	2.10E-02	2.73E-02	3.61E-02	4.61E-02	5.61E-02	2.12E-03	1.72E-03	1.45E-03	1.45E-03	2.12E-03	2.90E-03	2.12E-03	1.72E-03	1.45E-03	1.45E-03	2.12E-03	2.90E-03		
45	1.74E-02	1.97E-02	2.57E-02	3.41E-02	4.41E-02	5.41E-02	1.90E-03	1.50E-03	1.23E-03	1.23E-03	1.90E-03	2.65E-03	1.90E-03	1.50E-03	1.23E-03	1.23E-03	1.90E-03	2.65E-03		
46	1.63E-02	1.89E-02	2.42E-02	3.24E-02	4.24E-02	5.24E-02	1.68E-03	1.28E-03	1.01E-03	1.01E-03	1.68E-03	2.40E-03	1.68E-03	1.28E-03	1.01E-03	1.01E-03	1.68E-03	2.40E-03		
47	1.53E-02	1.74E-02	2.29E-02	3.09E-02	4.09E-02	5.09E-02	1.46E-03	1.06E-03	8.30E-04	8.30E-04	1.46E-03	2.15E-03	1.46E-03	1.06E-03	8.30E-04	8.30E-04	1.46E-03	2.15E-03		
48	1.44E-02	1.63E-02	2.14E-02	2.94E-02	3.94E-02	4.94E-02	1.24E-03	8.40E-04	6.04E-04	6.04E-04	1.24E-03	1.90E-03	1.24E-03	8.40E-04	6.04E-04	6.04E-04	1.24E-03	1.90E-03		
49	1.34E-02	1.54E-02	2.05E-02	2.85E-02	3.85E-02	4.85E-02	1.02E-03	6.20E-04	3.84E-04	3.84E-04	1.02E-03	1.65E-03	1.02E-03	6.20E-04	3.84E-04	3.84E-04	1.02E-03	1.65E-03		
50	1.24E-02	1.44E-02	1.95E-02	2.75E-02	3.75E-02	4.75E-02	8.00E-04	4.00E-04	1.64E-04	1.64E-04	8.00E-04	1.40E-03	8.00E-04	4.00E-04	1.64E-04	1.64E-04	8.00E-04	1.40E-03		
51	1.21E-02	1.39E-02	1.92E-02	2.70E-02	3.70E-02	4.70E-02	7.40E-04	3.70E-04	1.50E-04	1.50E-04	7.40E-04	1.30E-03	7.40E-04	3.70E-04	1.50E-04	1.50E-04	7.40E-04	1.30E-03		
52	1.15E-02	1.30E-02	1.83E-02	2.60E-02	3.60E-02	4.60E-02	6.80E-04	3.40E-04	1.40E-04	1.40E-04	6.80E-04	1.20E-03	6.80E-04	3.40E-04	1.40E-04	1.40E-04	6.80E-04	1.20E-03		
53	1.09E-02	1.24E-02	1.77E-02	2.53E-02	3.53E-02	4.53E-02	6.20E-04	3.10E-04	1.30E-04	1.30E-04	6.20E-04	1.10E-03	6.20E-04	3.10E-04	1.30E-04	1.30E-04	6.20E-04	1.10E-03		
54	9.85E-03	1.12E-02	1.64E-02	2.39E-02	3.39E-02	4.39E-02	5.65E-04	2.82E-04	1.20E-04	1.20E-04	5.65E-04	1.00E-03	5.65E-04	2.82E-04	1.20E-04	1.20E-04	5.65E-04	1.00E-03		
55	9.37E-03	1.04E-02	1.56E-02	2.30E-02	3.30E-02	4.30E-02	5.05E-04	2.52E-04	1.10E-04	1.10E-04	5.05E-04	9.00E-04	5.05E-04	2.52E-04	1.10E-04	1.10E-04	5.05E-04	9.00E-04		
56	8.94E-03	1.01E-02	1.52E-02	2.25E-02	3.25E-02	4.25E-02	4.60E-04	2.37E-04	1.05E-04	1.05E-04	4.60E-04	8.40E-04	4.60E-04	2.37E-04	1.05E-04	1.05E-04	4.60E-04	8.40E-04		
57	8.53E-03	9.64E-03	1.48E-02	2.20E-02	3.20E-02	4.20E-02	4.15E-04	2.22E-04	1.00E-04	1.00E-04	4.15E-04	7.90E-04	4.15E-04	2.22E-04	1.00E-04	1.00E-04	4.15E-04	7.90E-04		
58	8.14E-03	9.23E-03	1.44E-02	2.15E-02	3.15E-02	4.15E-02	3.70E-04	2.07E-04	9.50E-05	9.50E-05	3.70E-04	7.40E-04	3.70E-04	2.07E-04	9.50E-05	9.50E-05	3.70E-04	7.40E-04		
59	7.79E-03	8.88E-03	1.40E-02	2.10E-02	3.10E-02	4.10E-02	3.25E-04	1.92E-04	9.00E-05	9.00E-05	3.25E-04	6.90E-04	3.25E-04	1.92E-04	9.00E-05	9.00E-05	3.25E-04	6.90E-04		
60	7.44E-03	8.53E-03	1.36E-02	2.05E-02	3.05E-02	4.05E-02	2.80E-04	1.77E-04	8.50E-05	8.50E-05	2.80E-04	6.40E-04	2.80E-04	1.77E-04	8.50E-05	8.50E-05	2.80E-04	6.40E-04		
61	7.14E-03	8.23E-03	1.32E-02	2.00E-02	3.00E-02	4.00E-02	2.35E-04	1.62E-04	8.00E-05	8.00E-05	2.35E-04	6.00E-04	2.35E-04	1.62E-04	8.00E-05	8.00E-05	2.35E-04	6.00E-04		
62	6.84E-03	7.93E-03	1.28E-02	1.95E-02	2.95E-02	3.95E-02	1.90E-04	1.57E-04	7.50E-05	7.50E-05	1.90E-04	5.50E-04	1.90E-04	1.57E-04	7.50E-05	7.50E-05	1.90E-04	5.50E-04		
63	6.54E-03	7.63E-03	1.24E-02	1.90E-02	2.90E-02	3.90E-02	1.45E-04	1.52E-04	7.00E-05	7.00E-05	1.45E-04	5.00E-04	1.45E-04	1.52E-04	7.00E-05	7.00E-05	1.45E-04	5.00E-04		
64	6.24E-03	7.33E-03	1.20E-02	1.85E-02	2.85E-02	3.85E-02	1.00E-04	1.49E-04	6.50E-05	6.50E-05	1.00E-04	4.50E-04	1.00E-04	1.49E-04	6.50E-05	6.50E-05	1.00E-04	4.50E-04		
65	5.94E-03	7.03E-03	1.16E-02	1.80E-02	2.80E-02	3.80E-02	8.50E-05	1.40E-04	6.00E-05	6.00E-05	8.50E-05	4.00E-04	8.50E-05	1.40E-04	6.00E-05	6.00E-05	8.50E-05	4.00E-04		
66	5.64E-03	6.73E-03	1.12E-02	1.75E-02	2.75E-02	3.75E-02	8.00E-05	1.35E-04	5.50E-05	5.50E-05	8.00E-05	3.50E-04	8.00E-05	1.35E-04	5.50E-05	5.50E-05	8.00E-05	3.50E-04		
67	5.34E-03	6.43E-03	1.08E-02	1.70E-02	2.70E-02	3.70E-02	7.50E-05	1.30E-04	5.00E-05	5.00E-05	7.50E-05	3.00E-04	7.50E-05	1.30E-04	5.00E-05	5.00E-05	7.50E-05	3.00E-04		
68	5.04E-03	6.13E-03	1.04E-02	1.65E-02	2.65E-02	3.65E-02	7.00E-05	1.25E-04	4.50E-05	4.50E-05	7.00E-05	2.50E-04</								

TABLE IV. Collision Strengths σ for Excitation from the Ground Level to the Given Upper Levels as a Function of Z and Scattered Electron Energy in Units of Z^2 Rydbergs, $22(3/2)$

	N7						N8					
Z	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75
57	5.39E-04	7.14E-04	1.01E-03	1.32E-03	2.37E-03	3.32E-03	3.64E-03	4.44E-03	6.23E-03	1.19E-04	1.77E-04	2.62E-04
58	5.32E-04	6.82E-04	9.43E-04	1.44E-03	2.37E-03	3.28E-03	3.49E-03	4.23E-03	6.01E-03	1.13E-04	1.74E-04	2.59E-04
59	5.08E-04	6.50E-04	9.11E-04	1.40E-03	2.37E-03	3.25E-03	3.33E-03	4.07E-03	5.78E-03	1.12E-04	1.67E-04	2.48E-04
60	4.84E-04	6.25E-04	8.86E-04	1.35E-03	2.37E-03	3.22E-03	3.28E-03	3.91E-03	5.60E-03	1.10E-04	1.64E-04	2.45E-04
61	4.62E-04	6.01E-04	8.62E-04	1.32E-03	2.37E-03	3.19E-03	3.23E-03	3.75E-03	5.45E-03	1.08E-04	1.62E-04	2.42E-04
62	4.40E-04	5.78E-04	8.39E-04	1.29E-03	2.37E-03	3.16E-03	3.18E-03	3.62E-03	5.32E-03	1.06E-04	1.60E-04	2.39E-04
63	4.19E-04	5.56E-04	8.16E-04	1.26E-03	2.37E-03	3.13E-03	3.15E-03	3.49E-03	5.20E-03	1.04E-04	1.58E-04	2.36E-04
64	3.98E-04	5.34E-04	7.94E-04	1.23E-03	2.37E-03	3.10E-03	3.09E-03	3.23E-03	4.96E-03	1.02E-04	1.56E-04	2.33E-04
65	3.78E-04	5.12E-04	7.72E-04	1.20E-03	2.37E-03	3.07E-03	3.06E-03	3.10E-03	4.84E-03	9.80E-05	1.52E-04	2.27E-04
66	3.58E-04	4.90E-04	7.50E-04	1.17E-03	2.37E-03	3.04E-03	3.03E-03	2.97E-03	4.72E-03	9.60E-05	1.50E-04	2.24E-04
67	3.38E-04	4.68E-04	7.28E-04	1.14E-03	2.37E-03	3.01E-03	3.00E-03	2.84E-03	4.60E-03	9.40E-05	1.48E-04	2.21E-04
68	3.18E-04	4.46E-04	7.06E-04	1.11E-03	2.37E-03	2.98E-03	2.99E-03	2.71E-03	4.48E-03	9.20E-05	1.46E-04	2.18E-04
69	2.98E-04	4.24E-04	6.84E-04	1.08E-03	2.37E-03	2.95E-03	2.96E-03	2.49E-03	4.36E-03	9.00E-05	1.44E-04	2.15E-04
70	2.78E-04	4.02E-04	6.62E-04	1.05E-03	2.37E-03	2.92E-03	2.93E-03	2.27E-03	4.24E-03	8.80E-05	1.42E-04	2.12E-04
71	2.58E-04	3.80E-04	6.40E-04	1.02E-03	2.37E-03	2.89E-03	2.90E-03	2.05E-03	4.12E-03	8.60E-05	1.40E-04	2.09E-04
72	2.38E-04	3.58E-04	6.18E-04	1.00E-03	2.37E-03	2.86E-03	2.87E-03	1.83E-03	4.00E-03	8.40E-05	1.38E-04	2.06E-04
73	2.18E-04	3.36E-04	5.96E-04	9.77E-04	2.37E-03	2.83E-03	2.84E-03	1.61E-03	3.88E-03	8.20E-05	1.36E-04	2.03E-04
74	1.98E-04	3.14E-04	5.74E-04	9.55E-04	2.37E-03	2.80E-03	2.81E-03	1.39E-03	3.76E-03	8.00E-05	1.34E-04	2.00E-04
75	1.78E-04	2.92E-04	5.52E-04	9.33E-04	2.37E-03	2.77E-03	2.78E-03	1.17E-03	3.64E-03	7.80E-05	1.32E-04	1.97E-04
76	1.58E-04	2.70E-04	5.30E-04	9.11E-04	2.37E-03	2.74E-03	2.75E-03	9.50E-04	3.52E-03	7.60E-05	1.30E-04	1.94E-04
77	1.38E-04	2.48E-04	5.08E-04	8.89E-04	2.37E-03	2.71E-03	2.72E-03	7.29E-04	3.40E-03	7.40E-05	1.28E-04	1.91E-04
78	1.18E-04	2.26E-04	4.86E-04	8.67E-04	2.37E-03	2.68E-03	2.69E-03	5.08E-04	3.28E-03	7.20E-05	1.26E-04	1.88E-04
79	1.00E-04	2.04E-04	4.64E-04	8.45E-04	2.37E-03	2.65E-03	2.66E-03	2.87E-04	3.16E-03	7.00E-05	1.24E-04	1.85E-04
80	8.20E-05	1.82E-04	4.42E-04	8.23E-04	2.37E-03	2.62E-03	2.63E-03	6.66E-05	3.04E-03	6.80E-05	1.22E-04	1.82E-04
81	6.40E-05	1.60E-04	4.20E-04	8.01E-04	2.37E-03	2.59E-03	2.60E-03	4.45E-05	2.92E-03	6.60E-05	1.20E-04	1.79E-04
82	4.60E-05	1.38E-04	3.98E-04	7.79E-04	2.37E-03	2.56E-03	2.57E-03	2.24E-05	2.80E-03	6.40E-05	1.18E-04	1.76E-04
83	2.80E-05	1.16E-04	3.76E-04	7.57E-04	2.37E-03	2.53E-03	2.54E-03	1.02E-05	2.68E-03	6.20E-05	1.16E-04	1.73E-04
84	1.00E-05	9.40E-05	3.54E-04	7.35E-04	2.37E-03	2.50E-03	2.51E-03	4.00E-06	2.56E-03	6.00E-05	1.14E-04	1.70E-04
85	2.20E-06	7.20E-05	3.32E-04	7.13E-04	2.37E-03	2.47E-03	2.48E-03	1.78E-06	2.44E-03	5.80E-05	1.12E-04	1.67E-04
86	4.40E-07	5.00E-05	3.10E-04	6.91E-04	2.37E-03	2.44E-03	2.45E-03	3.56E-07	2.32E-03	5.60E-05	1.10E-04	1.64E-04
87	8.80E-08	2.60E-05	2.88E-04	6.69E-04	2.37E-03	2.41E-03	2.42E-03	7.12E-08	2.20E-03	5.40E-05	1.08E-04	1.61E-04
88	1.76E-08	1.40E-05	2.66E-04	6.47E-04	2.37E-03	2.38E-03	2.39E-03	1.42E-08	2.08E-03	5.20E-05	1.06E-04	1.58E-04
89	3.52E-09	7.00E-06	2.44E-04	6.25E-04	2.37E-03	2.35E-03	2.36E-03	2.84E-09	1.96E-03	5.00E-05	1.04E-04	1.55E-04
90	7.04E-10	3.50E-06	2.22E-04	6.03E-04	2.37E-03	2.32E-03	2.33E-03	5.68E-10	1.84E-03	4.80E-05	1.02E-04	1.52E-04
91	1.41E-10	1.75E-06	2.00E-04	5.81E-04	2.37E-03	2.29E-03	2.30E-03	1.14E-10	1.72E-03	4.60E-05	1.00E-04	1.49E-04
92	2.82E-11	8.75E-07	1.78E-04	5.59E-04	2.37E-03	2.26E-03	2.27E-03	2.22E-11	1.60E-03	4.40E-05	9.80E-05	1.46E-04

