ISSN 0915-6364

NATIONAL INSTITUTE FOR FUSION SCIENCE

Partial and Total Electronic Stopping Cross Sections of Atoms for a Singly Charged Helium Ion: Part I

T. Kaneko, T. Nishihara, T. Taguchi, K. Nakagawa, M. Murakami, M. Hosono, S. Matsushita, K. Hayase, M. Moriya, Y. Matsukuma, K. Miura and H. Tawara

(Received — Mar. 7, 1991)

NIFS-DATA-11 Mar. 1991

RESEARCH REPORT
NIFS-DATA Series

NAGOYA, JAPAN

PARTIAL AND TOTAL ELECTRONIC STOPPING CROSS SECTIONS OF ATOMS FOR A SINGLY CHARGED HELIUM ION : PART I

T. KANEKO#,*, T. NISHIHARA*, T. TAGUCHI*, K. NAKAGAWA*,
M. MURAKAMI*, M. HOSONO*, S. MATSUSHITA*, K. HAYASE*,
M. MORIYA*, Y. MATSUKUMA*, K. MIURA* AND HIRO TAWARA#

National Institute for Fusion Science
Nagoya 464-01, Japan

* Department of Applied Physics, Okayama University of Science
Ridaicho, Okayama 700, Japan

Partial and total electronic stopping cross sections of atoms with Z ($2 \leq Z \leq 54$) for a He^+ ion are tabulated on the basis of the wave-packet theory [Phys.Rev. A40,2188(1989); Phys.Stat.Sol. (B)156,49(1989)].

[key words ; electronic stopping, partial cross section, total cross section, a singly charged helium ion, wave packet theory]

The electronic stopping power of matter for energetic ions has attracted our attention theoretically[1-11] as well as experimentally because it is one of the basic problems in the studies of both the plasma-wall interaction in a fusion reactor and the atomic collision phenomena in solids. So far, the theoretical estimates have been performed of the stopping for both a free electron gas[1-4] and atomic electrons based either on Born approximation[5,6] or on the momentum exchange between electron clouds of a projectile and of a target atom[7]. In addition, the density functional calculations [8], the binary-encounter theory[9], and the calculations on the basis of the local electron density models[10,11] were also made. Recently, some effort has been made to estimate shellwise partial stoppings on the basis of binary-encounter model[12]. The effect of the variation of the ion size on the electronic stopping and straggling due to the static screening has also been discussed[13].

Most of experiments performed have been aimed at the electronic energy loss of an ion with point charge. Lately, however, as significant progress has been made in high energy resolution and charge separation techniques, more detailed information has come to be brought. A typical example is a recent measurement of the electronic stopping power of a thin carbon foil ($2 - 100 \mu g/cm^2$) for 32 MeV $^3He^+$ ions[14]. The charge state of emerging ions has been chosen to be the same as that of the incident ions. In thinner foils ($< 40 \mu g/cm^2$), it is confirmed that the charge exchange processes do not occur significantly during the passage of He^+ ions. In thicker foils ($> 40 \mu g/cm^2$), the energy loss spectra observed display double peaks, where the

lower energy peak is understood to be due to the He^+ ions which has not undergone the charge exchange reaction inside the foils. This experiment indicates clearly the necessity of the stopping power data for partially stripped ions in a frozen charge state. These data are found to agree with the recent analytical formula [15].

The wave packet theory of the stopping of bound electrons has recently been developed and presented in detail[16]. The main thrust of the wave packet theory is the use of momentum space representation to describe bound electrons, where the localized nature is held in the momentum distribution function. This theory yields the electronic stopping cross section of atoms and solids[17,18] and the energy-loss straggling of atoms[19] for protons on the independent shell model. The aim of this report is to present the tables of the partial and total electronic stopping cross sections for a He^+ ion in collisions with neutral target atoms. Hereafter, m, e, v_0, a_0, and $\hbar$ denote the electron rest mass, the elementary charge, the Bohr velocity, the Bohr radius and the Planck constant divided by 2π, respectively.

As the basic treatment was already described in detail in other articles[16], only the main results are presented briefly here. In this method the core electrons belonging to an atomic shell classified by (n,l) (n : principal quantum number, l : angular momentum quantum number) are considered to be identical. The ensemble of such identical electrons is regarded as a wave packet of a degenerate electron gas governed by the momentum occupation probability W(q) for momentum q. The function form of W(q) is determined to be

$$W(q) = \exp(- q^2 / \bar{Q}^2) \ , \qquad (1)$$

where the characteristic momentum $\bar{Q}$ for the shell (n,l) is given as

$$\bar{Q} = Q \, N^{1/3} \ ,$$

$$Q = [\{ f_{HF}(0) \}^{-2/3} / \pi \ ]^{1/2} \ , \qquad (2)$$

in atomic units. Here $f_{HF}(0)$ denotes the one-electron Hartree-Fock(HF) momentum distribution $f_{HF}(q)$ calculated from the corresponding double zeta wavefunctions [20,21], and N is the number of electrons in the shell (n,l). The calculated values of Q are shown in figures 1 and 2.