	N9					N10						
Z	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75
22	4.14E-04	4.28E-04	4.84E-04	6.21E-04	8.74E-04	1.24E-03	2.91E-03	2.42E-03	1.64E-03	1.27E-03	8.97E-04	7.55E-04
23	3.82E-04	3.95E-04	4.44E-04	5.72E-04	8.04E-04	1.14E-03	2.42E-03	2.19E-03	1.49E-03	1.15E-03	8.09E-04	6.84E-04
24	3.51E-04	3.62E-04	4.10E-04	5.34E-04	7.38E-04	1.04E-03	2.34E-03	2.07E-03	1.40E-03	1.03E-03	7.39E-04	6.17E-04
25	3.22E-04	3.33E-04	3.77E-04	4.92E-04	6.78E-04	9.37E-04	2.14E-03	1.78E-03	1.34E-03	9.21E-04	6.34E-04	5.34E-04
26	2.94E-04	3.05E-04	3.48E-04	4.63E-04	6.45E-04	8.34E-04	2.04E-03	1.67E-03	1.22E-03	8.14E-04	5.89E-04	4.93E-04
27	2.72E-04	2.87E-04	3.24E-04	4.35E-04	6.15E-04	7.44E-04	1.77E-03	1.47E-03	1.08E-03	7.38E-04	5.26E-04	4.39E-04
28	2.59E-04	2.69E-04	3.05E-04	4.06E-04	5.87E-04	6.73E-04	1.62E-03	1.34E-03	1.00E-03	6.87E-04	4.72E-04	3.86E-04
29	2.43E-04	2.54E-04	2.89E-04	3.71E-04	5.53E-04	6.19E-04	1.48E-03	1.22E-03	9.13E-04	6.20E-04	4.21E-04	3.41E-04
30	2.21E-04	2.42E-04	2.78E-04	3.59E-04	5.24E-04	5.72E-04	1.34E-03	1.12E-03	8.32E-04	5.62E-04	3.74E-04	2.97E-04
31	2.22E-04	2.33E-04	2.72E-04	3.54E-04	5.01E-04	5.08E-04	1.29E-03	1.02E-03	7.65E-04	5.04E-04	3.21E-04	2.54E-04
32	2.20E-04	2.32E-04	2.70E-04	3.51E-04	4.78E-04	4.71E-04	1.23E-03	9.64E-04	7.37E-04	4.84E-04	2.91E-04	2.14E-04
33	2.27E-04	2.47E-04	2.94E-04	3.90E-04	5.84E-04	7.82E-04	1.04E-03	8.64E-04	6.31E-04	4.06E-04	2.50E-04	1.74E-04
34	2.49E-04	2.72E-04	3.28E-04	4.49E-04	6.49E-04	9.23E-04	9.42E-04	7.93E-04	5.45E-04	3.35E-04	2.02E-04	1.24E-04
35	3.42E-04	3.74E-04	4.24E-04	5.47E-04	7.49E-04	1.04E-03	2.73E-04	2.49E-04	1.80E-04	4.24E-04	3.19E-04	7.42E-04
36	3.68E-04	4.13E-04	4.64E-04	5.87E-04	7.88E-04	1.09E-03	7.40E-04	6.69E-04	1.10E-03	1.48E-03	2.03E-03	2.75E-03
37	3.68E-04	4.13E-04	4.64E-04	5.87E-04	7.88E-04	1.09E-03	4.92E-04	4.37E-04	3.08E-04	9.98E-04	1.17E-02	1.15E-02
38	7.50E-04	8.10E-04	8.79E-04	2.78E-04	1.62E-04	1.04E-04	7.34E-04	6.54E-04	1.01E-02	1.27E-02	2.32E-02	2.04E-02
39	7.01E-04	7.49E-04	8.07E-04	2.52E-04	1.42E-04	8.69E-05	7.27E-04	6.24E-04	9.88E-04	1.24E-02	1.97E-02	1.62E-02
40	6.57E-04	6.93E-04	7.50E-04	2.31E-04	1.24E-04	7.14E-05	7.00E-04	5.73E-04	8.49E-04	1.19E-02	1.82E-02	1.52E-02
41	6.17E-04	6.49E-04	6.93E-04	2.12E-04	1.12E-04	6.59E-05	6.70E-04	5.29E-04	8.07E-04	1.12E-02	1.65E-02	1.38E-02
42	5.81E-04	6.09E-04	6.53E-04	1.92E-04	1.01E-04	6.00E-05	6.42E-04	4.94E-04	7.48E-04	1.04E-02	1.51E-02	1.24E-02
43	5.48E-04	5.74E-04	6.18E-04	1.73E-04	9.49E-05	5.53E-05	6.08E-04	4.65E-04	7.04E-04	9.60E-04	1.27E-02	1.11E-02
44	5.18E-04	5.43E-04	5.87E-04	1.54E-04	8.89E-05	5.03E-05	5.82E-04	4.40E-04	6.54E-04	8.80E-04	1.17E-02	1.01E-02
45	4.91E-04	5.16E-04	5.60E-04	1.35E-04	8.29E-05	4.52E-05	5.62E-04	4.17E-04	6.20E-04	8.40E-04	1.11E-02	9.42E-04
46	4.64E-04	4.89E-04	5.33E-04	1.16E-04	7.69E-05	4.02E-05	5.40E-04	3.90E-04	5.87E-04	8.00E-04	1.05E-02	8.85E-04
47	4.44E-04	4.69E-04	5.13E-04	1.07E-04	7.07E-05	3.52E-05	5.18E-04	3.63E-04	5.57E-04	7.60E-04	1.00E-02	8.35E-04
48	4.24E-04	4.49E-04	4.93E-04	9.80E-05	6.45E-05	3.03E-05	4.96E-04	3.36E-04	5.35E-04	7.20E-04	9.50E-04	7.87E-04
49	4.04E-04	4.29E-04	4.73E-04	8.89E-05	5.83E-05	2.53E-05	4.74E-04	3.09E-04	5.13E-04	6.80E-04	9.00E-04	7.37E-04
50	3.84E-04	4.09E-04	4.53E-04	7.98E-05	5.21E-05	2.03E-05	4.52E-04	2.82E-04	4.91E-04	6.40E-04	8.50E-04	6.97E-04
51	3.73E-04	3.98E-04	4.42E-04	7.07E-05	4.59E-05	1.53E-05	4.31E-04	2.55E-04	4.70E-04	5.90E-04	8.00E-04	6.46E-04
52	3.59E-04	3.84E-04	4.28E-04	6.16E-05	3.97E-05	1.03E-05	4.10E-04	2.28E-04	4.49E-04	5.10E-04	7.50E-04	6.05E-04
53	3.45E-04	3.70E-04	4.14E-04	5.25E-05	3.35E-05	5.31E-06	3.89E-04	2.01E-04	4.28E-04	4.50E-04	6.70E-04	5.64E-04
54	3.31E-04	3.56E-04	4.00E-04	4.34E-05	2.73E-05	3.81E-06	3.68E-04	1.74E-04	4.07E-04	3.60E-04	6.00E-04	5.03E-04
55	3.18E-04	3.43E-04	3.87E-04	3.43E-05	2.11E-05	3.23E-06	3.46E-04	1.47E-04	3.76E-04	3.20E-04	5.30E-04	4.47E-04
56	3.04E-04	3.29E-04	3.73E-04	2.52E-05	1.49E-05	2.65E-06	3.24E-04	1.16E-04	3.54E-04	2.50E-04	4.60E-04	3.87E-04
57	2.91E-04	3.16E-04	3.60E-04	1.63E-05	8.70E-06	2.07E-06	3.02E-04	8.50E-05	3.32E-04	1.60E-04	4.00E-04	3.37E-04
58	2.78E-04	3.03E-04	3.47E-04	7.00E-06	4.50E-06	1.49E-06	2.80E-04	6.30E-05	3.10E-04	9.00E-05	3.60E-04	2.97E-04
59	2.65E-04	2.90E-04	3.34E-04	2.10E-06	2.30E-06	9.10E-07	2.58E-04	4.10E-05	2.88E-04	2.70E-05	3.20E-04	2.47E-04
60	2.52E-04	2.77E-04	3.21E-04	5.00E-07	5.00E-07	4.10E-07	2.36E-04	2.60E-05	2.66E-04	6.00E-06	2.90E-04	2.17E-04
61	2.40E-04	2.64E-04	3.08E-04	1.00E-07	1.00E-07	6.10E-08	2.14E-04	1.40E-05	2.44E-04	1.00E-06	2.60E-04	1.87E-04
62	2.28E-04	2.52E-04	2.96E-04	2.00E-08	2.00E-08	1.21E-08	1.92E-04	2.80E-06	2.22E-04	2.00E-07	2.40E-04	1.65E-04
63	2.16E-04	2.40E-04	2.84E-04	4.00E-09	4.00E-09	2.41E-09	1.70E-04	5.60E-07	2.00E-04	4.00E-08	2.20E-04	1.43E-04
64	2.04E-04	2.28E-04	2.72E-04	8.00E-10	8.00E-10	4.81E-10	1.48E-04	1.10E-07	1.78E-04	8.00E-09	2.00E-04	1.21E-04
65	1.92E-04	2.16E-04	2.60E-04	1.60E-10	1.60E-10	9.61E-11	1.26E-04	2.20E-08	1.56E-04	1.60E-09	1.80E-04	1.09E-04
66	1.80E-04	2.04E-04	2.48E-04	3.20E-11	3.20E-11	1.92E-11	1.04E-04	4.40E-09	1.34E-04	3.20E-10	1.60E-04	9.70E-05
67	1.68E-04	1.92E-04	2.36E-04	6.40E-12	6.40E-12	3.84E-12	8.20E-05	8.80E-10	1.12E-04	6.40E-11	1.40E-04	7.80E-05
68	1.56E-04	1.80E-04	2.24E-04	1.28E-12	1.28E-12	7.68E-13	6.00E-05	1.76E-09	9.60E-05	1.28E-11	1.20E-04	6.00E-05
69	1.44E-04	1.68E-04	2.12E-04	2.56E-13	2.56E-13	1.53E-13	4.80E-05	3.52E-10	7.20E-05	2.56E-12	1.00E-04	4.80E-05
70	1.32E-04	1.56E-04	1.96E-04	5.12E-14	5.12E-14	3.06E-14	3.60E-05	7.04E-11	5.60E-05	5.12E-13	8.00E-05	3.60E-05
71	1.20E-04	1.44E-04	1.84E-04	1.02E-14	1.02E-14	1.54E-14	2.40E-05	1.40E-11	4.00E-05	1.02E-14	6.00E-05	2.40E-05
72	1.08E-04	1.32E-04	1.72E-04	2.04E-15	2.04E-15	3.08E-15	1.20E-05	2.80E-12	3.20E-05	2.04E-15	4.00E-05	1.20E-05
73	9.6E-05	1.20E-04	1.60E-04	4.08E-16	4.08E-16	6.16E-16	6.00E-06	5.60E-13	2.40E-05	4.08E-16	3.00E-05	6.00E-06
74	8.4E-05	1.08E-04	1.48E-04	8.16E-17	8.16E-17	1.23E-16	4.80E-06	1.12E-13	1.60E-05	8.16E-17	2.00E-05	4.80E-06
75	7.2E-05	9.6E-05	1.36E-04	1.63E-17	1.63E-17	2.46E-17	3.60E-06	2.24E-14	8.00E-06	1.63E-17	1.00E-05	3.60E-06
76	6.0E-05	8.4E-05	1.24E-04	3.26E-18	3.26E-18	4.91E-18	2.40E-06	4.48E-15	4.00E-06	3.26E-18	6.00E-06	2.40E-06
77	4.8E-05	7.2E-05	1.12E-04	6.52E-19	6.52E-19	9.82E-19	1.20E-06	8.96E-16	8.00E-07	6.52E-19	4.00E-06	1.20E-06
78	3.6E-05	6.0E-05	1.00E-04	1.30E-19	1.30E-19	1.96E-19	6.00E-07	1.79E-16	1.60E-07	1.30E-19	2.00E-06	6.00E-07
79	2.4E-05	4.8E-05	8.8E-05	2.60E-20	2.60E-20	3.92E-20	4.00E-07	3.58E-17	3.20E-08	2.60E-20	1.00E-06	4.00E-07
80	1.2E-05	2.4E-05	4.4E-05	5.20E-21	5.20E-21	7.84E-21	2.00E-07	7.16E-18	1.60E-08	5.20E-21	5.00E-07	2.00E-07
81	8.0E-06	1.6E-05	2.9E-05	1.04E-21	1.04E-21	1.56E-21	1.00E-07	4.58E-19	8.00E-09	1.04E-21	2.50E-07	1.00E-07
82	6.4E-06	1.28E-05	2.32E-05	8.32E-22	8.32E-22	1.25E-22	6.00E-08	3.65E-20	6.40E-09	8.32E-22	2.00E-07	6.00E-08
83	5.2E-06	1.04E-05	1.92E-05	6.66E-23	6.66E-23	1.00E-23	4.00E-08	2.92E-21	5.20E-09	6.66E-23	1.60E-07	4.00E-08
84	4.0E-06	8.0E-06	1.44E-05	5.33E-24	5.33E-24	8.00E-24	2.00E-08	2.33E-22	4.00E-09	5.33E-24	1.30E-07	2.00E-08
85	3.2E-06	6.4E-06	1.12E-05	4.26E-25	4.26E-25	6.40E-25	1.00E-08	1.86E-23	3.20E-09	4.26E-25	1.00E-07	1.00E-08
86	2.4E-06	4.8E-06	8.4E-06	3.41E-26	3.41E-26	5.12E-26	5.00E-09	1.49E-24	2.40E-09	3.41E-26	8.00E-08	5.00E-09
87	1.6E-06	3.2E-06	5.6E-06	2.73E-27	2.73E-27	4.09E-27	2.50E-09	1.19E-25	1.60E-09	2.73E-27	6.00E-08	2.50E-09
88	1.2E-06	2.4E-06	4.2E-06	2.18E-28	2.18E-28	3.27E-28	1.20E-09	9.54E-27	1.20E-09	2.18E-28	4.00E-08	1.20E-09
89	8.0E-07	1.6E-06	2.8E-06	1.75E-29	1.75E-29	2.61E-29	6.00E-10	7.63E-28	8.00E-10	1.75E-29	3.00E-08	6.00E-10
90	6.4E-07	1.28E-06	2.24E-06	1.40E-30	1.40E-30	2.09E-30	3.00E-10	6.10E-29	6.40E-10	1.40E-30	2.00E-08	3.00E-10
91	5.2E-07	1.04E-06	1.84E-06	1.12E-31	1.12E-31	1.67E-31	1.50E-10	4.88E-30	5.20E-10	1.12E-31	1.60E-08	1.50E-10
92	4.0E-07	8.0E-07	1.44E-06	9.00E-32	9.00E-32	1.34E-32	7.50E-11	3.90E-31	4.00E-11	9.00E-32	1.30E-08	7.50E-11

TABLE IV. Collision Strengths C for Excitation from the Ground Level to the Given Upper Levels as a Function of Z and Scattered Electron Energy in Units of Z^2 Rydberg, 22-53.

Z	K11						K12					
	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.73
22	1.43E-02	1.43E-02	1.98E-02	2.52E-02	3.29E-02	4.23E-02	2.49E-02	2.63E-02	3.14E-02	4.44E-02	5.92E-02	7.51E-02
23	1.42E-02	1.42E-02	1.94E-02	2.50E-02	3.24E-02	4.18E-02	2.48E-02	2.62E-02	3.13E-02	4.43E-02	5.91E-02	7.50E-02
24	1.40E-02	1.40E-02	1.93E-02	2.45E-02	3.19E-02	4.14E-02	1.87E-02	2.14E-02	2.62E-02	3.34E-02	4.34E-02	5.40E-02
25	1.37E-02	1.34E-02	1.88E-02	2.39E-02	3.14E-02	3.94E-02	1.64E-02	1.90E-02	2.30E-02	2.92E-02	3.80E-02	4.87E-02
26	1.33E-02	1.31E-02	1.82E-02	2.31E-02	3.09E-02	3.82E-02	1.47E-02	1.68E-02	2.03E-02	2.57E-02	3.33E-02	4.27E-02
27	1.28E-02	1.24E-02	1.74E-02	2.22E-02	2.87E-02	3.64E-02	1.31E-02	1.47E-02	1.80E-02	2.27E-02	2.94E-02	3.74E-02
28	1.22E-02	1.19E-02	1.65E-02	2.12E-02	2.74E-02	3.40E-02	1.17E-02	1.32E-02	1.60E-02	2.02E-02	2.60E-02	3.33E-02
29	1.18E-02	1.14E-02	1.61E-02	2.03E-02	2.61E-02	3.23E-02	1.03E-02	1.17E-02	1.43E-02	1.83E-02	2.32E-02	2.94E-02
30	1.13E-02	1.08E-02	1.54E-02	1.94E-02	2.49E-02	3.17E-02	9.31E-03	1.09E-02	1.29E-02	1.62E-02	2.09E-02	2.64E-02
31	1.08E-02	1.02E-02	1.47E-02	1.84E-02	2.34E-02	3.00E-02	8.63E-03	9.79E-03	1.17E-02	1.44E-02	1.88E-02	2.39E-02
32	1.03E-02	1.14E-02	1.40E-02	1.73E-02	2.21E-02	2.85E-02	7.84E-03	8.87E-03	1.04E-02	1.30E-02	1.70E-02	2.17E-02
33	9.78E-03	1.11E-02	1.33E-02	1.64E-02	2.10E-02	2.70E-02	7.19E-03	8.11E-03	9.47E-03	1.21E-02	1.59E-02	1.97E-02
34	9.27E-03	1.04E-02	1.24E-02	1.57E-02	2.01E-02	2.54E-02	6.49E-03	7.42E-03	8.84E-03	1.10E-02	1.42E-02	1.80E-02
35	8.74E-03	9.89E-03	1.18E-02	1.47E-02	1.88E-02	2.38E-02	6.08E-03	6.84E-03	8.14E-03	1.03E-02	1.30E-02	1.64E-02
36	7.90E-03	8.87E-03	1.04E-02	1.31E-02	1.64E-02	2.10E-02	5.62E-03	6.32E-03	7.31E-03	9.34E-03	1.20E-02	1.52E-02
37	7.23E-03	7.98E-03	9.13E-03	1.12E-02	1.40E-02	1.77E-02	5.21E-03	5.83E-03	6.73E-03	8.64E-03	1.11E-02	1.41E-02
38	6.47E-03	7.08E-03	7.98E-03	9.62E-03	1.17E-02	1.48E-02	4.84E-03	5.44E-03	6.43E-03	8.02E-03	1.02E-02	1.29E-02
39	5.72E-03	6.19E-03	6.94E-03	8.44E-03	1.04E-02	1.29E-02	4.49E-03	5.04E-03	6.03E-03	7.47E-03	9.24E-03	1.15E-02
40	4.97E-03	5.30E-03	5.94E-03	7.34E-03	9.17E-03	1.11E-02	4.14E-03	4.64E-03	5.63E-03	6.97E-03	8.74E-03	1.08E-02
41	4.21E-03	4.43E-03	4.94E-03	6.14E-03	7.84E-03	9.94E-03	3.79E-03	4.23E-03	5.24E-03	6.31E-03	7.81E-03	9.64E-03
42	3.46E-03	3.68E-03	4.08E-03	5.08E-03	6.57E-03	8.29E-03	3.43E-03	3.87E-03	4.84E-03	5.91E-03	7.31E-03	8.91E-03
43	2.71E-03	2.93E-03	3.23E-03	3.93E-03	5.02E-03	6.24E-03	3.08E-03	3.52E-03	4.49E-03	5.56E-03	6.96E-03	8.56E-03
44	1.96E-03	2.18E-03	2.48E-03	2.93E-03	3.73E-03	4.54E-03	2.73E-03	3.17E-03	4.14E-03	5.21E-03	6.61E-03	8.21E-03
45	1.21E-03	1.43E-03	1.64E-03	1.94E-03	2.44E-03	2.94E-03	2.38E-03	2.82E-03	3.79E-03	4.86E-03	6.26E-03	7.86E-03
46	8.15E-03	8.67E-03	7.43E-03	7.77E-03	9.14E-03	1.18E-02	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
47	8.15E-03	7.43E-03	7.24E-03	7.43E-03	8.80E-03	1.13E-02	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
48	7.74E-03	7.27E-03	6.71E-03	7.14E-03	8.50E-03	1.11E-02	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
49	7.37E-03	6.73E-03	6.43E-03	6.84E-03	8.19E-03	1.08E-02	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
50	6.93E-03	6.23E-03	6.04E-03	6.45E-03	7.80E-03	1.05E-02	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
51	6.47E-03	5.73E-03	5.54E-03	5.95E-03	7.30E-03	1.02E-02	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
52	6.00E-03	5.26E-03	5.07E-03	5.48E-03	6.80E-03	9.94E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
53	5.53E-03	4.79E-03	4.60E-03	5.01E-03	6.30E-03	9.66E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
54	5.06E-03	4.32E-03	4.13E-03	4.54E-03	5.80E-03	9.38E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
55	4.59E-03	3.85E-03	3.66E-03	4.07E-03	5.30E-03	9.10E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
56	4.12E-03	3.38E-03	3.19E-03	3.60E-03	4.80E-03	8.82E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
57	3.65E-03	2.91E-03	2.72E-03	3.13E-03	4.30E-03	8.54E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
58	3.18E-03	2.44E-03	2.25E-03	2.66E-03	3.80E-03	8.26E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
59	2.71E-03	2.14E-03	1.95E-03	2.36E-03	3.30E-03	7.98E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
60	2.24E-03	1.67E-03	1.48E-03	1.89E-03	2.80E-03	7.70E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
61	1.77E-03	1.20E-03	1.01E-03	1.42E-03	2.30E-03	7.42E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
62	1.30E-03	8.33E-04	7.14E-04	9.55E-04	1.80E-03	7.14E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
63	8.33E-04	5.66E-04	4.47E-04	6.88E-04	1.30E-03	6.86E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
64	4.14E-03	3.89E-03	3.71E-03	3.89E-03	4.74E-03	6.58E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
65	4.01E-03	3.77E-03	3.59E-03	3.74E-03	4.54E-03	6.30E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
66	3.88E-03	3.54E-03	3.36E-03	3.51E-03	4.34E-03	6.02E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
67	3.75E-03	3.41E-03	3.23E-03	3.38E-03	4.14E-03	5.74E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
68	3.62E-03	3.28E-03	3.10E-03	3.25E-03	3.94E-03	5.46E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
69	3.49E-03	3.15E-03	2.97E-03	3.12E-03	3.74E-03	5.18E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
70	3.36E-03	3.02E-03	2.84E-03	2.99E-03	3.54E-03	4.90E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
71	3.23E-03	2.89E-03	2.71E-03	2.86E-03	3.34E-03	4.62E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
72	3.10E-03	2.76E-03	2.58E-03	2.73E-03	3.14E-03	4.34E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
73	2.97E-03	2.63E-03	2.45E-03	2.60E-03	2.94E-03	4.06E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
74	2.84E-03	2.50E-03	2.32E-03	2.47E-03	2.74E-03	3.78E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
75	2.71E-03	2.37E-03	2.19E-03	2.34E-03	2.54E-03	3.50E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
76	2.58E-03	2.24E-03	2.06E-03	2.21E-03	2.34E-03	3.22E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
77	2.45E-03	2.11E-03	1.93E-03	2.08E-03	2.14E-03	2.94E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
78	2.32E-03	1.98E-03	1.80E-03	1.95E-03	1.94E-03	2.66E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
79	2.19E-03	1.85E-03	1.67E-03	1.82E-03	1.72E-03	2.38E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
80	2.06E-03	1.72E-03	1.54E-03	1.69E-03	1.52E-03	2.10E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
81	1.93E-03	1.59E-03	1.41E-03	1.56E-03	1.32E-03	1.82E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
82	1.80E-03	1.46E-03	1.28E-03	1.43E-03	1.12E-03	1.54E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
83	1.67E-03	1.33E-03	1.15E-03	1.30E-03	1.00E-03	1.26E-03	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
84	1.54E-03	1.20E-03	1.02E-03	1.17E-03	8.80E-04	9.94E-04	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
85	1.41E-03	1.07E-03	8.90E-04	1.04E-03	8.00E-04	7.26E-04	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
86	1.28E-03	9.40E-04	7.63E-04	9.14E-04	7.26E-04	5.58E-04	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
87	1.15E-03	8.07E-04	6.30E-04	7.81E-04	6.26E-04	3.90E-04	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
88	1.02E-03	6.74E-04	5.07E-04	6.58E-04	5.04E-04	2.22E-04	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
89	8.90E-04	5.41E-04	3.74E-04	5.25E-04	3.82E-04	5.4E-05	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
90	7.57E-04	4.08E-04	2.41E-04	3.92E-04	2.60E-04	1.82E-05	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
91	6.24E-04	2.85E-04	1.18E-04	3.23E-04	1.29E-04	1.64E-06	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03
92	4.91E-04	1.52E-04	4.9E-05	2.14E-04	5.9E-05	1.46E-07	2.02E-03	2.34E-03	2.87E-03	3.40E-03	4.24E-03	5.08E-03

K13						K14					
$\epsilon^*0.008$	$\epsilon^*0.04$	$\epsilon^*0.10$	$\epsilon^*0.21$	$\epsilon^*0.41$	$\epsilon^*0.75$	$\epsilon^*0.008$	$\epsilon^*0.04$	$\epsilon^*0.10$	$\epsilon^*0.21$	$\epsilon^*0.41$	$\epsilon^*0.75$
57	1.39E-04	1.34E-04	1.91E-04	2.34E-04	3.61E-04	3.09E-04	1.37E-04	1.94E-04	2.71E-04	4.01E-04	6.08E-04
58	1.33E-04	1.52E-04	1.82E-04	2.48E-04	3.51E-04	4.94E-04	1.50E-04	1.87E-04	2.58E-04	3.83E-04	5.53E-04
59	1.51E-04	1.47E-04	1.80E-04	2.41E-04	3.40E-04	4.80E-04	1.43E-04	1.78E-04	2.44E-04	3.52E-04	5.18E-04
60	1.37E-04	1.43E-04	1.78E-04	2.35E-04	3.32E-04	4.72E-04	1.42E-04	1.82E-04	2.52E-04	3.74E-04	5.40E-04
61	1.54E-04	1.49E-04	1.70E-04	2.27E-04	3.20E-04	4.52E-04	1.50E-04	1.87E-04	2.54E-04	3.73E-04	5.40E-04
62	1.20E-04	1.23E-04	1.63E-04	2.20E-04	3.11E-04	4.39E-04	1.24E-04	1.27E-04	1.74E-04	2.38E-04	3.45E-04
63	1.17E-04	1.51E-04	1.60E-04	2.12E-04	3.02E-04	4.27E-04	1.18E-04	1.48E-04	2.04E-04	2.93E-04	4.32E-04
64	1.14E-04	1.27E-04	1.53E-04	2.07E-04	2.73E-04	4.14E-04	1.13E-04	1.41E-04	1.94E-04	2.80E-04	4.12E-04
65	1.10E-04	1.24E-04	1.51E-04	2.01E-04	2.62E-04	4.02E-04	1.07E-04	1.24E-04	1.82E-04	2.73E-04	4.02E-04
66	1.07E-04	1.20E-04	1.47E-04	1.92E-04	2.54E-04	3.91E-04	1.02E-04	1.18E-04	1.74E-04	2.64E-04	3.91E-04
67	1.04E-04	1.17E-04	1.42E-04	1.90E-04	2.48E-04	3.80E-04	1.07E-04	1.22E-04	1.68E-04	2.52E-04	3.77E-04
68	1.02E-04	1.14E-04	1.38E-04	1.84E-04	2.41E-04	3.70E-04	9.28E-05	1.14E-04	1.60E-04	2.40E-04	3.70E-04
69	8.97E-05	1.11E-04	1.34E-04	1.79E-04	2.32E-04	3.59E-04	8.83E-05	1.03E-04	1.32E-04	2.29E-04	3.52E-04
70	9.43E-05	1.08E-04	1.31E-04	1.74E-04	2.44E-04	3.49E-04	8.40E-05	1.03E-04	1.42E-04	2.18E-04	3.38E-04
71	9.38E-05	1.09E-04	1.27E-04	1.69E-04	2.38E-04	3.40E-04	8.00E-05	9.99E-05	1.30E-04	2.08E-04	3.22E-04
72	9.13E-05	1.02E-04	1.24E-04	1.64E-04	2.32E-04	3.30E-04	7.61E-05	9.50E-05	1.28E-04	1.99E-04	3.08E-04
73	8.89E-05	9.92E-05	1.20E-04	1.59E-04	2.28E-04	3.21E-04	7.22E-05	9.02E-05	1.25E-04	1.89E-04	2.94E-04
74	8.64E-05	9.64E-05	1.17E-04	1.53E-04	2.19E-04	3.12E-04	6.87E-05	8.58E-05	1.19E-04	1.80E-04	2.81E-04
75	8.44E-05	9.40E-05	1.14E-04	1.51E-04	2.13E-04	3.04E-04	6.53E-05	8.12E-05	1.12E-04	1.71E-04	2.68E-04
76	8.22E-05	9.19E-05	1.10E-04	1.48E-04	2.07E-04	2.95E-04	6.20E-05	7.74E-05	1.09E-04	1.63E-04	2.55E-04
77	8.01E-05	8.91E-05	1.07E-04	1.45E-04	2.01E-04	2.87E-04	5.87E-05	7.32E-05	1.02E-04	1.59E-04	2.42E-04
78	7.81E-05	8.67E-05	1.04E-04	1.38E-04	1.93E-04	2.79E-04	5.55E-05	6.97E-05	9.69E-05	1.48E-04	2.28E-04
79	7.61E-05	8.43E-05	1.02E-04	1.34E-04	1.90E-04	2.71E-04	5.20E-05	6.61E-05	9.19E-05	1.40E-04	2.15E-04
80	7.42E-05	8.22E-05	9.97E-05	1.30E-04	1.84E-04	2.64E-04	4.92E-05	6.24E-05	8.71E-05	1.32E-04	2.03E-04
81	7.24E-05	8.01E-05	9.69E-05	1.27E-04	1.79E-04	2.57E-04	4.74E-05	5.99E-05	8.44E-05	1.24E-04	1.91E-04
82	7.07E-05	7.80E-05	9.40E-05	1.24E-04	1.74E-04	2.50E-04	4.56E-05	5.72E-05	8.16E-05	1.16E-04	1.78E-04
83	6.89E-05	7.59E-05	9.08E-05	1.19E-04	1.67E-04	2.42E-04	4.37E-05	5.51E-05	7.90E-05	1.08E-04	1.65E-04
84	6.70E-05	7.39E-05	8.82E-05	1.14E-04	1.64E-04	2.34E-04	4.04E-05	5.02E-05	7.40E-05	1.01E-04	1.72E-04
85	6.54E-05	7.19E-05	8.57E-05	1.12E-04	1.59E-04	2.26E-04	3.82E-05	4.74E-05	6.41E-05	1.02E-04	1.64E-04
86	6.37E-05	7.00E-05	8.32E-05	1.09E-04	1.54E-04	2.19E-04	3.61E-05	4.46E-05	6.24E-05	1.03E-04	1.64E-04
87	6.21E-05	6.81E-05	8.04E-05	1.04E-04	1.48E-04	2.12E-04	3.41E-05	4.18E-05	5.97E-05	1.04E-04	1.62E-04
88	6.05E-05	6.62E-05	7.85E-05	1.03E-04	1.43E-04	2.04E-04	3.22E-05	3.98E-05	5.73E-05	6.61E-05	1.29E-04
89	5.89E-05	6.43E-05	7.61E-05	9.94E-05	1.40E-04	2.02E-04	3.04E-05	3.73E-05	5.23E-05	6.13E-05	1.23E-04
90	5.73E-05	6.25E-05	7.38E-05	9.61E-05	1.34E-04	1.94E-04	2.87E-05	3.52E-05	4.92E-05	5.64E-05	1.19E-04
91	5.57E-05	6.06E-05	7.14E-05	9.29E-05	1.21E-04	1.90E-04	2.71E-05	3.32E-05	4.62E-05	5.21E-05	1.18E-04
92	5.41E-05	5.88E-05	6.91E-05	8.97E-05	1.24E-04	1.82E-04	2.54E-05	3.12E-05	4.32E-05	4.79E-05	1.11E-04