The dielectric function of the electronic shell considered can be expressed by the reduced variables z and u as follows:

$$\varepsilon (z,u) = 1 + \chi^2 / z^2 \ [\ f_1(z,u) + i \ f_2(z,u) \ ] \ , \qquad (3)$$

$$f_1(z,u) = (\pi)^{1/2} / (4z) \ [\ G(u+z) - G(u-z) \ ] \ , \qquad (4)$$

$$f_2(z,u) = \pi / (8z) \ [\ \exp\{ -(u-z)^2 \} - \exp\{ -(u+z)^2 \} \ ] \ , \qquad (5)$$

$$G(y) = y \exp(-y^2) \ \Phi \ (1/2, \ 3/2, \ y^2) \ , \qquad (6)$$

in the framework of the linear response theory. Here, the variables z and u are related to the conventional variable for momentum transfer, $\hbar k$, and that for energy transfer, $\hbar\omega$, via

$z=k/(2\bar{Q})$ and $u=\omega/(k\bar{Q})$. In eq.(3), χ is expressed as $\chi^2=1/(\pi\bar{Q})$ and $\Phi(1/2,3/2,y^2)$ denotes a degenerate hypergeometric function which is described[22] as

$$\Phi(a,b,x) = 1 + (a/b)x + \{a(a+1)/b(b+1)\}x^2/2! + \cdots \quad (7)$$

The stopping power S of a single shell for a partially stripped ion with nuclear charge Z_1e moving at velocity V on a straight-line trajectory is calculated as

$$S = 4\pi e^4/(mV^2)\cdot N_E\cdot L \ , \quad (8)$$

$$L = 8/(\pi^{3/2}\chi^2)\int_0^{\infty} dz\ z\ |Z_1 - \rho(2Qz)|^2 \int_0^{V/\bar{v}} du\ u\ \mathrm{Im}\{\varepsilon^{-1}(z,u)-1\}, \quad (9)$$

where $\bar{v}=\bar{Q}/m$ and N_E denotes the number density of electrons in the shell considered. The factor $\rho(2Qz)$ denotes the form factor of the projectile defined as the Fourier transform of the spatial distribution $\rho(\vec{r})$: $\rho(\vec{q}) = \int d^3r\ \rho(\vec{r})\exp(-i\vec{q}\vec{r})$. In the case of a hydrogen-like ion with atomic number Z_1, we have the following:

$$\rho(q) = [\ 1 + (qa/2)^2\ ]^{-2} \ , \quad (10)$$

using the relation $\rho(r)=|\Psi(r)|^2$, where $\Psi(r)$, the 1s state wave function, is given as $\Psi(r)=(\pi a^3)^{-1/2}\exp(-r/a)$ with $a=a_0/Z_1$. In particular, one has $a=0.5a_0$ for a singly charged helium ion.

In order to describe the stopping power for a partially

stripped ion S_Z (eq.(8)), relative to that for a proton S_H, it is convenient to introduce the concept of the effective charge Z_{EFF} for the ion which is defined by

$$Z_{EFF} = \{ S_Z / S_H \}^{1/2}. \qquad (11)$$

A general feature of the effective charge is summarized as follows: at low velocities the screening effect of bound electrons is rather strong so that the target electrons are scattered by the effective ion charge smaller than the nuclear charge Z. As the velocity increases, the effective charge becomes large because the target electrons undergo a hard collision with the ion. According to the recent theory[15], the effective charge of a He^+ ion is described by

$$Z_{EFF} = [\{ \ln(2mV^2/I) + 3 \ln(V/2v_0) + 13/12 \} / \ln(2mV^2/I)]^{1/2}, \qquad (12)$$

where I denotes the mean excitation energy of a target atom. The calculated effective charge of a He^+ ion based on the wave-packet theory is plotted in figs.3-6 for He up to Al targets. In figure 4, the broken line indicates the result of eq.(12) for a carbon target(I=77.3eV), which is compared with the experimental data by Ogawa et al. [14]. These figures display that there is only very slight difference in Z_{EFF} at high velocities among various targets. On the other hand, at low velocities, the target dependence of Z_{EFF} appears more clearly. In this velocity region,

high Q value leads to high Z_{EFF} value in principle. Figure 7 shows the target dependence of Z_{EFF} at $V=0.2V_0$, which displayes the shell effect. For the atom with a closed shell configuration, Z_{EFF} becoms maximal because of the above reason. On the contrary, the outermost shell of alkali atoms has rather small Q value which results in small Z_{EFF} value.