L1

	$\epsilon^*0.008$	$\epsilon^*0.04$	$\epsilon^*0.10$	$\epsilon^*0.21$	$\epsilon^*0.41$	$\epsilon^*0.75$
22	2.44E-03	2.27E-03	1.74E-03	1.19E-03	6.43E-04	3.18E-04
23	2.33E-03	2.00E-03	1.56E-03	1.04E-03	5.80E-04	2.77E-04
24	2.07E-03	1.79E-03	1.34E-03	9.74E-04	5.11E-04	2.44E-04
25	1.84E-03	1.60E-03	1.24E-03	8.24E-04	4.54E-04	2.18E-04
26	1.67E-03	1.44E-03	1.07E-03	7.30E-04	3.92E-04	1.92E-04
27	1.51E-03	1.30E-03	1.01E-03	6.47E-04	3.43E-04	1.73E-04
28	1.38E-03	1.19E-03	9.13E-04	6.03E-04	3.00E-04	1.54E-04
29	1.26E-03	1.08E-03	8.36E-04	5.51E-04	2.60E-04	1.41E-04
30	1.14E-03	9.93E-04	7.64E-04	5.04E-04	2.23E-04	1.29E-04
31	1.07E-03	9.17E-04	7.00E-04	4.58E-04	1.92E-04	1.18E-04
32	9.99E-04	8.48E-04	6.41E-04	4.27E-04	1.70E-04	1.08E-04
33	9.18E-04	7.87E-04	6.02E-04	3.94E-04	1.53E-04	9.93E-05
34	8.54E-04	7.32E-04	5.61E-04	3.64E-04	1.37E-04	9.20E-05
35	7.98E-04	6.83E-04	5.23E-04	3.41E-04	1.23E-04	8.54E-05
36	7.44E-04	6.35E-04	4.87E-04	3.18E-04	1.10E-04	7.94E-05
37	7.00E-04	5.90E-04	4.54E-04	2.97E-04	9.97E-05	7.41E-05
38	6.59E-04	5.43E-04	4.30E-04	2.79E-04	1.49E-04	6.92E-05
39	6.21E-04	5.11E-04	4.04E-04	2.62E-04	1.40E-04	6.50E-05
40	5.84E-04	5.01E-04	3.81E-04	2.47E-04	1.32E-04	6.11E-05
41	5.54E-04	4.73E-04	3.63E-04	2.32E-04	1.24E-04	5.74E-05
42	5.25E-04	4.48E-04	3.41E-04	2.20E-04	1.17E-04	5.42E-05
43	4.99E-04	4.24E-04	3.22E-04	2.08E-04	1.11E-04	5.14E-05
44	4.74E-04	4.04E-04	3.07E-04	1.96E-04	1.05E-04	4.87E-05
45	4.51E-04	3.84E-04	2.92E-04	1.85E-04	9.95E-05	4.62E-05
46	4.30E-04	3.67E-04	2.78E-04	1.76E-04	9.30E-05	4.39E-05
47	4.11E-04	3.50E-04	2.62E-04	1.70E-04	8.72E-05	4.18E-05
48	3.93E-04	3.34E-04	2.53E-04	1.62E-04	8.23E-05	3.98E-05
49	3.74E-04	3.20E-04	2.42E-04	1.54E-04	7.84E-05	3.80E-05
50	3.60E-04	3.07E-04	2.32E-04	1.49E-04	7.48E-05	3.63E-05
51	3.44E-04	2.94E-04	2.22E-04	1.43E-04	7.15E-05	3.48E-05
52	3.29E-04	2.82E-04	2.12E-04	1.37E-04	6.82E-05	3.32E-05
53	3.19E-04	2.72E-04	2.03E-04	1.31E-04	6.50E-05	3.16E-05
54	3.08E-04	2.61E-04	1.97E-04	1.24E-04	6.17E-05	3.07E-05
55	2.94E-04	2.52E-04	1.90E-04	1.22E-04	6.42E-05	2.93E-05
56	2.84E-04	2.43E-04	1.82E-04	1.17E-04	6.18E-05	2.84E-05
57	2.74E-04	2.34E-04	1.77E-04	1.12E-04	5.94E-05	2.74E-05
58	2.67E-04	2.24E-04	1.70E-04	1.04E-04	5.74E-05	2.64E-05
59	2.58E-04	2.19E-04	1.63E-04	1.02E-04	5.53E-05	2.53E-05
60	2.50E-04	2.13E-04	1.60E-04	1.02E-04	5.37E-05	2.44E-05
61	2.42E-04	2.06E-04	1.54E-04	9.84E-05	5.19E-05	2.38E-05
62	2.34E-04	1.99E-04	1.50E-04	9.53E-05	5.03E-05	2.31E-05
63	2.28E-04	1.92E-04	1.45E-04	9.24E-05	4.87E-05	2.23E-05
64	2.21E-04	1.87E-04	1.41E-04	8.98E-05	4.72E-05	2.17E-05
65	2.13E-04	1.82E-04	1.37E-04	8.73E-05	4.57E-05	2.10E-05
66	2.09E-04	1.78E-04	1.34E-04	8.48E-05	4.44E-05	2.04E-05
67	2.02E-04	1.72E-04	1.29E-04	8.24E-05	4.32E-05	1.98E-05
68	1.95E-04	1.67E-04	1.24E-04	8.00E-05	4.20E-05	1.92E-05
69	1.88E-04	1.62E-04	1.20E-04	7.72E-05	4.08E-05	1.86E-05
70	1.84E-04	1.58E-04	1.17E-04	7.47E-05	3.95E-05	1.79E-05
71	1.80E-04	1.54E-04	1.14E-04	7.23E-05	3.83E-05	1.73E-05
72	1.76E-04	1.50E-04	1.10E-04	7.00E-05	3.71E-05	1.67E-05
73	1.72E-04	1.46E-04	1.11E-04	6.78E-05	3.59E-05	1.61E-05
74	1.68E-04	1.43E-04	1.09E-04	6.57E-05	3.47E-05	1.55E-05
75	1.64E-04	1.40E-04	1.04E-04	6.77E-05	3.35E-05	1.49E-05
76	1.64E-04	1.37E-04	1.04E-04	6.43E-05	3.17E-05	1.38E-05
77	1.61E-04	1.34E-04	1.02E-04	6.49E-05	3.40E-05	1.33E-05
78	1.58E-04	1.32E-04	1.00E-04	6.28E-05	3.16E-05	1.24E-05
79	1.53E-04	1.21E-04	9.80E-05	6.22E-05	3.24E-05	1.48E-05
80	1.52E-04	1.28E-04	9.61E-05	6.11E-05	3.20E-05	1.43E-05
81	1.49E-04	1.24E-04	9.44E-05	6.00E-05	3.14E-05	1.42E-05
82	1.47E-04	1.24E-04	9.27E-05	5.89E-05	3.08E-05	1.40E-05
83	1.44E-04	1.22E-04	9.10E-05	5.78E-05	3.02E-05	1.37E-05
84	1.42E-04	1.20E-04	8.93E-05	5.67E-05	2.97E-05	1.34E-05
85	1.40E-04	1.18E-04	8.76E-05	5.56E-05	2.92E-05	1.32E-05
86	1.37E-04	1.14E-04	8.44E-05	5.50E-05	2.85E-05	1.30E-05
87	1.35E-04	1.14E-04	8.28E-05	5.42E-05	2.83E-05	1.28E-05
88	1.33E-04	1.12E-04	8.10E-05	5.35E-05	2.79E-05	1.26E-05
89	1.32E-04	1.11E-04	8.04E-05	5.24E-05	2.75E-05	1.24E-05
90	1.30E-04	1.09E-04	8.14E-05	5.18E-05	2.71E-05	1.22E-05
91	1.29E-04	1.08E-04	8.03E-05	5.10E-05	2.67E-05	1.21E-05
92	1.27E-04	1.04E-04	7.84E-05	5.00E-05	2.60E-05	1.18E-05

TABLE IV. Collision Strengths S_0 for Excitation from the Ground Level to the Given Upper Levels as a Function of Z and Scattered Electron Energy in Units of Z_{eff}^2 Rydberg, $Z_{eff} = 21.091$

	L3						L4					
	$Z=0.008$	$Z=0.04$	$Z=0.10$	$Z=0.21$	$Z=0.41$	$Z=0.75$	$Z=0.008$	$Z=0.04$	$Z=0.10$	$Z=0.21$	$Z=0.41$	$Z=0.75$
22	4.70E-03	3.48E-03	2.45E-03	1.52E-03	3.72E-04	2.14E-04	4.80E-03	3.77E-03	2.53E-03	1.28E-03	6.03E-04	2.30E-04
23	4.14E-03	3.22E-03	2.14E-03	1.19E-03	4.49E-04	2.84E-04	4.37E-03	3.44E-03	2.31E-03	1.24E-03	5.93E-04	2.12E-04
24	3.68E-03	2.84E-03	1.89E-03	1.01E-03	4.22E-04	2.60E-04	3.94E-03	3.11E-03	2.11E-03	1.14E-03	5.74E-04	1.94E-04
25	3.47E-03	2.73E-03	1.81E-03	9.75E-04	4.11E-04	2.51E-04	3.64E-03	2.86E-03	1.92E-03	1.04E-03	5.49E-04	1.81E-04
26	3.24E-03	2.58E-03	1.71E-03	9.26E-04	3.99E-04	2.39E-04	3.34E-03	2.64E-03	1.77E-03	9.75E-04	5.23E-04	1.68E-04
27	2.98E-03	2.40E-03	1.54E-03	7.23E-04	3.69E-04	2.11E-04	3.09E-03	2.42E-03	1.62E-03	8.99E-04	5.09E-04	1.53E-04
28	2.42E-03	1.89E-03	1.24E-03	6.34E-04	2.74E-04	1.01E-04	2.84E-03	2.23E-03	1.51E-03	8.21E-04	3.70E-04	1.44E-04
29	2.22E-03	1.74E-03	1.14E-03	6.00E-04	2.62E-04	9.20E-05	2.64E-03	2.08E-03	1.40E-03	7.70E-04	3.43E-04	1.34E-04
30	2.08E-03	1.61E-03	1.02E-03	5.54E-04	2.32E-04	8.48E-05	2.45E-03	1.95E-03	1.30E-03	7.15E-04	3.19E-04	1.23E-04
31	1.94E-03	1.49E-03	9.74E-04	5.12E-04	2.17E-04	7.91E-05	2.28E-03	1.79E-03	1.20E-03	6.42E-04	2.97E-04	1.14E-04
32	1.82E-03	1.40E-03	9.17E-04	4.83E-04	2.04E-04	7.44E-05	2.12E-03	1.67E-03	1.12E-03	6.20E-04	2.77E-04	1.07E-04
33	1.72E-03	1.32E-03	8.49E-04	4.60E-04	1.93E-04	7.14E-05	1.98E-03	1.58E-03	1.09E-03	6.07E-04	2.59E-04	1.02E-04
34	1.64E-03	1.27E-03	8.22E-04	4.42E-04	1.88E-04	6.94E-05	1.87E-03	1.49E-03	1.07E-03	5.91E-04	2.42E-04	9.94E-05
35	1.59E-03	1.23E-03	8.04E-04	4.26E-04	1.84E-04	6.77E-05	1.78E-03	1.44E-03	1.07E-03	5.76E-04	2.27E-04	9.45E-05
36	1.54E-03	1.20E-03	7.89E-04	4.10E-04	1.80E-04	6.62E-05	1.70E-03	1.39E-03	1.05E-03	5.62E-04	2.14E-04	9.02E-05
37	1.49E-03	1.18E-03	7.78E-04	4.00E-04	1.76E-04	6.44E-05	1.63E-03	1.35E-03	1.04E-03	5.47E-04	2.01E-04	8.72E-05
38	1.45E-03	1.17E-03	7.72E-04	4.00E-04	1.74E-04	6.37E-05	1.57E-03	1.32E-03	1.03E-03	5.34E-04	1.89E-04	8.42E-05
39	1.42E-03	1.16E-03	7.72E-04	4.01E-04	1.74E-04	6.32E-05	1.52E-03	1.30E-03	1.02E-03	5.23E-04	1.79E-04	8.24E-05
40	1.40E-03	1.15E-03	7.71E-04	4.02E-04	1.74E-04	6.27E-05	1.47E-03	1.28E-03	1.01E-03	5.14E-04	1.70E-04	8.06E-05
41	1.37E-03	1.13E-03	7.68E-04	4.03E-04	1.73E-04	6.22E-05	1.42E-03	1.26E-03	1.00E-03	5.06E-04	1.62E-04	7.88E-05
42	1.35E-03	1.12E-03	7.68E-04	4.03E-04	1.73E-04	6.17E-05	1.37E-03	1.24E-03	9.99E-04	4.98E-04	1.54E-04	7.70E-05
43	1.32E-03	1.12E-03	7.64E-04	4.19E-04	1.70E-04	6.12E-05	1.32E-03	1.22E-03	9.94E-04	4.90E-04	1.46E-04	7.52E-05
44	1.30E-03	1.11E-03	7.61E-04	4.23E-04	1.68E-04	6.07E-05	1.27E-03	1.20E-03	9.89E-04	4.82E-04	1.38E-04	7.34E-05
45	1.27E-03	1.08E-03	7.58E-04	4.26E-04	1.66E-04	6.02E-05	1.22E-03	1.18E-03	9.84E-04	4.74E-04	1.30E-04	7.16E-05
46	1.25E-03	1.07E-03	7.58E-04	4.26E-04	1.66E-04	6.02E-05	1.17E-03	1.16E-03	9.79E-04	4.66E-04	1.22E-04	6.98E-05
47	1.23E-03	1.06E-03	7.58E-04	4.26E-04	1.66E-04	6.02E-05	1.12E-03	1.14E-03	9.74E-04	4.58E-04	1.14E-04	6.80E-05
48	1.21E-03	1.05E-03	7.58E-04	4.26E-04	1.66E-04	6.02E-05	1.07E-03	1.12E-03	9.69E-04	4.50E-04	1.06E-04	6.62E-05
49	1.19E-03	1.04E-03	7.58E-04	4.26E-04	1.66E-04	6.02E-05	1.02E-03	1.10E-03	9.64E-04	4.42E-04	1.00E-04	6.44E-05
50	1.17E-03	1.03E-03	7.58E-04	4.26E-04	1.66E-04	6.02E-05	9.74E-04	1.08E-03	9.59E-04	4.34E-04	9.42E-05	6.26E-05
51	1.15E-03	1.02E-03	7.58E-04	4.26E-04	1.66E-04	6.02E-05	9.26E-04	1.06E-03	9.54E-04	4.26E-04	8.84E-05	6.08E-05
52	1.13E-03	1.01E-03	7.58E-04	4.26E-04	1.66E-04	6.02E-05	8.78E-04	1.04E-03	9.49E-04	4.18E-04	8.26E-05	5.90E-05
53	1.11E-03	1.00E-03	7.58E-04	4.26E-04	1.66E-04	6.02E-05	8.30E-04	1.02E-03	9.44E-04	4.10E-04	7.68E-05	5.72E-05
54	1.09E-03	9.99E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	7.82E-04	1.00E-03	9.39E-04	4.02E-04	7.10E-05	5.54E-05
55	1.07E-03	9.98E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	7.34E-04	9.98E-04	9.34E-04	3.94E-04	6.52E-05	5.36E-05
56	1.05E-03	9.97E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	6.86E-04	9.96E-04	9.29E-04	3.86E-04	5.94E-05	5.18E-05
57	1.03E-03	9.96E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	6.38E-04	9.94E-04	9.24E-04	3.78E-04	5.36E-05	5.00E-05
58	1.01E-03	9.95E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	5.90E-04	9.92E-04	9.19E-04	3.70E-04	4.78E-05	4.82E-05
59	9.99E-04	9.94E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	5.42E-04	9.90E-04	9.14E-04	3.62E-04	4.20E-05	4.64E-05
60	9.97E-04	9.93E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	4.94E-04	9.88E-04	9.09E-04	3.54E-04	3.62E-05	4.46E-05
61	9.95E-04	9.92E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	4.46E-04	9.86E-04	9.04E-04	3.46E-04	3.04E-05	4.28E-05
62	9.93E-04	9.91E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	3.98E-04	9.84E-04	9.00E-04	3.38E-04	2.46E-05	4.10E-05
63	9.91E-04	9.90E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	3.50E-04	9.82E-04	8.95E-04	3.30E-04	1.88E-05	3.92E-05
64	9.89E-04	9.88E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	3.02E-04	9.80E-04	8.90E-04	3.22E-04	1.30E-05	3.74E-05
65	9.87E-04	9.86E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	2.54E-04	9.78E-04	8.85E-04	3.14E-04	7.2E-06	3.56E-05
66	9.85E-04	9.84E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	2.06E-04	9.76E-04	8.80E-04	3.06E-04	1.6E-06	3.38E-05
67	9.83E-04	9.82E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	1.58E-04	9.74E-04	8.75E-04	2.98E-04	1.0E-06	3.20E-05
68	9.81E-04	9.80E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	1.10E-04	9.72E-04	8.70E-04	2.90E-04	4.2E-07	3.02E-05
69	9.79E-04	9.78E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	6.2E-05	9.70E-04	8.65E-04	2.82E-04	3.4E-07	2.84E-05
70	9.77E-04	9.76E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	1.4E-05	9.68E-04	8.60E-04	2.74E-04	2.6E-07	2.66E-05
71	9.75E-04	9.74E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.66E-04	8.55E-04	2.66E-04	1.8E-07	2.48E-05
72	9.73E-04	9.72E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.64E-04	8.50E-04	2.58E-04	1.0E-07	2.30E-05
73	9.71E-04	9.70E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.62E-04	8.45E-04	2.50E-04	2.2E-07	2.12E-05
74	9.69E-04	9.68E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.60E-04	8.40E-04	2.42E-04	1.4E-07	1.94E-05
75	9.67E-04	9.66E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.58E-04	8.35E-04	2.34E-04	6.2E-08	1.76E-05
76	9.65E-04	9.64E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.56E-04	8.30E-04	2.26E-04	4.4E-08	1.58E-05
77	9.63E-04	9.62E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.54E-04	8.25E-04	2.18E-04	2.6E-08	1.40E-05
78	9.61E-04	9.60E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.52E-04	8.20E-04	2.10E-04	8.2E-09	1.22E-05
79	9.59E-04	9.58E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.50E-04	8.15E-04	2.02E-04	4.4E-09	1.04E-05
80	9.57E-04	9.56E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.48E-04	8.10E-04	1.94E-04	2.6E-09	8.6E-06
81	9.55E-04	9.54E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.46E-04	8.05E-04	1.86E-04	8.2E-10	6.8E-06
82	9.53E-04	9.52E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.44E-04	8.00E-04	1.78E-04	4.4E-10	5.0E-06
83	9.51E-04	9.50E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.42E-04	7.95E-04	1.70E-04	2.6E-10	3.2E-06
84	9.49E-04	9.48E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.40E-04	7.90E-04	1.62E-04	8.2E-11	1.4E-06
85	9.47E-04	9.46E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.38E-04	7.85E-04	1.54E-04	4.4E-11	6.2E-07
86	9.45E-04	9.44E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.36E-04	7.80E-04	1.46E-04	2.6E-11	2.4E-07
87	9.43E-04	9.42E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.34E-04	7.75E-04	1.38E-04	8.2E-12	1.0E-07
88	9.41E-04	9.40E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.32E-04	7.70E-04	1.30E-04	4.4E-12	4.2E-08
89	9.39E-04	9.38E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.30E-04	7.65E-04	1.22E-04	2.6E-12	1.8E-08
90	9.37E-04	9.36E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.28E-04	7.60E-04	1.14E-04	8.2E-13	8.0E-09
91	9.35E-04	9.34E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.26E-04	7.55E-04	1.06E-04	4.4E-13	3.2E-09
92	9.33E-04	9.32E-04	7.58E-04	4.26E-04	1.66E-04	6.02E-05	0.00E-05	9.24E-04	7.50E-04	9.8E-05	2.6E-13	1.4E-09

TABLE IV. Collision Strengths σ for Excitation from the Ground Level to the Given Upper Level as a Function of E and Scattered Electron Energy in Units of $E_{H\alpha}$ Rydberg, 21.51 eV

L5											L6										
	$E=0.008$	$E=0.04$	$E=0.10$	$E=0.21$	$E=0.41$	$E=0.73$		$E=0.008$	$E=0.04$	$E=0.10$	$E=0.21$	$E=0.41$	$E=0.73$		$E=0.008$	$E=0.04$	$E=0.10$	$E=0.21$	$E=0.41$	$E=0.73$	
37	6.73E-04	6.99E-04	4.83E-04	2.78E-04	1.31E-04	3.39E-05		2.34E-04	1.99E-04	1.50E-04	6.61E-05	5.09E-05	2.24E-05		2.27E-04	1.92E-04	1.44E-04	6.26E-05	4.91E-05	2.24E-05	
38	6.39E-04	6.70E-04	4.63E-04	2.67E-04	1.34E-04	3.18E-05		2.27E-04	1.92E-04	1.44E-04	6.26E-05	4.91E-05	2.24E-05		2.27E-04	1.92E-04	1.44E-04	6.26E-05	4.91E-05	2.24E-05	
39	6.05E-04	6.36E-04	4.38E-04	2.64E-04	1.37E-04	3.07E-05		2.19E-04	1.87E-04	1.39E-04	6.15E-05	4.79E-05	2.18E-05		2.19E-04	1.87E-04	1.39E-04	6.15E-05	4.79E-05	2.18E-05	
40	5.72E-04	6.03E-04	4.14E-04	2.61E-04	1.40E-04	2.96E-05		2.11E-04	1.80E-04	1.34E-04	6.04E-05	4.68E-05	2.15E-05		2.11E-04	1.80E-04	1.34E-04	6.04E-05	4.68E-05	2.15E-05	
41	5.39E-04	5.70E-04	3.95E-04	2.58E-04	1.43E-04	2.85E-05		2.04E-04	1.72E-04	1.30E-04	5.93E-05	4.62E-05	2.12E-05		2.04E-04	1.72E-04	1.30E-04	5.93E-05	4.62E-05	2.12E-05	
42	5.06E-04	5.37E-04	3.82E-04	2.55E-04	1.46E-04	2.74E-05		1.96E-04	1.65E-04	1.25E-04	5.82E-05	4.56E-05	2.09E-05		1.96E-04	1.65E-04	1.25E-04	5.82E-05	4.56E-05	2.09E-05	
43	4.73E-04	5.04E-04	3.69E-04	2.52E-04	1.49E-04	2.63E-05		1.89E-04	1.58E-04	1.22E-04	5.71E-05	4.50E-05	2.06E-05		1.89E-04	1.58E-04	1.22E-04	5.71E-05	4.50E-05	2.06E-05	
44	4.40E-04	4.71E-04	3.56E-04	2.49E-04	1.52E-04	2.52E-05		1.82E-04	1.51E-04	1.19E-04	5.60E-05	4.44E-05	2.03E-05		1.82E-04	1.51E-04	1.19E-04	5.60E-05	4.44E-05	2.03E-05	
45	4.07E-04	4.38E-04	3.43E-04	2.46E-04	1.55E-04	2.41E-05		1.75E-04	1.44E-04	1.16E-04	5.49E-05	4.38E-05	2.00E-05		1.75E-04	1.44E-04	1.16E-04	5.49E-05	4.38E-05	2.00E-05	
46	3.74E-04	4.05E-04	3.30E-04	2.43E-04	1.58E-04	2.30E-05		1.68E-04	1.37E-04	1.13E-04	5.38E-05	4.32E-05	1.97E-05		1.68E-04	1.37E-04	1.13E-04	5.38E-05	4.32E-05	1.97E-05	
47	3.41E-04	3.72E-04	3.17E-04	2.40E-04	1.61E-04	2.19E-05		1.61E-04	1.30E-04	1.10E-04	5.27E-05	4.26E-05	1.94E-05		1.61E-04	1.30E-04	1.10E-04	5.27E-05	4.26E-05	1.94E-05	
48	3.08E-04	3.39E-04	3.04E-04	2.37E-04	1.64E-04	2.08E-05		1.54E-04	1.23E-04	1.07E-04	5.16E-05	4.20E-05	1.91E-05		1.54E-04	1.23E-04	1.07E-04	5.16E-05	4.20E-05	1.91E-05	
49	2.75E-04	3.06E-04	2.91E-04	2.34E-04	1.67E-04	1.97E-05		1.47E-04	1.16E-04	1.04E-04	5.05E-05	4.14E-05	1.88E-05		1.47E-04	1.16E-04	1.04E-04	5.05E-05	4.14E-05	1.88E-05	
50	2.42E-04	2.73E-04	2.80E-04	2.31E-04	1.70E-04	1.86E-05		1.40E-04	1.09E-04	1.01E-04	4.94E-05	4.08E-05	1.85E-05		1.40E-04	1.09E-04	1.01E-04	4.94E-05	4.08E-05	1.85E-05	
51	2.09E-04	2.40E-04	2.77E-04	2.28E-04	1.73E-04	1.75E-05		1.33E-04	1.02E-04	9.80E-05	4.83E-05	4.02E-05	1.82E-05		1.33E-04	1.02E-04	9.80E-05	4.83E-05	4.02E-05	1.82E-05	
52	1.76E-04	2.07E-04	2.64E-04	2.25E-04	1.76E-04	1.64E-05		1.26E-04	9.90E-05	9.40E-05	4.72E-05	3.96E-05	1.79E-05		1.26E-04	9.90E-05	9.40E-05	4.72E-05	3.96E-05	1.79E-05	
53	1.43E-04	1.74E-04	2.51E-04	2.22E-04	1.79E-04	1.53E-05		1.19E-04	9.20E-05	8.70E-05	4.61E-05	3.85E-05	1.76E-05		1.19E-04	9.20E-05	8.70E-05	4.61E-05	3.85E-05	1.76E-05	
54	1.10E-04	1.41E-04	2.38E-04	2.19E-04	1.82E-04	1.42E-05		1.12E-04	8.50E-05	8.00E-05	4.50E-05	3.74E-05	1.73E-05		1.12E-04	8.50E-05	8.00E-05	4.50E-05	3.74E-05	1.73E-05	
55	8.7E-05	1.18E-04	2.35E-04	2.16E-04	1.85E-04	1.31E-05		1.05E-04	7.80E-05	7.30E-05	4.39E-05	3.63E-05	1.70E-05		1.05E-04	7.80E-05	7.30E-05	4.39E-05	3.63E-05	1.70E-05	
56	6.4E-05	9.5E-05	2.32E-04	2.13E-04	1.88E-04	1.20E-05		9.8E-05	7.10E-05	6.60E-05	4.28E-05	3.52E-05	1.67E-05		9.8E-05	7.10E-05	6.60E-05	4.28E-05	3.52E-05	1.67E-05	
57	4.1E-05	7.2E-05	2.29E-04	2.10E-04	1.91E-04	1.09E-05		9.1E-05	6.40E-05	5.90E-05	4.17E-05	3.41E-05	1.64E-05		9.1E-05	6.40E-05	5.90E-05	4.17E-05	3.41E-05	1.64E-05	
58	1.9E-05	5.3E-05	2.26E-04	2.07E-04	1.94E-04	9.8E-06		8.4E-05	5.70E-05	5.20E-05	4.06E-05	3.35E-05	1.61E-05		8.4E-05	5.70E-05	5.20E-05	4.06E-05	3.35E-05	1.61E-05	
59	1.6E-05	4.0E-05	2.23E-04	2.04E-04	1.97E-04	8.7E-06		7.7E-05	5.0E-05	4.50E-05	3.95E-05	3.24E-05	1.58E-05		7.7E-05	5.0E-05	4.50E-05	3.95E-05	3.24E-05	1.58E-05	
60	1.3E-05	3.3E-05	2.20E-04	2.01E-04	2.00E-04	7.6E-06		7.0E-05	4.3E-05	3.80E-05	3.84E-05	3.13E-05	1.55E-05		7.0E-05	4.3E-05	3.80E-05	3.84E-05	3.13E-05	1.55E-05	
61	1.0E-05	2.6E-05	2.17E-04	1.98E-04	2.03E-04	6.5E-06		6.3E-05	3.6E-05	3.30E-05	3.73E-05	3.02E-05	1.52E-05		6.3E-05	3.6E-05	3.30E-05	3.73E-05	3.02E-05	1.52E-05	
62	7.7E-06	2.0E-05	2.14E-04	1.95E-04	2.06E-04	5.4E-06		5.6E-05	2.9E-05	3.00E-05	3.66E-05	2.91E-05	1.49E-05		5.6E-05	2.9E-05	3.00E-05	3.66E-05	2.91E-05	1.49E-05	
63	5.4E-06	1.3E-05	2.11E-04	1.92E-04	2.09E-04	4.3E-06		4.9E-05	2.2E-05	2.70E-05	3.60E-05	2.80E-05	1.46E-05		4.9E-05	2.2E-05	2.70E-05	3.60E-05	2.80E-05	1.46E-05	
64	3.1E-06	9.0E-06	2.08E-04	1.89E-04	2.12E-04	3.2E-06		4.2E-05	1.5E-05	2.40E-05	3.51E-05	2.69E-05	1.43E-05		4.2E-05	1.5E-05	2.40E-05	3.51E-05	2.69E-05	1.43E-05	
65	8.7E-07	6.0E-06	2.05E-04	1.86E-04	2.15E-04	2.1E-06		3.5E-05	8.0E-06	2.10E-05	3.42E-05	2.66E-05	1.40E-05		3.5E-05	8.0E-06	2.10E-05	3.42E-05	2.66E-05	1.40E-05	
66	8.1E-07	6.9E-06	2.02E-04	1.83E-04	2.18E-04	1.0E-06		2.8E-05	4.0E-06	1.90E-05	3.33E-05	2.63E-05	1.37E-05		2.8E-05	4.0E-06	1.90E-05	3.33E-05	2.63E-05	1.37E-05	
67	3.1E-07	2.0E-06	2.00E-04	1.80E-04	2.21E-04	0.0E-06		2.1E-05	2.0E-06	1.60E-05	3.24E-05	2.60E-05	1.34E-05		2.1E-05	2.0E-06	1.60E-05	3.24E-05	2.60E-05	1.34E-05	
68	1.6E-07	1.0E-06	1.97E-04	1.77E-04	2.24E-04	0.0E-06		1.4E-05	1.0E-06	1.10E-05	3.15E-05	2.57E-05	1.31E-05		1.4E-05	1.0E-06	1.10E-05	3.15E-05	2.57E-05	1.31E-05	
69	8.7E-08	5.0E-07	1.94E-04	1.74E-04	2.27E-04	0.0E-06		7.0E-06	5.0E-07	6.0E-06	3.06E-05	2.54E-05	1.28E-05		7.0E-06	5.0E-07	6.0E-06	3.06E-05	2.54E-05	1.28E-05	
70	4.3E-08	2.0E-07	1.91E-04	1.71E-04	2.30E-04	0.0E-06		4.0E-06	2.0E-07	3.0E-06	2.97E-05	2.51E-05	1.25E-05		4.0E-06	2.0E-07	3.0E-06	2.97E-05	2.51E-05	1.25E-05	
71	2.1E-08	1.0E-07	1.88E-04	1.68E-04	2.33E-04	0.0E-06		2.0E-06	1.0E-07	1.0E-06	2.88E-05	2.48E-05	1.22E-05		2.0E-06	1.0E-07	1.0E-06	2.88E-05	2.48E-05	1.22E-05	
72	1.0E-08	5.0E-08	1.85E-04	1.65E-04	2.36E-04	0.0E-06		1.0E-06	5.0E-08	5.0E-07	2.79E-05	2.45E-05	1.19E-05		1.0E-06	5.0E-08	5.0E-07	2.79E-05	2.45E-05	1.19E-05	
73	5.0E-09	2.0E-08	1.82E-04	1.62E-04	2.39E-04	0.0E-06		5.0E-07	2.0E-08	2.0E-07	2.70E-05	2.42E-05	1.16E-05		5.0E-07	2.0E-08	2.0E-07	2.70E-05	2.42E-05	1.16E-05	
74	2.5E-09	1.0E-08	1.79E-04	1.59E-04	2.42E-04	0.0E-06		2.5E-07	1.0E-08	1.0E-06	2.61E-05	2.39E-05	1.13E-05		2.5E-07	1.0E-08	1.0E-06	2.61E-05	2.39E-05	1.13E-05	
75	1.2E-09	5.0E-09	1.76E-04	1.56E-04	2.45E-04	0.0E-06		1.2E-07	5.0E-09	5.0E-08	2.52E-05	2.36E-05	1.10E-05		1.2E-07	5.0E-09	5.0E-08	2.52E-05	2.36E-05	1.10E-05	
76	6.0E-10	2.0E-09	1.73E-04	1.53E-04	2.48E-04	0.0E-06		6.0E-08	2.0E-09	2.0E-07	2.43E-05	2.33E-05	1.07E-05		6.0E-08	2.0E-09	2.0E-07	2.43E-05	2.33E-05	1.07E-05	
77	3.0E-10	1.0E-09	1.70E-04	1.50E-04	2.51E-04	0.0E-06		3.0E-08	1.0E-09	1.0E-06	2.34E-05	2.24E-05	1.04E-05		3.0E-08	1.0E-09	1.0E-06	2.34E-05	2.24E-05	1.04E-05	
78	1.5E-10	5.0E-10	1.67E-04	1.47E-04	2.54E-04	0.0E-06		1.5E-08	5.0E-10	5.0E-08	2.25E-05	2.21E-05	1.01E-05		1.5E-08	5.0E-10	5.0E-08	2.25E-05	2.21E-05	1.01E-05	
79	7.0E-11	2.0E-10	1.64E-04	1.44E-04	2.57E-04	0.0E-06		7.0E-09	2.0E-10	2.0E-07	2.16E-05	2.18E-05	9.8E-06		7.0E-09	2.0E-10	2.0E-07	2.16E-05	2.18E-05	9.8E-06	
80	3.0E-11																				

TABLE IV. Collision strengths $2\pi a_0^2$ for excitation from the Ground Level to the Closest Upper Levels as a function of Z and Scattered Electron Energy in Units of E_{eff}^2 Hydrogen, $12\pi^2 a_0^2$

	L9						L10					
Z	E'=0.008	E'=0.04	E'=0.10	E'=0.21	E'=0.41	E'=0.75	E'=0.008	E'=0.04	E'=0.10	E'=0.21	E'=0.41	E'=0.75
22	1.39E-03	1.78E-03	7.84E-04	4.24E-04	1.80E-04	4.53E-05	1.77E-03	1.42E-03	9.83E-04	5.36E-04	2.54E-04	1.01E-04
23	1.35E-03	1.64E-03	7.02E-04	3.77E-04	1.60E-04	3.80E-05	1.62E-03	1.29E-03	8.84E-04	5.01E-04	2.29E-04	8.77E-05
24	1.22E-03	1.51E-03	6.31E-04	3.38E-04	1.45E-04	3.37E-05	1.47E-03	1.17E-03	8.03E-04	4.57E-04	2.07E-04	8.27E-05
25	1.10E-03	1.41E-03	5.71E-04	3.04E-04	1.29E-04	3.07E-05	1.34E-03	1.08E-03	7.50E-04	4.13E-04	1.89E-04	7.53E-05
26	1.01E-03	1.32E-03	5.20E-04	2.78E-04	1.18E-04	2.77E-05	1.22E-03	9.72E-04	6.84E-04	3.74E-04	1.72E-04	6.89E-05
27	9.23E-04	1.21E-03	4.77E-04	2.53E-04	1.08E-04	2.52E-05	1.12E-03	8.91E-04	6.10E-03	3.45E-04	1.58E-04	6.21E-05
28	8.34E-04	1.12E-03	4.31E-04	2.34E-04	1.00E-04	2.35E-05	1.03E-03	8.18E-04	5.62E-04	3.16E-04	1.45E-04	5.81E-05
29	7.48E-04	1.02E-03	3.91E-04	2.15E-04	9.27E-05	2.18E-05	9.48E-04	7.34E-04	5.16E-04	2.92E-04	1.34E-04	5.29E-05
30	6.72E-04	9.34E-04	3.57E-04	1.98E-04	8.47E-05	2.00E-05	8.71E-04	6.67E-04	4.77E-04	2.69E-04	1.23E-04	4.80E-05
31	7.19E-04	8.35E-04	3.48E-04	1.98E-04	8.21E-05	1.94E-05	8.12E-04	6.44E-04	4.62E-04	2.49E-04	1.14E-04	4.39E-05
32	6.80E-04	8.31E-04	3.32E-04	1.91E-04	8.24E-05	1.89E-05	7.75E-04	6.00E-04	4.10E-04	2.32E-04	1.04E-04	4.24E-05
33	6.37E-04	8.14E-04	3.16E-04	1.84E-04	8.12E-05	1.83E-05	7.32E-04	5.73E-04	3.82E-04	2.14E-04	9.89E-05	3.97E-05
34	6.40E-04	8.03E-04	3.13E-04	1.82E-04	8.07E-05	1.80E-05	6.94E-04	5.61E-04	3.64E-04	2.01E-04	9.52E-05	3.71E-05
35	6.28E-04	7.92E-04	3.10E-04	1.80E-04	8.00E-05	1.77E-05	6.70E-04	5.50E-04	3.52E-04	1.94E-04	9.35E-05	3.56E-05
36	6.18E-04	7.84E-04	3.07E-04	1.78E-04	7.93E-05	1.75E-05	6.50E-04	5.40E-04	3.42E-04	1.88E-04	9.20E-05	3.42E-05
37	6.09E-04	7.76E-04	3.04E-04	1.76E-04	7.86E-05	1.73E-05	6.30E-04	5.30E-04	3.32E-04	1.82E-04	9.05E-05	3.28E-05
38	5.99E-04	7.68E-04	3.02E-04	1.74E-04	7.79E-05	1.71E-05	6.10E-04	5.20E-04	3.22E-04	1.76E-04	8.90E-05	3.14E-05
39	5.89E-04	7.60E-04	3.00E-04	1.72E-04	7.72E-05	1.69E-05	5.90E-04	5.10E-04	3.12E-04	1.70E-04	8.75E-05	3.00E-05
40	5.79E-04	7.52E-04	2.98E-04	1.70E-04	7.65E-05	1.67E-05	5.70E-04	5.00E-04	3.02E-04	1.64E-04	8.60E-05	2.86E-05
41	5.69E-04	7.44E-04	2.96E-04	1.68E-04	7.58E-05	1.65E-05	5.50E-04	4.90E-04	2.92E-04	1.58E-04	8.45E-05	2.72E-05
42	5.59E-04	7.36E-04	2.94E-04	1.66E-04	7.51E-05	1.63E-05	5.30E-04	4.80E-04	2.82E-04	1.52E-04	8.30E-05	2.58E-05
43	5.49E-04	7.28E-04	2.92E-04	1.64E-04	7.44E-05	1.61E-05	5.10E-04	4.70E-04	2.72E-04	1.46E-04	8.15E-05	2.44E-05
44	5.39E-04	7.20E-04	2.90E-04	1.62E-04	7.37E-05	1.59E-05	4.90E-04	4.60E-04	2.62E-04	1.40E-04	8.00E-05	2.30E-05
45	5.29E-04	7.12E-04	2.88E-04	1.60E-04	7.30E-05	1.57E-05	4.70E-04	4.50E-04	2.52E-04	1.34E-04	7.85E-05	2.16E-05
46	5.19E-04	7.04E-04	2.86E-04	1.58E-04	7.23E-05	1.55E-05	4.50E-04	4.40E-04	2.42E-04	1.28E-04	7.70E-05	2.02E-05
47	5.09E-04	6.96E-04	2.84E-04	1.56E-04	7.16E-05	1.53E-05	4.30E-04	4.30E-04	2.32E-04	1.22E-04	7.55E-05	1.88E-05
48	4.99E-04	6.88E-04	2.82E-04	1.54E-04	7.09E-05	1.51E-05	4.10E-04	4.20E-04	2.22E-04	1.16E-04	7.40E-05	1.74E-05
49	4.89E-04	6.80E-04	2.80E-04	1.52E-04	7.02E-05	1.49E-05	3.90E-04	4.10E-04	2.12E-04	1.10E-04	7.25E-05	1.60E-05
50	4.79E-04	6.72E-04	2.78E-04	1.50E-04	6.95E-05	1.47E-05	3.70E-04	4.00E-04	2.02E-04	1.04E-04	7.10E-05	1.46E-05
51	4.69E-04	6.64E-04	2.76E-04	1.48E-04	6.88E-05	1.45E-05	3.50E-04	3.90E-04	1.92E-04	9.8E-05	6.95E-05	1.32E-05
52	4.59E-04	6.56E-04	2.74E-04	1.46E-04	6.81E-05	1.43E-05	3.30E-04	3.80E-04	1.82E-04	9.2E-05	6.80E-05	1.18E-05
53	4.49E-04	6.48E-04	2.72E-04	1.44E-04	6.74E-05	1.41E-05	3.10E-04	3.70E-04	1.72E-04	8.6E-05	6.65E-05	1.04E-05
54	4.39E-04	6.40E-04	2.70E-04	1.42E-04	6.67E-05	1.39E-05	2.90E-04	3.60E-04	1.62E-04	8.0E-05	6.50E-05	9.0E-06
55	4.29E-04	6.32E-04	2.68E-04	1.40E-04	6.60E-05	1.37E-05	2.70E-04	3.50E-04	1.52E-04	7.4E-05	6.35E-05	7.6E-06
56	4.19E-04	6.24E-04	2.66E-04	1.38E-04	6.53E-05	1.35E-05	2.50E-04	3.40E-04	1.42E-04	6.8E-05	6.20E-05	6.2E-06
57	4.09E-04	6.16E-04	2.64E-04	1.36E-04	6.46E-05	1.33E-05	2.30E-04	3.30E-04	1.32E-04	6.2E-05	6.05E-05	4.8E-06
58	3.99E-04	6.08E-04	2.62E-04	1.34E-04	6.39E-05	1.31E-05	2.10E-04	3.20E-04	1.22E-04	5.6E-05	5.90E-05	3.4E-06
59	3.89E-04	6.00E-04	2.60E-04	1.32E-04	6.32E-05	1.29E-05	1.90E-04	3.10E-04	1.12E-04	5.0E-05	5.75E-05	2.0E-06
60	3.79E-04	5.92E-04	2.58E-04	1.30E-04	6.25E-05	1.27E-05	1.70E-04	3.00E-04	1.02E-04	4.4E-05	5.60E-05	0E-06
61	3.69E-04	5.84E-04	2.56E-04	1.28E-04	6.18E-05	1.25E-05	1.50E-04	2.90E-04	9.2E-05	3.8E-05	5.45E-05	0E-06
62	3.59E-04	5.76E-04	2.54E-04	1.26E-04	6.11E-05	1.23E-05	1.30E-04	2.80E-04	8.2E-05	3.2E-05	5.30E-05	0E-06
63	3.49E-04	5.68E-04	2.52E-04	1.24E-04	6.04E-05	1.21E-05	1.10E-04	2.70E-04	7.2E-05	2.6E-05	5.15E-05	0E-06
64	3.39E-04	5.60E-04	2.50E-04	1.22E-04	5.97E-05	1.19E-05	9.0E-05	2.60E-04	6.2E-05	2.0E-05	5.00E-05	0E-06
65	3.29E-04	5.52E-04	2.48E-04	1.20E-04	5.90E-05	1.17E-05	8.0E-05	2.50E-04	5.2E-05	1.4E-05	4.85E-05	0E-06
66	3.19E-04	5.44E-04	2.46E-04	1.18E-04	5.83E-05	1.15E-05	7.0E-05	2.40E-04	4.2E-05	8E-06	4.70E-05	0E-06
67	3.09E-04	5.36E-04	2.44E-04	1.16E-04	5.76E-05	1.13E-05	6.0E-05	2.30E-04	3.2E-05	2E-06	4.55E-05	0E-06
68	2.99E-04	5.28E-04	2.42E-04	1.14E-04	5.69E-05	1.11E-05	5.0E-05	2.20E-04	2.2E-05	0E-06	4.40E-05	0E-06
69	2.89E-04	5.20E-04	2.40E-04	1.12E-04	5.62E-05	1.09E-05	4.0E-05	2.10E-04	1.2E-05	0E-06	4.25E-05	0E-06
70	2.79E-04	5.12E-04	2.38E-04	1.10E-04	5.55E-05	1.07E-05	3.0E-05	2.00E-04	0E-06	0E-06	4.10E-05	0E-06
71	2.69E-04	5.04E-04	2.36E-04	1.08E-04	5.48E-05	1.05E-05	2.0E-05	1.90E-04	0E-06	0E-06	3.95E-05	0E-06
72	2.59E-04	4.96E-04	2.34E-04	1.06E-04	5.41E-05	1.03E-05	1.0E-05	1.80E-04	0E-06	0E-06	3.80E-05	0E-06
73	2.49E-04	4.88E-04	2.32E-04	1.04E-04	5.34E-05	1.01E-05	0E-06	1.70E-04	0E-06	0E-06	3.65E-05	0E-06
74	2.39E-04	4.80E-04	2.30E-04	1.02E-04	5.27E-05	9.9E-06	0E-06	1.60E-04	0E-06	0E-06	3.50E-05	0E-06
75	2.29E-04	4.72E-04	2.28E-04	1.00E-04	5.20E-05	9.7E-06	0E-06	1.50E-04	0E-06	0E-06	3.35E-05	0E-06
76	2.19E-04	4.64E-04	2.26E-04	9.8E-05	5.13E-05	9.5E-06	0E-06	1.40E-04	0E-06	0E-06	3.20E-05	0E-06
77	2.09E-04	4.56E-04	2.24E-04	9.6E-05	5.06E-05	9.3E-06	0E-06	1.30E-04	0E-06	0E-06	3.05E-05	0E-06
78	1.99E-04	4.48E-04	2.22E-04	9.4E-05	4.99E-05	9.1E-06	0E-06	1.20E-04	0E-06	0E-06	2.90E-05	0E-06
79	1.89E-04	4.40E-04	2.20E-04	9.2E-05	4.92E-05	8.9E-06	0E-06	1.10E-04	0E-06	0E-06	2.75E-05	0E-06
80	1.79E-04	4.32E-04	2.18E-04	9.0E-05	4.85E-05	8.7E-06	0E-06	1.00E-04	0E-06	0E-06	2.60E-05	0E-06
81	1.69E-04	4.24E-04	2.16E-04	8.8E-05	4.78E-05	8.5E-06	0E-06	9.0E-05	0E-06	0E-06	2.45E-05	0E-06
82	1.59E-04	4.16E-04	2.14E-04	8.6E-05	4.71E-05	8.3E-06	0E-06	8.0E-05	0E-06	0E-06	2.30E-05	0E-06
83	1.49E-04	4.08E-04	2.12E-04	8.4E-05	4.64E-05	8.1E-06	0E-06	7.0E-05	0E-06	0E-06	2.15E-05	0E-06
84	1.39E-04	4.00E-04	2.10E-04	8.2E-05	4.57E-05	7.9E-06	0E-06	6.0E-05	0E-06	0E-06	2.00E-05	0E-06
85	1.29E-04	3.92E-04	2.08E-04	8.0E-05	4.50E-05	7.7E-06	0E-06	5.0E-05	0E-06	0E-06	1.85E-05	0E-06
86	1.19E-04	3.84E-04	2.06E-04	7.8E-05	4.43E-05	7.5E-06	0E-06	4.0E-05	0E-06	0E-06	1.70E-05	0E-06
87	1.09E-04	3.76E-04	2.04E-04	7.6E-05	4.36E-05	7.3E-06	0E-06	3.0E-05	0E-06	0E-06	1.55E-05	0E-06
88	9.9E-05	3.68E-04	2.02E-04	7.4E-05	4.29E-05	7.1E-06	0E-06	2.0E-05	0E-06	0E-06	1.40E-05	0E-06
89	8.9E-05	3.60E-04	2.00E-04	7.2E-05	4.22E-05	6.9E-06	0E-06	1.0E-05	0E-06	0E-06	1.25E-05	0E-06
90	7.9E-05	3.52E-04	1.98E-04	7.0E-05</								

	L11						L12					
Z	E'=0.008	E'=0.04	E'=0.10	E'=0.21	E'=0.41	E'=0.75	E'=0.008	E'=0.04	E'=0.10	E'=0.21	E'=0.41	E'=0.75
37	3.14E-04	2.52E-04	1.77E-04	1.03E-04	4.93E-05	2.08E-05	9.34E-05	8.02E-05	5.79E-05	3.79E-05	1.98E-05	8.94E-06
38	3.01E-04	2.42E-04	1.70E-04	9.72E-05	4.74E-05	2.00E-05	9.20E-05	7.73E-05	5.74E-05	3.63E-05	1.91E-05	8.82E-06
39	2.89E-04	2.32E-04	1.63E-04	9.53E-05	4.68E-05	1.93E-05	8.97E-05	7.43E-05	5.53E-05	3.52E-05	1.84E-05	8.72E-06
40	2.78E-04	2.24E-04	1.57E-04	9.37E-05	4.61E-05	1.88E-05	8.74E-05	7.18E-05	5.44E-05	3.43E-05	1.78E-05	8.62E-06
41	2.67E-04	2.15E-04	1.51E-04	9.20E-05	4.54E-05	1.83E-05	8.52E-05	6.93E-05	5.17E-05	3.26E-05	1.72E-05	8.52E-06
42	2.57E-04	2.07E-04	1.45E-04	9.03E-05	4.47E-05	1.78E-05	8.30E-05	6.69E-05	5.00E-05	3.17E-05	1.64E-05	8.42E-06
43	2.47E-04	1.99E-04	1.40E-04	8.86E-05	4.40E-05	1.73E-05	8.08E-05	6.47E-05	4.82E-05	3.07E-05	1.58E-05	8.32E-06
44	2.37E-04	1.92E-04	1.35E-04	8.70E-05	4.33E-05	1.68E-05	7.86E-05	6.23E-05	4.67E-05	2.97E-05	1.52E-05	8.22E-06
45	2.28E-04	1.85E-04	1.30E-04	8.53E-05	4.26E-05	1.63E-05	7.64E-05	6.01E-05	4.52E-05	2.88E-05	1.46E-05	8.12E-06
46	2.20E-04	1.78E-04	1.25E-04	8.37E-05	4.19E-05	1.58E-05	7.42E-05	5.79E-05	4.37E-05	2.79E-05	1.40E-05	8.02E-06
47	2.12E-04	1.71E-04	1.21E-04	8.20E-05	4.12E-05	1.53E-05	7.20E-05	5.57E-05	4.22E-05	2.70E-05	1.34E-05	7.92E-06
48	2.04E-04	1.65E-04	1.16E-04	8.04E-05	4.05E-05	1.48E-05	6.98E-05	5.35E-05	4.07E-05	2.61E-05	1.28E-05	7.82E-06
49	1.97E-04	1.59E-04	1.12E-04	7.87E-05	3.98E-05	1.43E-05	6.76E-05	5.13E-05	3.92E-05	2.52E-05	1.22E-05	7.72E-06
50	1.90E-04	1.54E-04	1.08E-04	7.71E-05	3.91E-05	1.38E-05	6.54E-05	4.91E-05	3.77E-05	2.43E-05	1.16E-05	7.62E-06
51	1.83E-04	1.48E-04	1.04E-04	7.54E-05	3.84E-05	1.33E-05	6.32E-05	4.69E-05	3.62E-05	2.34E-05	1.10E-05	7.52E-06
52	1.77E-04	1.43E-04	1.01E-04	7.38E-05	3.77E-05	1.28E-05	6.10E-05	4.47E-05	3.47E-05	2.25E-05	1.04E-05	7.42E-06
53	1.71E-04	1.38E-04	9.78E-05	7.22E-05	3.70E-05	1.23E-05	5.88E-05	4.25E-05	3.32E-05	2.16E-05	1.00E-05	7.32E-06
54	1.65E-04	1.34E-04	9.62E-05	7.06E-05	3.63E-05	1.18E-05	5.66E-05	4.03E-05	3.17E-05	2.07E-05	9.40E-06	7.22E-06
55	1.59E-04	1.29E-04	9.46E-05	6.90E-05	3.56E-05	1.13E-05	5.44E-05	3.81E-05	3.02E-05	1.98E-05	9.00E-06	7.12E-06
56	1.53E-04	1.25E-04	9.30E-05	6.74E-05	3.49E-05	1.08E-05	5.22E-05	3.59E-05	2.87E-05	1.89E-05	8.60E-06	7.02E-06
57	1.47E-04	1.21E-04	9.14E-05	6.58E-05	3.42E-05	1.03E-05	5.00E-05	3.37E-05	2.72E-05	1.80E-05	8.20E-06	6.92E-06
58	1.41E-04	1.17E-04	8.98E-05	6.42E-05	3.35E-05	9.80E-06	4.78E-05	3.15E-05	2.57E-05	1.71E-05	7.80E-06	6.82E-06
59	1.35E-04	1.13E-04	8.82E-05	6.26E-05	3.28E-05	9.30E-06	4.56E-05	2.93E-05	2.42E-05	1.62E-05	7.40E-06	6.72E-06
60	1.29E-04	1.09E-04	8.66E-05	6.10E-05	3.21E-05	8.80E-06	4.34E-05	2.71E-05	2.27E-05	1.53E-05	7.00E-06	6.62E-06
61	1.24E-04	1.05E-04	8.50E-05	5.94E-05	3.14E-05	8.30E-06	4.12E-05	2.49E-05	2.12E-05	1.44E-05	6.60E-06	6.52E-06
62	1.18E-04	1.01E-04	8.34E-05	5.78E-05	3.07E-05	7.80E-06	3.90E-05	2.27E-05	1.97E-05	1.35E-05	6.20E-06	6.42E-06
63	1.13E-04	9.74E-05	8.18E-05	5.62E-05	3.00E-05	7.30E-06	3.68E-05	2.05E-05	1.82E-05	1.26E-05	5.80E-06	6.32E-06
64	1.07E-04	9.38E-05	8.02E-05	5.46E-05	2.93E-05	6.80E-06	3.46E-05	1.83E-05	1.67E-05	1.17E-05	5.40E-06	6.22E-06
65	1.02E-04	9.02E-05	7.86E-05	5.30E-05	2.86E-05	6.30E-06	3.24E-05	1.61E-05	1.52E-05	1.08E-05	5.00E-06	6.12E-06
66	9.74E-05	8.66E-05	7.70E-05	5.14E-05	2.79E-05	5.80E-06	3.02E-05	1.39E-05	1.37E-05	9.90E-06	4.60E-06	6.02E-06
67	9.26E-05	8.30E-05	7.54E-05	4.98E-05	2.72E-05	5.30E-06	2.80E-05	1.17E-05	1.22E-05	9.00E-06	4.20E-06	5.92E-06
68	8.78E-05	7.94E-05	7.38E-05	4.82E-05	2.65E-05	4.80E-06	2.58E-05	1.05E-05	1.07E-05	8.10E-06	3.80E-06	5.82E-06
69	8.30E-05	7.58E-05	7.22E-05	4.66E-05	2.58E-05	4.30E-06	2.36E-05	9.30E-06	9.50E-06	7.20E-06	3.40E-06	5.72E-06
70	7.82E-05	7.22E-05	7.06E-05	4.50E-05	2.51E-05	3.80E-06	2.14E-05	8.10E-06	8.30E-06	6.30E-06	3.00E-06	5.62E-06
71	7.34E-05	6.86E-05	6.90E-05	4.34E-05	2.44E-05	3.30E-06	1.92E-05	6.90E-06	7.10E-06	5.40E-06	2.60E-06	5.52E-06
72	6.86E-05	6.50E-05	6.74E-05	4.18E-05	2.37E-05	2.80E-06	1.70E-05	5.70E-06	5.90E-06	4.50E-06	2.20E-06	5.42E-06

	L13					N1						
Z	E'=0.008	E'=0.04	E'=0.10	E'=0.21	E'=0.41	E'=0.75	E'=0.008	E'=0.04	E'=0.10	E'=0.21	E'=0.41	E'=0.75
22	2.89E-04	2.24E-04	1.44E-04	7.80E-05	3.33E-05	1.27E-05	7.40E-05	6.44E-05	5.09E-05	3.93E-05	3.30E-05	3.14E-05
23	2.76E-04	2.15E-04	1.41E-04	7.71E-05	3.28E-05	1.22E-05	6.81E-05	5.79E-05	4.62E-05	3.63E-05	3.13E-05	3.01E-05
24	2.67E-04	2.04E-04	1.35E-04	7.60E-05	3.19E-05	1.18E-05	6.12E-05	5.24E-05	4.22E-05	3.38E-05	2.92E-05	2.87E-05
25	2.54E-04	1.97E-04	1.27E-04	7.47E-05	3.10E-05	1.13E-05	5.53E-05	4.74E-05	3.84E-05	3.14E-05	2.79E-05	2.74E-05
26	2.44E-04	1.88E-04	1.22E-04	7.34E-05	3.02E-05	1.08E-05	5.04E-05	4.42E-05	3.58E-05	2.98E-05	2.62E-05	2.61E-05
27	2.34E-04	1.80E-04	1.17E-04	7.21E-05	2.94E-05	1.03E-05	4.55E-05	4.10E-05	3.32E-05	2.72E-05	2.40E-05	2.44E-05
28	2.24E-04	1.70E-04	1.11E-04	7.08E-05	2.86E-05	9.77E-06	4.06E-05	3.78E-05	3.06E-05	2.56E-05	2.23E-05	2.34E-05
29	2.14E-04	1.62E-04	1.06E-04	6.94E-05	2.78E-05	9.20E-06	3.57E-05	3.46E-05	2.80E-05	2.40E-05	2.08E-05	2.24E-05
30	2.04E-04	1.54E-04	1.01E-04	6.81E-05	2.70E-05	8.63E-06	3.08E-05	3.14E-05	2.54E-05	2.24E-05	1.91E-05	2.14E-05
31	1.94E-04	1.47E-04	9.73E-05	6.67E-05	2.62E-05	8.06E-06	2.59E-05	2.82E-05	2.28E-05	2.08E-05	1.74E-05	2.04E-05
32	1.84E-04	1.39E-04	9.58E-05	6.54E-05	2.54E-05	7.49E-06	2.10E-05	2.50E-05	2.02E-05	1.89E-05	1.58E-05	1.94E-05
33	1.74E-04	1.32E-04	9.43E-05	6.41E-05	2.46E-05	6.92E-06	1.61E-05	2.22E-05	1.76E-05	1.74E-05	1.42E-05	1.84E-05
34	1.64E-04	1.24E-04	9.28E-05	6.28E-05	2.38E-05	6.35E-06	1.12E-05	1.94E-05	1.52E-05	1.59E-05	1.26E-05	1.74E-05
35	1.54E-04	1.20E-04	9.13E-05	6.15E-05	2.30E-05	5.78E-06	6.63E-06	1.76E-05	1.32E-05	1.45E-05	1.10E-05	1.64E-05
36	1.44E-04	1.14E-04	8.97E-05	6.02E-05	2.22E-05	5.21E-06	5.14E-06	1.58E-05	1.10E-05	1.30E-05	9.60E-06	1.54E-05
37	1.34E-04	1.07E-04	8.82E-05	5.89E-05	2.14E-05	4.64E-06	4.65E-06	1.40E-05	9.80E-06	1.12E-05	8.20E-06	1.44E-05
38	1.24E-04	1.01E-04	8.66E-05	5.76E-05	2.06E-05	4.07E-06	4.16E-06	1.22E-05	8.60E-06	9.60E-06	7.00E-06	1.34E-05
39	1.14E-04	9.54E-05	8.50E-05	5.63E-05	1.98E-05	3.50E-06	3.67E-06	1.04E-05	7.40E-06	8.40E-06	5.80E-06	1.24E-05
40	1.04E-04	8.97E-05	8.34E-05	5.50E-05	1.90E-05	2.93E-06	3.18E-06	9.20E-06	6.20E-06	7.20E-06	4.60E-06	1.14E-05
41	9.46E-05	8.41E-05	8.18E-05	5.37E-05	1.82E-05	2.36E-06	2.79E-06	8.00E-06	5.00E-06	6.00E-06	3.90E-06	1.04E-05
42	8.48E-05	7.83E-05	8.02E-05	5.24E-05	1.74E-05	1.79E-06	2.40E-06	6.80E-06	4.80E-06	5.80E-06	3.30E-06	9.40E-06
43	7.50E-05	7.22E-05	7.86E-05	5.11E-05	1.66E-05	1.22E-06	2.01E-06	5.60E-06	4.60E-06	5.60E-06	2.90E-06	8.40E-06
44	6.52E-05	6.46E-05	7.70E-05	4.98E-05	1.58E-05	6.64E-06	1.83E-06	4.40E-06	4.40E-06	5.40E-06	2.40E-06	7.40E-06
45	5.54E-05	5.54E-05	7.54E-05	4.85E-05	1.50E-05	6.07E-06	1.65E-06	3.20E-06	3.20E-06	4.20E-06	2.00E-06	6.40E-06
46	4.56E-05	4.56E-05	7.42E-05	4.72E-05	1.42E-05	5.50E-06	1.47E-06	2.00E-06	2.00E-06	3.00E-06	1.80E-06	5.40E-06
47	3.58E-05	3.58E-05	7.30E-05	4.59E-05	1.34E-05	4.93E-06	1.29E-06	1.80E-06	1.80E-06	2.80E-06	1.60E-06	4.80E-06
48	2.60E-05	2.60E-05	7.18E-05	4.46E-05	1.26E-05	4.36E-06	1.11E-06	1.60E-06	1.60E-06	2.60E-06	1.40E-06	4.20E-06
49	1.62E-05	1.62E-05	7.06E-05	4.33E-05	1.18E-05	3.79E-06	9.30E-07	1.40E-06	1.40E-06	2.40E-06	1.20E-06	3.60E-06
50	6.4E-06	6.4E-06	6.94E-05	4.20E-05	1.10E-05	3.22E-06	7.3E-07	1.20E-06	1.20E-06	2.20E-06	1.00E-06	3.00E-06
51	5.42E-06	5.42E-06	6.82E-05	4.07E-05	1.02E-05	2.65E-06	6.5E-07	1.00E-06	1.00E-06	2.00E-06	9.00E-07	2.40E-06
52	4.44E-06	4.44E-06	6.70E-05	3.94E-05	9.40E-06	2.08E-06	5.7E-07	8.80E-07	8.80E-07	1.80E-06	7.20E-07	1.80E-06
53	3.46E-06	3.46E-06	6.58E-05	3.81E-05	8.60E-06	1.51E-06	4.9E-07	7.60E-07	7.60E-07	1.60E-06	6.00E-07	1.40E-06
54	2.48E-06	2.48E-06	6.46E-05	3.68E-05	7.80E-06	9.5E-07	4.1E-07	6.40E-07	6.40E-07	1.40E-06	5.20E-07	1.20E-06
55	1.50E-06	1.50E-06	6.34E-05	3.55E-05	7.00E-06	8.9E-07	3.3E-07	5.20E-07	5.20E-07	1.20E-06	4.00E-07	9.0E-07
56	6.4E-07	6.4E-07	6.22E-05	3.42E-05	6.20E-06	8.1E-07	2.4E-07	4.10E-07	4.10E-07	9.0E-07	3.00E-07	6.0E-07
57	5.42E-07	5.42E-07	6.10E-05	3.29E-05	5.40E-06	7.5E-07	1.9E-07	3.20E-07	3.20E-07	7.0E-07	2.20E-07	4.4E-07
58	4.44E-07	4.44E-07	6.00E-05	3.16E-05	4.60E-06	6.9E-07	1.7E-07	2.60E-07	2.60E-07	5.0E-07	1.60E-07	3.2E-07
59	3.46E-07	3.46E-07	5.88E-05	3.03E-05	3.80E-06	6.3E-07	1.5E-07	2.00E-07	2.00E-07	4.0E-07	1.20E-07	2.4E-07
60	2.48E-07	2.48E-07	5.76E-05	2.90E-05	3.00E-06	5.7E-07	1.3E-07	1.60E-07	1.60E-07	3.0E-07	8.0E-08	1.6E-07
61	1.50E-07	1.50E-07	5.64E-05	2.77E-05	2.20E-06	5.1E-07	1.1E-07	1.20E-07	1.20E-07	2.0E-07	5.0E-08	1.0E-07
62	6.4E-08	6.4E-08	5.52E-05	2.64E-05	1.40E-06	4.5E-07	9.0E-08	9.0E-08	9.0E-08	1.0E-07	2.0E-08	4.0E-08
63	5.42E-08	5.42E-08	5.40E-05	2.51E-05	1.22E-06	3.9E-07	7.3E-08	7.3E-08	7.3E-08	8.0E-08	1.2E-08	2.4E-08
64	4.44E-08	4.44E-08	5.28E-05	2.38E-05	1.04E-06	3.3E-07	6.1E-08	6.1E-08	6.1E-08	6.0E-08	8.0E-09	1.6E-08
65	3.46E-08	3.46E-08	5.16E-05	2.25E-05	9.60E-07	2.7E-07	4.9E-08	4.9E-08	4.9E-08	4.0E-08	4.0E-09	8.0E-09
66	2.48E-08	2.48E-08	5.04E-05	2.12E-05	8.80E-07	2.1E-07	4.1E-08	4.1E-08	4.1E-08	3.0E-08	3.0E-09	6.0E-09
67	1.50E-08	1.50E-08	4.92E-05	2.00E-05	8.00E-07	1.5E-07	3.3E-08	3.3E-08	3.3E-08	2.0E-08	2.0E-09	4.0E-09
68	6.4E-09	6.4E-09	4.80E-05	1.87E-05	7.20E-07	9.0E-08	2.5E-08	2.5E-08	2.5E-08	1.0E-08	1.0E-09	2.0E-09
69	5.42E-09	5.42E-09	4.68E-05	1.74E-05	6.40E-07	8.4E-08	2.1E-08	2.1E-08	2.1E-08	8.0E-09	8.0E-10	1.6E-09
70	4.44E-09	4.44E-09	4.56E-05	1.61E-05	5.60E-07	7.8E-08	1.7E-08	1.7E-08	1.7E-08	6.0E-09	6.0E-10	1.2E-09
71	3.46E-09	3.46E-09	4.44E-05	1.48E-05	4.80E-07	7.2E-08	1.3E-08	1.3E-08	1.3E-08	4.0E-09	4.0E-10	8.0E-10
72	2.48E-09	2.48E-09	4.32E-05	1.35E-05	4.00E-07	6.6E-08	1.1E-08	1.1E-08	1.1E-08	3.0E-09	3.0E-10	6.0E-10
73	1.50E-09	1.50E-09	4.20E-05	1.22E-05	3.20E-07	6.0E-08	9.0E-09	9.0E-09	9.0E-09	2.0E-09	2.0E-10	4.0E-10
74	6.4E-10	6.4E-10	4.08E-05	1.10E-05	2.40E-07	5.4E-08	7.3E-09	7.3E-09	7.3E-09	1.0E-09	1.0E-10	2.0E-10
75	5.42E-10	5.42E-10	3.96E-05	9.9E-06	2.00E-07	4.8E-08	6.1E-09	6.1E-09	6.1E-09	8.0E-10	8.0E-11	1.6E-10
76	4.44E-10	4.44E-10	3.84E-05	8.8E-06	1.60E-07	4.2E-08	5.3E-09	5.3E-09	5.3E-09	6.0E-10	6.0E-11	1.2E-10
77	3.46E-10	3.46E-10	3.72E-05	7.7E-06	1.20E-07	3.6E-08	4.5E-09	4.5E-09	4.5E-09	4.0E-10	4.0E-11	8.0E-11
78	2.48E-10	2.48E-10	3.60E-05	6.6E-06	8.0E-08	3.0E-08	3.7E-09	3.7E-09	3.7E-09	3.0E-10	3.0E-11	6.0E-11
79	1.50E-10	1.50E-10	3.48E-05	5.5E-06	6.40E-08	2.4E-08	3.1E-09	3.1E-09	3.1E-09	2.0E-10	2.0E-11	4.0E-11
80	6.4E-11	6.4E-11	3.36E-05	4.4E-06	5.20E-08	1.8E-08	2.5E-09	2.5E-09	2.5E-09	1.0E-10	1.0E-11	2.0E-11
81	5.42E-11	5.42E-11	3.24E-05	3.3E-06	4.00E-08	1.2E-08	2.1E-09	2.1E-09	2.1E-09	8.0E-11	8.0E-12	1.6E-11
82	4.44E-11	4.44E-11	3.12E-05	2.2E-06	3.20E-08	1.0E-08	1.7E-09	1.7E-09	1.7E-09	6.0E-11	6.0E-12	1.2E-11
83	3.46E-11	3.46E-11	3.00E-05	1.1E-06	2.40E-08	8.0E-09	1.3E-09	1.3E-09	1.3E-09	4.0E-11	4.0E-12	8.0E-12
84	2.48E-11	2.48E-11	2.88E-05	9.9E-07	1.60E-08	6.4E-09	1.1E-09	1.1E-09	1.1E-09	3.0E-11	3.0E-12	6.0E-12
85	1.50E-11	1.50E-11	2.76E-05	8.8E-07	1.20E-08	5.6E-09	9.0E-10	9.0E-10	9.0E-10	2.0E-11	2.0E-12	4.0E-12
86	6.4E-12	6.4E-12	2.64E-05	7.7E-07	8.0E-09	4.8E-09	7.3E-10	7.3E-10	7.3E-10	1.0E-11	1.0E-12	2.0E-12
87	5.42E-12	5.42E-12	2.52E-05	6.6E-07	6.40E-09	4.2E-09	6.1E-10	6.1E-10	6.1E-10	8.0E-12	8.0E-13	1.6E-12
88	4.44E-12	4.44E-12	2.40E-05	5.5E-07	5.20E-09	3.6E-09	5.3E-10	5.3E-10	5.3E-10	6.0E-12	6.0E-13	1.2E-12
89	3.46E-12	3.46E-12	2.28E-05	4.4E-07	4.00E-09	3.0E-09	4.5E-10	4.5E-10	4.5E-10	4.0E-12	4.0E-13	8.0E-13
90	2.48E-12	2.48E-12	2.16E-05	3.3E-07	3.20E-09	2.4E-09	3.7E-10	3.7E-10	3.7E-10	3.0E-12	3.0E-13	6.0E-13
91	1.50E-12	1.50E-12	2.04E-05	2.2E-07	2.40E-09	1.8E-09	3.1E-10	3.1E-10	3.1E-10	2.0E-12	2.0E-13	4.0E-13
92	6.4E-13	6.4E-13	1.92E-05	1.1E-07	1.60E-09	1.2E-09	2.5E-10	2.5E-10	2.5E-10	1.0E-12	1.0E-13	2.0E-13
93	5.42E-13	5.42E-13	1.80E-05	9.9E-08	1.20E-09	1.0E-09	2.1E-10	2.1E-10	2.1E-10	8.0E-13	8.0E-14	1.6E-13
94	4.44E-13	4.44E-13	1.68E-05	8.8E-08	8.0E-10	8.4E-10	1.7E-10	1.7E-10	1.7E-10	6.0E-13	6.0E-14	1.2E-13
95	3.46E-13	3.46E-13	1.56E-05	7.7E-08	6.40E-10	7.2E-10	1.3E-10	1.3E-10	1.3E-10	4.0E-13	4.0E-14	8.0E-14
96	2.48E-13	2.48E-13	1.44E-05	6.6E-08	5.20E-10	6.0E-10	1.1E-10	1.1E-10	1.1E-10	3.0E-13	3.0E-14	6.0E-14
97	1.50E-1											

TABLE IV. Collision Strengths Ω for Excitation from the Ground Level to the Given Upper Levels at z and Scattered Electron Energy in Units of z_{eff}^2 Rydbergs, 22-2-92

	E=0.00E	E=0.04E	E=0.10E	E=0.21E	E=0.41E	E=0.73E	E=0.00E	E=0.04E	E=0.10E	E=0.21E	E=0.41E	E=0.73E
22	5.07E-03	4.58E-03	4.14E-03	4.01E-03	4.23E-03	4.40E-03	3.83E-03	3.32E-03	4.38E-03	6.22E-03	4.74E-03	4.49E-03
23	4.98E-03	4.53E-03	3.72E-03	3.93E-03	3.77E-03	4.10E-03	3.34E-03	4.77E-03	4.20E-03	4.73E-03	3.89E-03	4.12E-03
24	4.14E-03	3.74E-03	3.34E-03	3.28E-03	3.28E-03	3.67E-03	4.89E-03	4.37E-03	3.83E-03	3.53E-03	3.57E-03	3.78E-03
25	5.79E-03	5.40E-03	5.03E-03	5.12E-03	5.03E-03	5.31E-03	4.49E-03	4.91E-03	3.34E-03	3.29E-03	3.29E-03	3.47E-03
26	5.44E-03	5.10E-03	4.78E-03	4.63E-03	4.77E-03	5.00E-03	4.12E-03	4.49E-03	3.23E-03	3.00E-03	2.62E-03	2.69E-03
27	3.17E-03	3.84E-03	3.34E-03	3.42E-03	3.53E-03	3.74E-03	3.80E-03	3.40E-03	3.00E-03	2.77E-03	2.78E-03	2.94E-03
28	2.62E-03	2.41E-03	2.32E-03	2.22E-03	2.31E-03	2.51E-03	3.11E-03	3.14E-03	2.77E-03	2.34E-03	2.34E-03	2.51E-03
29	2.49E-03	2.41E-03	2.15E-03	2.04E-03	2.13E-03	2.30E-03	3.43E-03	2.91E-03	2.57E-03	2.34E-03	2.37E-03	2.51E-03
30	2.49E-03	2.32E-03	1.98E-03	1.89E-03	1.94E-03	2.13E-03	3.62E-03	2.70E-03	2.38E-03	2.19E-03	2.20E-03	2.32E-03
31	2.79E-03	2.54E-03	2.04E-03	1.92E-03	1.97E-03	2.16E-03	3.48E-03	2.54E-03	2.22E-03	1.99E-03	2.00E-03	2.12E-03
32	2.13E-03	1.92E-03	1.71E-03	1.62E-03	1.67E-03	1.83E-03	2.42E-03	2.34E-03	2.04E-03	1.90E-03	1.90E-03	2.01E-03
33	2.00E-03	1.73E-03	1.59E-03	1.51E-03	1.57E-03	1.70E-03	2.44E-03	2.18E-03	1.97E-03	1.77E-03	1.77E-03	1.87E-03
34	1.87E-03	1.67E-03	1.49E-03	1.41E-03	1.47E-03	1.59E-03	2.28E-03	2.04E-03	1.80E-03	1.63E-03	1.63E-03	1.73E-03
35	1.73E-03	1.54E-03	1.39E-03	1.32E-03	1.37E-03	1.49E-03	2.14E-03	1.91E-03	1.68E-03	1.52E-03	1.52E-03	1.62E-03
36	1.64E-03	1.47E-03	1.30E-03	1.24E-03	1.29E-03	1.40E-03	2.00E-03	1.79E-03	1.58E-03	1.43E-03	1.43E-03	1.53E-03
37	1.54E-03	1.38E-03	1.22E-03	1.14E-03	1.21E-03	1.31E-03	1.88E-03	1.68E-03	1.48E-03	1.34E-03	1.34E-03	1.44E-03
38	1.43E-03	1.28E-03	1.13E-03	1.04E-03	1.11E-03	1.21E-03	1.74E-03	1.54E-03	1.34E-03	1.20E-03	1.20E-03	1.30E-03
39	1.37E-03	1.22E-03	1.09E-03	1.03E-03	1.07E-03	1.17E-03	1.67E-03	1.49E-03	1.31E-03	1.21E-03	1.21E-03	1.30E-03
40	1.30E-03	1.15E-03	1.02E-03	0.974E-03	1.01E-03	1.10E-03	1.57E-03	1.41E-03	1.24E-03	1.14E-03	1.14E-03	1.21E-03
41	1.23E-03	1.09E-03	0.971E-03	0.921E-03	0.959E-03	1.03E-03	1.49E-03	1.32E-03	1.17E-03	1.08E-03	1.08E-03	1.14E-03
42	1.14E-03	1.04E-03	0.920E-03	0.873E-03	0.909E-03	0.974E-03	1.41E-03	1.24E-03	1.11E-03	1.02E-03	1.02E-03	1.08E-03
43	1.10E-03	0.923E-03	0.773E-03	0.728E-03	0.763E-03	0.844E-03	1.32E-03	1.19E-03	1.05E-03	0.948E-03	0.948E-03	1.00E-03
44	1.03E-03	0.853E-03	0.703E-03	0.657E-03	0.692E-03	0.768E-03	1.24E-03	1.13E-03	0.994E-03	0.884E-03	0.884E-03	0.93E-03
45	0.971E-03	0.808E-03	0.658E-03	0.612E-03	0.647E-03	0.724E-03	1.20E-03	1.07E-03	0.930E-03	0.844E-03	0.844E-03	0.89E-03
46	0.919E-03	0.756E-03	0.606E-03	0.560E-03	0.595E-03	0.672E-03	1.14E-03	1.02E-03	0.874E-03	0.788E-03	0.788E-03	0.84E-03
47	0.905E-03	0.742E-03	0.592E-03	0.546E-03	0.581E-03	0.658E-03	1.08E-03	0.964E-03	0.826E-03	0.740E-03	0.740E-03	0.80E-03
48	0.842E-03	0.679E-03	0.529E-03	0.483E-03	0.518E-03	0.595E-03	1.03E-03	0.915E-03	0.776E-03	0.690E-03	0.690E-03	0.74E-03
49	0.824E-03	0.661E-03	0.511E-03	0.465E-03	0.500E-03	0.577E-03	0.978E-03	0.859E-03	0.720E-03	0.634E-03	0.634E-03	0.69E-03
50	0.761E-03	0.598E-03	0.448E-03	0.402E-03	0.437E-03	0.514E-03	0.920E-03	0.801E-03	0.662E-03	0.576E-03	0.576E-03	0.63E-03
51	0.743E-03	0.580E-03	0.430E-03	0.384E-03	0.419E-03	0.496E-03	0.897E-03	0.778E-03	0.639E-03	0.553E-03	0.553E-03	0.61E-03
52	0.725E-03	0.562E-03	0.412E-03	0.366E-03	0.401E-03	0.478E-03	0.88E-03	0.761E-03	0.622E-03	0.536E-03	0.536E-03	0.59E-03
53	0.692E-03	0.529E-03	0.379E-03	0.333E-03	0.368E-03	0.445E-03	0.850E-03	0.732E-03	0.593E-03	0.507E-03	0.507E-03	0.56E-03
54	0.674E-03	0.511E-03	0.361E-03	0.315E-03	0.350E-03	0.427E-03	0.830E-03	0.712E-03	0.573E-03	0.487E-03	0.487E-03	0.54E-03
55	0.611E-03	0.448E-03	0.298E-03	0.252E-03	0.287E-03	0.364E-03	0.790E-03	0.672E-03	0.533E-03	0.447E-03	0.447E-03	0.50E-03
56	0.593E-03	0.430E-03	0.280E-03	0.234E-03	0.269E-03	0.346E-03	0.760E-03	0.642E-03	0.503E-03	0.417E-03	0.417E-03	0.47E-03
57	0.575E-03	0.412E-03	0.262E-03	0.216E-03	0.251E-03	0.328E-03	0.740E-03	0.622E-03	0.485E-03	0.399E-03	0.399E-03	0.45E-03
58	0.512E-03	0.349E-03	0.200E-03	0.154E-03	0.189E-03	0.270E-03	0.690E-03	0.572E-03	0.433E-03	0.347E-03	0.347E-03	0.40E-03
59	0.500E-03	0.337E-03	0.188E-03	0.142E-03	0.177E-03	0.252E-03	0.670E-03	0.554E-03	0.415E-03	0.329E-03	0.329E-03	0.38E-03
60	0.310E-03	0.147E-03	0.097E-03	0.051E-03	0.086E-03	0.127E-03	0.370E-03	0.304E-03	0.194E-03	0.108E-03	0.108E-03	0.12E-03
61	0.113E-03	0.47E-04	0.07E-04	0.030E-04	0.12E-04	0.44E-04	0.72E-04	0.54E-04	0.35E-04	0.21E-04	0.20E-04	0.48E-04
62	0.94E-04	0.41E-04	0.26E-04	0.17E-04	0.20E-04	0.30E-04	0.49E-04	0.43E-04	0.27E-04	0.16E-04	0.15E-04	0.31E-04
63	0.72E-04	0.24E-04	0.15E-04	0.09E-04	0.11E-04	0.16E-04	0.37E-04	0.32E-04	0.20E-04	0.12E-04	0.11E-04	0.23E-04
64	0.62E-04	0.12E-04	0.08E-04	0.04E-04	0.05E-04	0.07E-04	0.30E-04	0.25E-04	0.15E-04	0.09E-04	0.08E-04	0.19E-04
65	0.47E-04	0.79E-05	0.51E-05	0.32E-05	0.44E-05	0.12E-04	0.17E-04	0.14E-04	0.08E-04	0.05E-04	0.04E-04	0.09E-04
66	0.42E-04	0.84E-05	0.56E-05	0.31E-05	0.25E-05	0.01E-04	0.48E-04	0.21E-04	0.73E-05	0.44E-05	0.34E-05	0.90E-04
67	0.18E-04	0.72E-05	0.24E-05	0.21E-05	0.43E-05	0.90E-05	0.40E-04	0.04E-04	0.59E-05	0.33E-05	0.41E-05	0.74E-05
68	0.05E-04	0.62E-05	0.23E-05	0.12E-05	0.23E-05	0.80E-05	0.32E-04	0.09E-04	0.43E-05	0.21E-05	0.29E-05	0.64E-05
69	0.23E-04	0.51E-05	0.14E-05	0.02E-05	0.24E-05	0.70E-05	0.14E-04	0.374E-05	0.32E-05	0.144E-05	0.31E-05	0.51E-05
70	0.13E-04	0.49E-05	0.12E-05	0.01E-05	0.22E-05	0.62E-05	0.10E-04	0.35E-05	0.30E-05	0.13E-05	0.29E-05	0.49E-05
71	0.49E-04	0.30E-05	0.93E-06	0.85E-06	0.07E-05	0.50E-05	0.89E-05	0.37E-05	0.08E-05	0.87E-06	0.94E-06	0.39E-05
72	0.39E-04	0.20E-05	0.87E-06	0.77E-06	0.29E-05	0.40E-05	0.71E-05	0.34E-05	0.97E-06	0.74E-06	0.84E-06	0.17E-05
73	0.48E-04	0.11E-05	0.29E-06	0.70E-06	0.91E-06	0.39E-05	0.57E-05	0.22E-05	0.84E-06	0.64E-06	0.74E-06	0.07E-05
74	0.38E-04	0.02E-05	0.21E-06	0.42E-06	0.84E-06	0.27E-05	0.44E-05	0.10E-05	0.74E-06	0.87E-06	0.63E-06	0.94E-06
75	0.37E-04	0.94E-06	0.64E-06	0.34E-06	0.74E-06	0.30E-05	0.31E-05	0.299E-05	0.64E-06	0.28E-06	0.33E-06	0.87E-06
76	0.23E-04	0.84E-06	0.54E-06	0.24E-06	0.54E-06	0.12E-05	0.28E-05	0.27E-05	0.54E-06	0.27E-06	0.32E-06	0.79E-06
77	0.11E-04	0.78E-06	0.50E-06	0.20E-06	0.40E-06	0.06E-05	0.26E-05	0.27E-05	0.47E-06	0.28E-06	0.33E-06	0.79E-06
78	0.02E-04	0.70E-06	0.43E-06	0.34E-06	0.57E-06	0.99E-06	0.94E-06	0.47E-06	0.39E-06	0.22E-06	0.30E-06	0.60E-06
79	0.94E-06	0.62E-06	0.37E-06	0.31E-06	0.51E-06	0.97E-06	0.84E-06	0.26E-06	0.30E-06	0.15E-06	0.22E-06	0.52E-06
80	0.84E-06	0.54E-06	0.31E-06	0.23E-06	0.49E-06	0.87E-06	0.75E-06	0.49E-06	0.31E-06	0.07E-06	0.15E-06	0.44E-06
81	0.79E-06	0.50E-06	0.22E-06	0.19E-06	0.40E-06	0.81E-06	0.62E-06	0.40E-06	0.24E-06	0.00E-06	0.07E-06	0.24E-06
82	0.72E-06	0.43E-06	0.19E-06	0.14E-06	0.34E-06	0.73E-06	0.54E-06	0.31E-06	0.04E-06	0.93E-07	0.20E-06	0.29E-06
83	0.67E-06	0.37E-06	0.16E-06	0.11E-06	0.30E-06	0.65E-06	0.50E-06	0.27E-06	0.03E-06	0.84E-07	0.18E-06	0.26E-06
84	0.58E-06	0.31E-06	0.09E-06	0.04E-06	0.24E-06	0.62E-06	0.38E-06	0.15E-06	0.02E-06	0.80E-07	0.87E-07	0.14E-06
85	0.52E-06	0.24E-06	0.04E-06	0.00E-06	0.20E-06	0.40E-06	0.29E-06	0.07E-06	0.18E-06	0.73E-07	0.81E-07	0.20E-06
86	0.45E-06	0.20E-06	0.19E-06	0.19E-06	0.13E-06	0.53E-06	0.21E-06	0.00E-06	0.17E-06	0.67E-07	0.75E-07	0.21E-06
87	0.40E-06	0.13E-06	0.14E-06	0.11E-06	0.21E-06	0.31E-06	0.12E-06	0.12E-06	0.12E-06	0.61E-07	0.69E-07	0.14E-06
88	0.34E-06	0.10E-06	0.10E-06	0.87E-07	0.07E-06	0.44E-06	0.03E-06	0.18E-06	0.14E-06	0.54E-07	0.62E-07	0.18E-06
89	0.29E-06	0.08E-06	0.08E-06	0.02E-06	0.23E-06	0.32E-06	0.19E-06	0.15E-06	0.14E-06	0.50E-07	0.57E-07	0.12E-06
90	0.22E-06	0.06E-06	0.08E-06	0.01E-06	0.19E-06	0.25E-06	0.15E-06	0.15E-06	0.15E-06	0.47E-07	0.54E-07	0.10E-06
91	0.18E-06	0.94E-07	0.17E-06	0.75E-07	0.13E-06	0.34E-06	0.14E-06	0.17E-06	0.14E-06	0.40E-07	0.47E-07	0.11E-06
92	0.13E-06	0.91E-07	0.17E-06	0.70E-07	0.11E-06	0.31E-06	0.17E-06	0.14E-06	0.14E-06	0.35E-07	0.42E-07	0.10E-06

	p4						p3					
	E=0.008	E=0.04	E=0.12	E=0.20	E=0.41	E=0.75	E=0.008	E=0.04	E=0.12	E=0.20	E=0.41	E=0.75
1	2.20E-03	1.84E-02	1.47E-02	1.17E-02	8.84E-04	8.80E-04	1.58E-03	1.21E-03	1.02E-03	8.14E-04	7.53E-04	7.79E-04
2	1.97E-03	1.63E-02	1.28E-02	9.87E-04	8.03E-04	7.78E-04	1.42E-03	1.18E-03	9.15E-04	7.30E-04	7.48E-04	7.17E-04
3	1.77E-03	1.48E-02	1.15E-02	8.79E-04	7.34E-04	7.14E-04	1.28E-03	1.04E-03	8.23E-04	6.54E-04	6.08E-04	6.44E-04
4	1.61E-02	1.34E-02	1.04E-02	7.74E-04	6.72E-04	6.57E-04	1.14E-03	9.37E-04	7.44E-04	5.93E-04	5.50E-04	5.83E-04
5	1.44E-03	1.22E-02	9.48E-04	7.27E-04	6.17E-04	6.07E-04	1.04E-03	8.72E-04	6.74E-04	5.38E-04	4.95E-04	5.31E-04
6	1.33E-03	1.11E-02	8.64E-04	6.64E-04	5.69E-04	5.62E-04	9.41E-04	7.74E-04	6.18E-04	4.98E-04	4.53E-04	4.84E-04
7	1.23E-03	1.02E-02	7.92E-04	6.22E-04	5.30E-04	5.24E-04	8.64E-04	7.13E-04	5.62E-04	4.54E-04	4.14E-04	4.42E-04
8	1.12E-03	9.37E-04	7.30E-04	5.64E-04	4.69E-04	4.64E-04	7.81E-04	6.40E-04	5.17E-04	4.18E-04	3.81E-04	4.07E-04
9	1.02E-03	8.44E-04	6.74E-04	5.20E-04	4.34E-04	4.32E-04	7.30E-04	6.18E-04	4.77E-04	3.78E-04	3.51E-04	3.73E-04
10	9.54E-04	7.79E-04	6.24E-04	4.84E-04	4.23E-04	4.24E-04	6.65E-04	5.71E-04	4.40E-04	3.49E-04	3.24E-04	3.44E-04
11	8.71E-04	7.15E-04	5.79E-04	4.52E-04	3.75E-04	3.98E-04	6.45E-04	5.30E-04	4.08E-04	3.23E-04	3.00E-04	3.21E-04
12	8.23E-04	6.89E-04	5.39E-04	4.22E-04	3.50E-04	3.74E-04	6.04E-04	4.93E-04	3.78E-04	3.00E-04	2.84E-04	3.02E-04
13	7.67E-04	6.42E-04	5.02E-04	3.92E-04	3.47E-04	3.52E-04	5.62E-04	4.59E-04	3.52E-04	2.80E-04	2.60E-04	2.78E-04
14	7.17E-04	6.02E-04	4.71E-04	3.70E-04	3.27E-04	3.32E-04	5.22E-04	4.29E-04	3.30E-04	2.61E-04	2.42E-04	2.62E-04
15	6.71E-04	5.62E-04	4.41E-04	3.48E-04	3.08E-04	3.14E-04	4.80E-04	4.02E-04	3.09E-04	2.44E-04	2.27E-04	2.52E-04
16	6.30E-04	5.28E-04	4.13E-04	3.27E-04	2.91E-04	2.97E-04	4.40E-04	3.77E-04	2.89E-04	2.29E-04	2.13E-04	2.29E-04
17	5.91E-04	4.97E-04	3.92E-04	3.07E-04	2.74E-04	2.80E-04	4.04E-04	3.49E-04	2.68E-04	2.12E-04	1.97E-04	2.14E-04
18	5.58E-04	4.68E-04	3.68E-04	2.92E-04	2.62E-04	2.67E-04	3.70E-04	3.24E-04	2.54E-04	2.02E-04	1.88E-04	2.05E-04
19	5.27E-04	4.42E-04	3.48E-04	2.74E-04	2.47E-04	2.54E-04	3.35E-04	3.13E-04	2.42E-04	1.91E-04	1.77E-04	1.91E-04
20	4.98E-04	4.18E-04	3.26E-04	2.61E-04	2.35E-04	2.42E-04	3.14E-04	2.98E-04	2.28E-04	1.80E-04	1.68E-04	1.81E-04
21	4.72E-04	3.94E-04	3.12E-04	2.48E-04	2.23E-04	2.31E-04	2.94E-04	2.82E-04	2.16E-04	1.71E-04	1.59E-04	1.71E-04
22	4.48E-04	3.74E-04	2.94E-04	2.34E-04	2.12E-04	2.21E-04	2.72E-04	2.67E-04	2.03E-04	1.67E-04	1.56E-04	1.63E-04
23	4.25E-04	3.57E-04	2.81E-04	2.24E-04	2.02E-04	2.11E-04	2.54E-04	2.49E-04	1.92E-04	1.55E-04	1.44E-04	1.51E-04
24	4.03E-04	3.39E-04	2.68E-04	2.14E-04	1.94E-04	2.02E-04	2.35E-04	2.31E-04	1.83E-04	1.46E-04	1.34E-04	1.48E-04
25	3.83E-04	3.23E-04	2.53E-04	2.04E-04	1.85E-04	1.93E-04	2.18E-04	2.14E-04	1.74E-04	1.35E-04	1.29E-04	1.41E-04
26	3.64E-04	3.08E-04	2.43E-04	1.93E-04	1.77E-04	1.84E-04	2.05E-04	2.01E-04	1.67E-04	1.27E-04	1.23E-04	1.34E-04
27	3.46E-04	2.94E-04	2.34E-04	1.84E-04	1.69E-04	1.76E-04	1.92E-04	1.89E-04	1.60E-04	1.24E-04	1.19E-04	1.29E-04
28	3.29E-04	2.82E-04	2.22E-04	1.78E-04	1.63E-04	1.71E-04	1.82E-04	1.79E-04	1.50E-04	1.18E-04	1.14E-04	1.24E-04
29	3.12E-04	2.70E-04	2.14E-04	1.71E-04	1.56E-04	1.65E-04	1.74E-04	1.71E-04	1.48E-04	1.15E-04	1.09E-04	1.18E-04
30	2.96E-04	2.58E-04	2.04E-04	1.64E-04	1.50E-04	1.59E-04	1.62E-04	1.63E-04	1.40E-04	1.10E-04	1.04E-04	1.13E-04
31	2.80E-04	2.48E-04	1.94E-04	1.57E-04	1.44E-04	1.53E-04	1.52E-04	1.53E-04	1.34E-04	1.06E-04	9.95E-05	1.09E-04
32	2.65E-04	2.38E-04	1.88E-04	1.51E-04	1.38E-04	1.47E-04	1.46E-04	1.46E-04	1.28E-04	1.02E-04	9.54E-05	1.03E-04
33	2.50E-04	2.29E-04	1.80E-04	1.45E-04	1.32E-04	1.41E-04	1.40E-04	1.40E-04	1.22E-04	9.75E-05	9.04E-05	1.00E-04
34	2.36E-04	2.20E-04	1.74E-04	1.40E-04	1.28E-04	1.37E-04	1.36E-04	1.36E-04	1.18E-04	9.37E-05	8.63E-05	9.71E-05
35	2.22E-04	2.11E-04	1.67E-04	1.35E-04	1.24E-04	1.33E-04	1.32E-04	1.32E-04	1.14E-04	9.02E-05	8.30E-05	9.41E-05

TABLE IV. Collision Strength Q for Excitation from the Ground Level to the Given Upper Levels as a Function of Z and Scattered Electron Energy in Units of $1/a_0$ Rydbergs, $22/2Z^{3/2}$

M4										M5									
1	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75	E=0.008	E=0.04	E=0.10	E=0.21	E=0.41	E=0.75	E=0.75
57	2.43E-04	2.04E-04	1.61E-04	1.30E-04	1.08E-04	1.28E-04	1.74E-04	1.43E-04	1.10E-04	8.48E-05	6.20E-05	9.09E-05	1.60E-04	1.30E-04	1.04E-04	8.07E-05	7.91E-05	8.79E-05	8.79E-05
58	2.34E-04	1.94E-04	1.53E-04	1.23E-04	1.04E-04	1.24E-04	1.67E-04	1.36E-04	1.04E-04	7.97E-05	5.83E-05	8.79E-05	1.56E-04	1.26E-04	1.00E-04	7.74E-05	7.64E-05	8.51E-05	8.51E-05
59	2.24E-04	1.84E-04	1.43E-04	1.13E-04	0.94E-04	1.14E-04	1.58E-04	1.26E-04	0.94E-04	7.47E-05	5.33E-05	8.29E-05	1.50E-04	1.20E-04	9.47E-05	7.24E-05	7.14E-05	8.01E-05	8.01E-05
60	2.14E-04	1.74E-04	1.33E-04	1.03E-04	0.84E-04	1.04E-04	1.50E-04	1.18E-04	0.84E-04	6.97E-05	4.83E-05	7.79E-05	1.44E-04	1.14E-04	8.97E-05	6.74E-05	6.64E-05	7.51E-05	7.51E-05
61	2.04E-04	1.64E-04	1.23E-04	0.93E-04	0.74E-04	0.94E-04	1.42E-04	1.08E-04	0.74E-04	6.47E-05	4.33E-05	7.19E-05	1.38E-04	1.08E-04	8.47E-05	6.14E-05	6.04E-05	6.91E-05	6.91E-05
62	1.94E-04	1.54E-04	1.13E-04	0.83E-04	0.64E-04	0.84E-04	1.34E-04	1.00E-04	0.64E-04	5.97E-05	3.83E-05	6.59E-05	1.32E-04	1.02E-04	7.97E-05	5.64E-05	5.54E-05	6.41E-05	6.41E-05
63	1.84E-04	1.44E-04	1.03E-04	0.73E-04	0.54E-04	0.74E-04	1.26E-04	9.47E-05	0.54E-04	5.47E-05	3.33E-05	6.09E-05	1.26E-04	9.47E-05	7.47E-05	5.14E-05	5.04E-05	5.91E-05	5.91E-05
64	1.74E-04	1.34E-04	0.93E-04	0.63E-04	0.44E-04	0.64E-04	1.18E-04	8.97E-05	0.44E-04	4.97E-05	2.83E-05	5.59E-05	1.20E-04	8.97E-05	6.97E-05	4.64E-05	4.54E-05	5.41E-05	5.41E-05
65	1.64E-04	1.24E-04	0.83E-04	0.53E-04	0.34E-04	0.54E-04	1.10E-04	8.47E-05	0.34E-04	4.47E-05	2.33E-05	5.09E-05	1.14E-04	8.47E-05	6.47E-05	4.14E-05	4.04E-05	4.91E-05	4.91E-05
66	1.54E-04	1.14E-04	0.73E-04	0.43E-04	0.24E-04	0.44E-04	1.02E-04	7.97E-05	0.24E-04	3.97E-05	1.83E-05	4.59E-05	1.08E-04	7.97E-05	5.97E-05	3.64E-05	3.54E-05	4.41E-05	4.41E-05
67	1.44E-04	1.04E-04	0.63E-04	0.33E-04	0.14E-04	0.34E-04	9.47E-05	7.47E-05	0.14E-04	3.47E-05	1.33E-05	4.09E-05	1.02E-04	7.47E-05	5.47E-05	3.14E-05	3.04E-05	3.91E-05	3.91E-05
68	1.34E-04	0.94E-04	0.53E-04	0.23E-04	0.04E-04	0.24E-04	8.97E-05	6.97E-05	0.04E-04	2.97E-05	8.33E-06	3.61E-05	9.67E-05	6.97E-05	4.97E-05	2.64E-05	2.54E-05	3.41E-05	3.41E-05
69	1.24E-04	0.84E-04	0.43E-04	0.13E-04	-0.06E-04	0.14E-04	8.47E-05	6.47E-05	-0.06E-04	2.47E-05	6.83E-06	3.13E-05	9.17E-05	6.47E-05	4.47E-05	2.14E-05	2.04E-05	2.91E-05	2.91E-05
70	1.14E-04	0.74E-04	0.33E-04	0.03E-04	-0.16E-04	0.04E-04	7.97E-05	5.97E-05	-0.16E-04	1.97E-05	5.33E-06	2.65E-05	8.67E-05	5.97E-05	3.97E-05	1.64E-05	1.54E-05	2.41E-05	2.41E-05
71	1.04E-04	0.64E-04	0.23E-04	-0.07E-04	-0.26E-04	-0.04E-04	7.47E-05	5.47E-05	-0.26E-04	1.47E-05	3.83E-06	2.17E-05	8.17E-05	5.47E-05	3.47E-05	1.14E-05	1.04E-05	1.91E-05	1.91E-05
72	9.47E-05	0.54E-04	0.13E-04	-0.17E-04	-0.36E-04	-0.14E-04	6.97E-05	4.97E-05	-0.36E-04	9.47E-06	2.33E-06	1.69E-05	7.67E-05	4.97E-05	2.97E-05	6.47E-06	6.37E-06	1.41E-05	1.41E-05
73	8.47E-05	0.44E-04	0.03E-04	-0.27E-04	-0.46E-04	-0.24E-04	6.47E-05	4.47E-05	-0.46E-04	8.97E-06	1.83E-06	1.21E-05	7.17E-05	4.47E-05	2.47E-05	5.47E-06	5.37E-06	1.11E-05	1.11E-05
74	7.47E-05	0.34E-04	-0.07E-04	-0.37E-04	-0.56E-04	-0.34E-04	5.97E-05	3.97E-05	-0.56E-04	8.47E-06	1.33E-06	9.47E-06	6.67E-05	3.97E-05	1.97E-05	4.47E-06	4.37E-06	9.47E-06	9.47E-06
75	6.47E-05	0.24E-04	-0.17E-04	-0.47E-04	-0.66E-04	-0.44E-04	5.47E-05	3.47E-05	-0.66E-04	7.97E-06	9.47E-07	8.47E-06	6.17E-05	3.47E-05	1.47E-05	3.47E-06	3.37E-06	8.47E-06	8.47E-06
76	5.47E-05	0.14E-04	-0.27E-04	-0.57E-04	-0.76E-04	-0.54E-04	4.97E-05	2.97E-05	-0.76E-04	7.47E-06	7.47E-07	7.47E-06	5.67E-05	2.97E-05	9.47E-06	2.47E-06	2.37E-06	7.47E-06	7.47E-06
77	4.47E-05	0.04E-04	-0.37E-04	-0.67E-04	-0.86E-04	-0.64E-04	4.47E-05	2.47E-05	-0.86E-04	6.97E-06	5.97E-07	6.97E-06	5.17E-05	2.47E-05	8.47E-06	1.47E-06	1.37E-06	6.97E-06	6.97E-06
78	3.47E-05	-0.06E-04	-0.47E-04	-0.77E-04	-0.96E-04	-0.74E-04	3.97E-05	1.97E-05	-0.96E-04	6.47E-06	4.97E-07	6.47E-06	4.67E-05	1.97E-05	7.47E-06	9.47E-07	8.47E-07	5.97E-06	5.97E-06
79	2.47E-05	-0.16E-04	-0.57E-04	-0.87E-04	-1.06E-04	-0.84E-04	3.47E-05	1.47E-05	-1.06E-04	5.97E-06	3.97E-07	5.97E-06	4.17E-05	1.47E-05	6.47E-06	7.47E-07	6.47E-07	4.97E-06	4.97E-06
80	1.47E-05	-0.26E-04	-0.67E-04	-0.97E-04	-1.16E-04	-0.94E-04	2.97E-05	9.47E-06	-1.16E-04	5.47E-06	2.97E-07	5.47E-06	3.67E-05	9.47E-06	5.47E-06	6.47E-07	5.47E-07	3.97E-06	3.97E-06
81	4.47E-06	-0.36E-04	-0.77E-04	-1.07E-04	-1.26E-04	-1.04E-04	2.47E-05	8.47E-06	-1.26E-04	4.97E-06	1.97E-07	4.97E-06	3.17E-05	8.47E-06	4.97E-06	5.47E-07	4.47E-07	2.97E-06	2.97E-06
82	3.47E-06	-0.46E-04	-0.87E-04	-1.17E-04	-1.36E-04	-1.14E-04	1.97E-05	7.47E-06	-1.36E-04	4.47E-06	1.47E-07	4.47E-06	2.67E-05	7.47E-06	4.47E-06	4.47E-07	3.47E-07	1.97E-06	1.97E-06
83	2.47E-06	-0.56E-04	-0.97E-04	-1.27E-04	-1.46E-04	-1.24E-04	1.47E-05	6.47E-06	-1.46E-04	3.97E-06	9.47E-08	3.97E-06	2.17E-05	6.47E-06	3.97E-06	3.47E-07	2.47E-07	9.47E-07	9.47E-07
84	1.47E-06	-0.66E-04	-1.07E-04	-1.37E-04	-1.56E-04	-1.34E-04	9.47E-06	5.47E-06	-1.56E-04	3.47E-06	7.47E-08	3.47E-06	1.67E-05	5.47E-06	3.47E-06	2.47E-07	1.47E-07	7.47E-07	7.47E-07
85	4.47E-07	-0.76E-04	-1.17E-04	-1.47E-04	-1.66E-04	-1.44E-04	8.47E-06	4.97E-06	-1.66E-04	2.97E-06	5.97E-08	2.97E-06	1.17E-05	4.97E-06	2.97E-06	1.47E-07	9.47E-08	5.97E-07	5.97E-07
86	3.47E-07	-0.86E-04	-1.27E-04	-1.57E-04	-1.76E-04	-1.54E-04	7.47E-06	4.47E-06	-1.76E-04	2.47E-06	4.97E-08	2.47E-06	9.47E-06	4.47E-06	2.47E-06	9.47E-08	4.97E-08	4.97E-07	4.97E-07
87	2.47E-07	-0.96E-04	-1.37E-04	-1.67E-04	-1.86E-04	-1.64E-04	6.47E-06	3.97E-06	-1.86E-04	1.97E-06	3.97E-08	1.97E-06	8.47E-06	3.97E-06	1.97E-06	7.47E-08	3.97E-08	3.97E-07	3.97E-07
88	1.47E-07	-1.06E-04	-1.47E-04	-1.77E-04	-1.96E-04	-1.74E-04	5.47E-06	3.47E-06	-1.96E-04	1.47E-06	2.97E-08	1.47E-06	7.47E-06	3.47E-06	1.47E-06	6.47E-08	2.97E-08	2.97E-07	2.97E-07
89	4.47E-08	-1.16E-04	-1.57E-04	-1.87E-04	-2.06E-04	-1.84E-04	4.47E-06	2.97E-06	-2.06E-04	9.47E-07	1.97E-08	9.47E-07	6.47E-06	2.97E-06	9.47E-07	5.47E-08	1.97E-08	1.97E-07	1.97E-07
90	3.47E-08	-1.26E-04	-1.67E-04	-1.97E-04	-2.16E-04	-1.94E-04	3.47E-06	2.47E-06	-2.16E-04	8.47E-07	1.47E-08	8.47E-07	5.47E-06	2.47E-06	8.47E-07	4.47E-08	1.47E-08	1.47E-07	1.47E-07
91	2.47E-08	-1.36E-04	-1.77E-04	-2.07E-04	-2.26E-04	-2.04E-04	2.47E-06	1.97E-06	-2.26E-04	7.47E-07	9.47E-09	7.47E-07	4.47E-06	1.97E-06	7.47E-07	3.47E-08	9.47E-09	9.47E-08	9.47E-08
92	1.47E-08	-1.46E-04	-1.87E-04	-2.17E-04	-2.36E-04	-2.14E-04	1.47E-06	1.47E-06	-2.36E-04	6.47E-07	7.47E-09	6.47E-07	3.47E-06	1.47E-06	6.47E-07	2.47E-08	7.47E-09	7.47E-08	7.47E-08

TABLE IV. Collision Strengths D for Excitation from the Ground Level to the Given Upper Levels as a Function of Z and Scattered Electron Energy in Units of $\frac{1}{2} m_e v^2$ Rydberg (a.u.).

Z	MB						NI					
	$E=0.008$	$E=0.04$	$E=0.10$	$E=0.21$	$E=0.41$	$E=0.75$	$E=0.008$	$E=0.04$	$E=0.10$	$E=0.21$	$E=0.41$	$E=0.75$
22	4.24E-04	3.14E-04	6.48E-04	8.62E-04	1.11E-03	1.28E-03	1.10E-02	8.77E-03	3.99E-03	3.30E-03	1.35E-03	6.20E-04
23	4.28E-04	3.19E-04	6.72E-04	8.84E-04	1.13E-03	1.29E-03	9.89E-03	7.85E-03	3.26E-03	3.02E-03	1.28E-03	5.34E-04
24	4.28E-04	3.18E-04	6.68E-04	8.74E-04	1.09E-03	1.22E-03	8.91E-03	7.07E-03	4.82E-03	2.71E-03	1.24E-03	4.98E-04
25	4.24E-04	3.12E-04	6.97E-04	8.58E-04	1.07E-03	1.22E-03	8.07E-03	6.49E-03	4.24E-03	2.45E-03	1.12E-03	4.49E-04
26	4.17E-04	3.02E-04	7.14E-04	8.35E-04	1.05E-03	1.18E-03	7.24E-03	5.81E-03	3.95E-03	2.22E-03	1.01E-03	4.07E-04
27	4.08E-04	2.91E-04	7.24E-04	8.07E-04	9.98E-04	1.14E-03	6.70E-03	5.30E-03	3.40E-03	2.02E-03	9.21E-04	3.70E-04
28	3.98E-04	2.77E-04	7.04E-04	7.79E-04	9.39E-04	1.09E-03	6.14E-03	4.89E-03	3.29E-03	1.84E-03	8.41E-04	3.38E-04
29	3.84E-04	2.61E-04	6.84E-04	7.48E-04	9.19E-04	1.02E-03	5.64E-03	4.44E-03	3.02E-03	1.49E-03	7.71E-04	3.10E-04
30	3.74E-04	2.43E-04	6.64E-04	7.14E-04	8.77E-04	9.98E-04	5.20E-03	4.11E-03	2.78E-03	1.34E-03	7.09E-04	2.85E-04
31	3.61E-04	2.28E-04	6.44E-04	6.84E-04	8.35E-04	9.49E-04	4.81E-03	3.80E-03	2.57E-03	1.14E-03	6.34E-04	2.62E-04
32	3.48E-04	2.10E-04	6.19E-04	6.51E-04	7.94E-04	9.02E-04	4.45E-03	3.52E-03	2.37E-03	1.02E-03	5.64E-04	2.40E-04
33	3.34E-04	1.93E-04	5.89E-04	6.19E-04	7.54E-04	8.55E-04	4.13E-03	3.27E-03	2.21E-03	0.92E-03	5.02E-04	2.24E-04
34	3.21E-04	1.74E-04	5.64E-04	5.89E-04	7.15E-04	8.10E-04	3.84E-03	3.03E-03	2.04E-03	0.81E-03	4.32E-04	2.10E-04
35	3.08E-04	1.59E-04	5.44E-04	5.58E-04	6.77E-04	7.67E-04	3.61E-03	2.84E-03	1.92E-03	0.70E-03	4.07E-04	1.94E-04
36	2.93E-04	1.43E-04	5.22E-04	5.29E-04	6.41E-04	7.24E-04	3.39E-03	2.64E-03	1.80E-03	0.60E-03	4.55E-04	1.82E-04
37	2.82E-04	1.27E-04	5.02E-04	5.02E-04	6.04E-04	6.87E-04	3.17E-03	2.45E-03	1.69E-03	0.50E-03	4.24E-04	1.71E-04
38	2.71E-04	1.12E-04	4.81E-04	4.73E-04	5.74E-04	6.50E-04	2.96E-03	2.24E-03	1.58E-03	0.41E-03	4.00E-04	1.61E-04
39	2.59E-04	1.00E-04	4.62E-04	4.50E-04	5.43E-04	6.14E-04	2.80E-03	2.10E-03	1.49E-03	0.32E-03	3.74E-04	1.51E-04
40	2.48E-04	8.84E-05	4.44E-04	4.32E-04	5.15E-04	5.82E-04	2.63E-03	2.00E-03	1.40E-03	0.24E-03	3.54E-04	1.42E-04
41	2.37E-04	7.70E-05	4.27E-04	4.04E-04	4.87E-04	5.52E-04	2.50E-03	1.97E-03	1.32E-03	0.27E-03	3.34E-04	1.34E-04
42	2.27E-04	6.64E-05	4.12E-04	3.84E-04	4.61E-04	5.24E-04	2.34E-03	1.84E-03	1.22E-03	0.24E-03	3.14E-04	1.27E-04
43	2.17E-04	5.64E-05	3.92E-04	3.64E-04	4.34E-04	4.97E-04	2.18E-03	1.71E-03	1.12E-03	0.21E-03	2.94E-04	1.20E-04
44	2.08E-04	4.74E-05	3.71E-04	3.43E-04	4.13E-04	4.72E-04	2.13E-03	1.67E-03	1.12E-03	0.21E-03	2.74E-04	1.14E-04
45	1.99E-04	3.94E-05	3.52E-04	3.28E-04	3.94E-04	4.48E-04	2.02E-03	1.59E-03	1.07E-03	0.20E-03	2.54E-04	1.08E-04
46	1.90E-04	3.24E-05	3.34E-04	3.12E-04	3.74E-04	4.24E-04	1.92E-03	1.51E-03	1.02E-03	0.19E-03	2.34E-04	1.03E-04
47	1.82E-04	2.64E-05	3.17E-04	2.97E-04	3.54E-04	4.04E-04	1.82E-03	1.43E-03	0.97E-03	0.18E-03	2.14E-04	9.77E-05
48	1.74E-04	2.14E-05	3.01E-04	2.82E-04	3.34E-04	3.84E-04	1.74E-03	1.37E-03	0.92E-03	0.17E-03	1.94E-04	9.27E-05
49	1.67E-04	1.64E-05	2.86E-04	2.67E-04	3.13E-04	3.64E-04	1.64E-03	1.31E-03	0.87E-03	0.16E-03	1.74E-04	8.77E-05
50	1.60E-04	1.14E-05	2.70E-04	2.52E-04	2.93E-04	3.44E-04	1.56E-03	1.25E-03	0.82E-03	0.15E-03	1.54E-04	8.27E-05
51	1.53E-04	0.74E-05	2.54E-04	2.44E-04	2.73E-04	3.24E-04	1.48E-03	1.19E-03	0.80E-03	0.14E-03	1.34E-04	7.77E-05
52	1.47E-04	6.34E-06	2.38E-04	2.33E-04	2.53E-04	3.04E-04	1.40E-03	1.14E-03	0.78E-03	0.13E-03	1.14E-04	7.27E-05
53	1.41E-04	5.24E-06	2.22E-04	2.22E-04	2.33E-04	2.84E-04	1.32E-03	1.08E-03	0.76E-03	0.12E-03	0.94E-04	6.77E-05
54	1.35E-04	4.14E-06	2.06E-04	2.13E-04	2.13E-04	2.64E-04	1.24E-03	1.03E-03	0.74E-03	0.11E-03	0.74E-04	6.27E-05
55	1.30E-04	3.04E-06	1.90E-04	2.03E-04	2.03E-04	2.44E-04	1.16E-03	1.01E-03	0.72E-03	0.10E-03	0.54E-04	5.77E-05
56	1.24E-04	2.04E-06	1.74E-04	1.93E-04	1.93E-04	2.24E-04	1.10E-03	0.94E-04	0.70E-03	0.09E-03	0.34E-04	5.27E-05
57	1.19E-04	1.54E-06	1.58E-04	1.83E-04	1.83E-04	2.04E-04	1.04E-03	0.91E-04	0.68E-03	0.08E-03	0.14E-04	4.77E-05
58	1.14E-04	1.04E-06	1.42E-04	1.68E-04	1.68E-04	1.84E-04	9.8E-04	0.84E-04	0.65E-03	0.07E-03	0.14E-04	4.27E-05
59	1.10E-04	7.4E-07	1.26E-04	1.53E-04	1.53E-04	1.64E-04	9.2E-04	0.78E-04	0.63E-03	0.06E-03	0.14E-04	3.77E-05
60	1.06E-04	6.4E-07	1.10E-04	1.38E-04	1.38E-04	1.44E-04	8.6E-04	0.72E-04	0.61E-03	0.05E-03	0.14E-04	3.27E-05
61	1.02E-04	5.4E-07	9.4E-05	1.23E-04	1.23E-04	1.24E-04	8.0E-04	0.66E-04	0.59E-03	0.04E-03	0.14E-04	2.77E-05
62	9.76E-05	4.4E-07	8.4E-05	1.08E-04	1.08E-04	1.14E-04	7.4E-04	0.60E-04	0.57E-03	0.03E-03	0.14E-04	2.27E-05
63	9.28E-05	3.4E-07	7.4E-05	9.4E-05	9.4E-05	1.04E-04	6.8E-04	0.54E-04	0.55E-03	0.02E-03	0.14E-04	1.77E-05
64	8.80E-05	2.4E-07	6.4E-05	8.4E-05	8.4E-05	9.4E-05	6.2E-04	0.48E-04	0.53E-03	0.01E-03	0.14E-04	1.27E-05
65	8.32E-05	1.4E-07	5.4E-05	7.4E-05	7.4E-05	8.4E-05	5.6E-04	0.42E-04	0.51E-03	0.00E-03	0.14E-04	7.7E-06
66	7.84E-05	4.4E-08	4.4E-05	6.4E-05	6.4E-05	7.4E-05	5.0E-04	0.36E-04	0.49E-03	0.00E-03	0.14E-04	2.7E-06
67	7.36E-05	3.4E-08	3.4E-05	5.4E-05	5.4E-05	6.4E-05	4.4E-04	0.30E-04	0.47E-03	0.00E-03	0.14E-04	1.7E-06
68	6.88E-05	2.4E-08	2.4E-05	4.4E-05	4.4E-05	5.4E-05	3.8E-04	0.24E-04	0.45E-03	0.00E-03	0.14E-04	7.7E-07
69	6.40E-05	1.4E-08	1.4E-05	3.4E-05	3.4E-05	4.4E-05	3.2E-04	0.18E-04	0.43E-03	0.00E-03	0.14E-04	2.7E-07
70	5.92E-05	4.4E-09	4.4E-06	2.4E-05	2.4E-05	3.4E-05	2.6E-04	0.12E-04	0.41E-03	0.00E-03	0.14E-04	1.7E-07
71	5.44E-05	3.4E-09	3.4E-06	1.4E-05	1.4E-05	2.4E-05	2.0E-04	6.4E-05	0.39E-03	0.00E-03	0.14E-04	7.7E-08
72	4.96E-05	2.4E-09	2.4E-06	4.4E-06	4.4E-06	1.4E-05	1.4E-04	4.4E-05	0.37E-03	0.00E-03	0.14E-04	2.7E-08
73	4.48E-05	1.4E-09	1.4E-06	3.4E-06	3.4E-06	4.4E-06	8.4E-05	3.4E-05	0.35E-03	0.00E-03	0.14E-04	1.7E-08
74	4.00E-05	4.4E-10	4.4E-07	2.4E-06	2.4E-06	3.4E-06	7.4E-05	2.4E-05	0.33E-03	0.00E-03	0.14E-04	7.7E-09
75	3.52E-05	3.4E-10	3.4E-07	1.4E-06	1.4E-06	2.4E-06	6.4E-05	1.4E-05	0.31E-03	0.00E-03	0.14E-04	2.7E-09
76	3.04E-05	2.4E-10	2.4E-07	4.4E-07	4.4E-07	1.4E-06	5.4E-05	4.4E-06	0.29E-03	0.00E-03	0.14E-04	1.7E-09
77	2.56E-05	1.4E-10	1.4E-07	3.4E-07	3.4E-07	4.4E-07	4.4E-05	3.4E-06	0.27E-03	0.00E-03	0.14E-04	7.7E-10
78	2.08E-05	4.4E-11	4.4E-08	2.4E-07	2.4E-07	3.4E-07	3.4E-05	2.4E-06	0.25E-03	0.00E-03	0.14E-04	2.7E-10
79	1.60E-05	3.4E-11	3.4E-08	1.4E-07	1.4E-07	2.4E-07	2.4E-05	1.4E-06	0.23E-03	0.00E-03	0.14E-04	1.7E-10
80	1.12E-05	2.4E-11	2.4E-08	4.4E-08	4.4E-08	1.4E-07	1.4E-05	4.4E-07	0.21E-03	0.00E-03	0.14E-04	7.7E-11
81	6.4E-06	1.4E-11	1.4E-08	3.4E-08	3.4E-08	4.4E-08	4.4E-06	3.4E-07	0.19E-03	0.00E-03	0.14E-04	2.7E-11
82	5.4E-06	4.4E-12	4.4E-09	2.4E-08	2.4E-08	3.4E-08	3.4E-06	2.4E-07	0.17E-03	0.00E-03	0.14E-04	1.7E-11
83	4.4E-06	3.4E-12	3.4E-09	1.4E-08	1.4E-08	2.4E-08	2.4E-06	1.4E-07	0.15E-03	0.00E-03	0.14E-04	7.7E-12
84	3.4E-06	2.4E-12	2.4E-09	4.4E-09	4.4E-09	1.4E-08	1.4E-06	4.4E-08	0.13E-03	0.00E-03	0.14E-04	2.7E-12
85	2.4E-06	1.4E-12	1.4E-09	3.4E-09	3.4E-09	4.4E-09	4.4E-07	3.4E-08	0.11E-03	0.00E-03	0.14E-04	1.7E-12
86	1.4E-06	4.4E-13	4.4E-10	2.4E-09	2.4E-09	3.4E-09	3.4E-07	2.4E-08	0.09E-03	0.00E-03	0.14E-04	7.7E-13
87	4.4E-07	3.4E-13	3.4E-10	1.4E-09	1.4E-09	2.4E-09	2.4E-07	1.4E-08	0.07E-03	0.00E-03	0.14E-04	2.7E-13
88	3.4E-07	2.4E-13	2.4E-10	4.4E-10	4.4E-10	1.4E-09	1.4E-07	4.4E-09	0.05E-03	0.00E-03	0.14E-04	1.7E-13
89	2.4E-07	1.4E-13	1.4E-10	3.4E-10	3.4E-10	4.4E-10	4.4E-08	3.4E-09	0.03E-03	0.00E-03	0.14E-04	7.7E-14
90	1.4E-07	4.4E-14	4.4E-11	2.4E-10	2.4E-10	3.4E-10	3.4E-08	2.4E-09	0.01E-03	0.00E-03	0.14E-04	2.7E-14
91	4.4E-08	3.4E-14	3.4E-11	1.4E-10	1.4E-10	2.4E-10	2.4E-08	1.4E-09	0.00E-03	0.00E-03	0.14E-04	1.7E-14
92	3.4E-08	2.4E-14	2.4E-11	4.4E-11	4.4E-11	1.4E-10	1.4E-08	4.4E-10	0.00E-03	0.00E-03	0.14E-04	7.7E-15

TABLE IV. Collision Strengths C for Excitation from the Ground Level to the Given Upper Levels as Function of Z and Scattered Electron Energy in Units of E_{211}^0 Rydbergs, 22(2,9)

Z	NO						NO					
	$E=0.008$	$E=0.04$	$E=0.10$	$E=0.25$	$E=0.4$	$E=0.75$	$E=0.008$	$E=0.04$	$E=0.10$	$E=0.25$	$E=0.4$	$E=0.75$
57	4.10E-04	3.23E-04	2.31E-04	1.23E-04	5.78E-05	3.37E-05	1.05E-04	8.07E-05	5.27E-05	2.82E-05	1.22E-05	4.71E-06
58	3.95E-04	3.13E-04	2.12E-04	1.20E-04	5.54E-05	3.28E-05	1.01E-04	7.74E-05	5.07E-05	2.71E-05	1.18E-05	4.54E-06
59	3.80E-04	3.01E-04	2.02E-04	1.14E-04	5.34E-05	3.19E-05	9.67E-05	7.44E-05	4.88E-05	2.61E-05	1.12E-05	4.37E-06
60	3.67E-04	2.91E-04	1.90E-04	1.15E-04	5.17E-05	3.12E-05	9.30E-05	7.17E-05	4.67E-05	2.51E-05	1.07E-05	4.21E-06
61	3.54E-04	2.80E-04	1.81E-04	1.06E-04	4.98E-05	3.04E-05	8.94E-05	6.90E-05	4.51E-05	2.42E-05	1.05E-05	4.04E-06
62	2.42E-04	2.71E-04	1.84E-04	1.04E-04	4.81E-05	2.97E-05	8.60E-05	6.44E-05	4.33E-05	2.33E-05	1.01E-05	3.91E-06
63	3.31E-04	2.62E-04	1.78E-04	1.01E-04	4.63E-05	2.90E-05	8.27E-05	6.29E-05	4.18E-05	2.24E-05	9.74E-06	3.77E-06
64	3.20E-04	2.53E-04	1.72E-04	9.72E-05	4.49E-05	2.84E-05	7.94E-05	6.13E-05	4.03E-05	2.14E-05	9.41E-06	3.64E-06
65	2.09E-04	2.45E-04	1.67E-04	9.40E-05	4.35E-05	2.78E-05	7.64E-05	5.92E-05	3.89E-05	2.06E-05	9.07E-06	3.51E-06
66	2.99E-04	2.37E-04	1.61E-04	9.10E-05	4.21E-05	2.72E-05	7.37E-05	5.70E-05	3.74E-05	2.01E-05	8.70E-06	3.38E-06
67	2.90E-04	2.29E-04	1.54E-04	8.82E-05	4.07E-05	2.67E-05	7.10E-05	5.49E-05	3.60E-05	1.93E-05	8.44E-06	3.25E-06
68	2.81E-04	2.22E-04	1.51E-04	8.54E-05	3.95E-05	2.62E-05	6.83E-05	5.29E-05	3.47E-05	1.84E-05	8.14E-06	3.15E-06
69	2.72E-04	2.14E-04	1.47E-04	8.28E-05	3.82E-05	2.57E-05	6.58E-05	5.09E-05	3.33E-05	1.80E-05	7.84E-06	3.04E-06
70	2.64E-04	2.09E-04	1.43E-04	8.03E-05	3.71E-05	2.52E-05	6.34E-05	4.91E-05	3.22E-05	1.72E-05	7.58E-06	2.94E-06
71	2.57E-04	2.03E-04	1.38E-04	7.80E-05	3.60E-05	2.47E-05	6.11E-05	4.73E-05	3.11E-05	1.67E-05	7.32E-06	2.84E-06
72	2.49E-04	1.97E-04	1.34E-04	7.57E-05	3.50E-05	2.42E-05	5.88E-05	4.54E-05	3.00E-05	1.61E-05	7.04E-06	2.74E-06
73	2.42E-04	1.92E-04	1.30E-04	7.32E-05	3.40E-05	2.37E-05	5.67E-05	4.39E-05	2.89E-05	1.54E-05	6.82E-06	2.64E-06
74	2.35E-04	1.84E-04	1.27E-04	7.13E-05	3.30E-05	2.32E-05	5.46E-05	4.23E-05	2.79E-05	1.50E-05	6.59E-06	2.54E-06
75	2.29E-04	1.81E-04	1.23E-04	6.95E-05	3.21E-05	2.27E-05	5.24E-05	4.08E-05	2.69E-05	1.43E-05	6.34E-06	2.47E-06
76	2.23E-04	1.74E-04	1.20E-04	6.74E-05	3.12E-05	2.22E-05	5.07E-05	3.93E-05	2.59E-05	1.40E-05	6.14E-06	2.37E-06
77	2.17E-04	1.71E-04	1.17E-04	6.56E-05	3.04E-05	2.18E-05	4.86E-05	3.79E-05	2.50E-05	1.35E-05	5.93E-06	2.30E-06
78	2.11E-04	1.67E-04	1.14E-04	6.40E-05	2.94E-05	2.13E-05	4.70E-05	3.63E-05	2.41E-05	1.30E-05	5.73E-06	2.23E-06
79	2.03E-04	1.63E-04	1.11E-04	6.24E-05	2.88E-05	2.08E-05	4.53E-05	3.52E-05	2.33E-05	1.24E-05	5.53E-06	2.13E-06
80	2.00E-04	1.59E-04	1.08E-04	6.08E-05	2.80E-05	2.03E-05	4.37E-05	3.39E-05	2.24E-05	1.22E-05	5.33E-06	2.08E-06
81	1.93E-04	1.54E-04	1.03E-04	5.92E-05	2.72E-05	2.00E-05	4.21E-05	3.27E-05	2.17E-05	1.17E-05	5.14E-06	2.01E-06
82	1.90E-04	1.51E-04	1.02E-04	5.77E-05	2.67E-05	1.97E-05	4.05E-05	3.15E-05	2.09E-05	1.13E-05	4.95E-06	1.94E-06
83	1.84E-04	1.47E-04	1.00E-04	5.62E-05	2.60E-05	1.94E-05	3.90E-05	3.04E-05	2.01E-05	1.09E-05	4.82E-06	1.88E-06
84	1.81E-04	1.43E-04	9.79E-05	5.50E-05	2.54E-05	1.91E-05	3.74E-05	2.93E-05	1.94E-05	1.04E-05	4.69E-06	1.82E-06
85	1.77E-04	1.40E-04	9.52E-05	5.37E-05	2.48E-05	1.87E-05	3.62E-05	2.82E-05	1.87E-05	1.02E-05	4.50E-06	1.74E-06
86	1.73E-04	1.37E-04	9.30E-05	5.24E-05	2.42E-05	1.87E-05	3.49E-05	2.72E-05	1.81E-05	9.83E-06	4.34E-06	1.70E-06
87	1.69E-04	1.33E-04	9.08E-05	5.12E-05	2.34E-05	1.84E-05	3.36E-05	2.62E-05	1.74E-05	9.48E-06	4.19E-06	1.64E-06
88	1.65E-04	1.30E-04	8.88E-05	5.00E-05	2.31E-05	1.82E-05	3.23E-05	2.52E-05	1.68E-05	9.15E-06	4.03E-06	1.59E-06
89	1.61E-04	1.27E-04	8.68E-05	4.89E-05	2.23E-05	1.81E-05	3.11E-05	2.43E-05	1.62E-05	8.82E-06	3.91E-06	1.53E-06
90	1.58E-04	1.25E-04	8.48E-05	4.78E-05	2.20E-05	1.81E-05	2.99E-05	2.34E-05	1.54E-05	8.52E-06	3.78E-06	1.48E-06
91	1.54E-04	1.22E-04	8.30E-05	4.67E-05	2.14E-05	1.81E-05	2.88E-05	2.23E-05	1.50E-05	8.21E-06	3.65E-06	1.42E-06
92	1.51E-04	1.19E-04	8.12E-05	4.57E-05	2.11E-05	1.82E-05	2.77E-05	2.17E-05	1.43E-05	7.92E-06	3.52E-06	1.38E-06