The partial and total stopping power of neutral atoms for a He^+ ion are tabulated at energies ranging from 1 keV/amu to 10^4 keV/amu. How to read these tables of He^+ stopping is explained in EXPLANATION OF TABLES. Finally, this report will be followed by the second one as PART II, in which Z_2 ranges up to 92.

REFERENCES

[1]. R.H. Ritchie, Phys.Rev.114,644(1959).

[2]. J. Neufeld and R.H. Ritchie, Phys.Rev.98,1632(1955).

[3]. J. Lindhard,K.Dan.Vidensk.Selsk.Mat.-Fys.Medd.28,(1954)no.8.

[4]. J. Lindhard and A. Winther, K.Dan.Vidensk.Selsk.Mat.-Fys. Medd.34(1964)no.4.

[5]. H. A. Bethe, Ann.Phys.(Leipzig)5,325(1930).

[6]. F. Bloch, Ann.Phys.(Leipzig)16,285(1933).

[7]. O. B. Firsov, Zh.Eksp.Teor.Fiz.36,1517(1959).[Sov.Phys. -JETP 9,1076(1959)].

[8]. P. M. Echenique, R. M. Nieminen, and R. H. Ritchie, Solid State Comm.37(1986)779.

[9]. P. Sigmund, Phys.Rev.A26,2497(1982).

[10]. I. Gertner, M. Meron, and B. Rosner, Phys.Rev.A18,2022 (1978);A21,1191(1980).

[11]. Toshiaki Kaneko, Phys.Rev.A30,1714(1984);A33,1602(1986).

[12]. J. Oddershede and J.R. Sabin, At.Data and Nucl.Data Tables 31,275(1984).

[13]. Toshiaki Kaneko, Phys.Rev. A41,4899(1990).

[14]. H. Ogawa, I. Katayama, Y. Haruyama, F. Fukuzawa, K. Yoshida, A. Aoki, M. Tosaki, I. Sugai, T. Kaneko, and H. Ikegami, Phys.Rev.B(1991) (in print).

[15]. Toshiaki Kaneko, Phys.Rev. A(1991)(in print).

[16]. Toshiaki Kaneko, Phys.Rev. A40, 2188(1989); Phys.Stat.Sol. (b)156,49(1989).

[17]. T. Kaneko, IPPJ(Nagoya University)-AM 63,1(1989).

[18]. T. Kaneko, NIFS(National Institute for Fusion Science) DATA 9,1(1990).

[19]. T. Kaneko, NIFS(National Institute for Fusion Science) DATA 3,1(1990).

[20]. E. Clementi and C. Roetti, At.Data and Nucl.Data Tables 14,177(1974).

[21]. A.D. McLean and R.S. McLean, At.Data and Nucl.Data Tables 26,197(1981).

[22]. I. S. Gradshteyn and I. M. Ryzhik,'Table of Integrals, Series, and Products'(Academic Press, 1980).

FIGURE CAPTIONS

Figures 1 and 2:

The values of parameter Q with respect to Z_2, determined from the double zeta wavefunctions[20]. The Q values for Li atom are calculated using the Roothan-Hartree-Fock wavefunctions because the double zeta functions in [20] have been found in error.

Figure 3:

Calculated effective charge Z_{EFF} of a singly charged helium ion passing through He, Li, and Be targets versus the velocity V in units of V_0.

Figure 4:

Calculated effective charge Z_{EFF} of a singly charged helium ion passing through B, C, and N targets versus the velocity V in units of V_0. The broken line indicates the theoretical result of eq.(12) for C target[15] and the experimental data at $V=20.7V_0$ is obtained for C target by Ogawa et al. [14].

Figure 5:

Calculated effective charge Z_{EFF} of a singly charged helium ion passing through O, F, and Ne targets versus the velocity V in units of V_0.

Figure 6:

Calculated effective charge Z_{EFF} of a singly charged helium ion passing through Na, Mg, and Al targets versus the velocity V in units of V_0.

Figure 7:

Calculated effective charge Z_{EFF} of a singly charged helium ion at $V=0.2V_0$ with respect to target atomic number.

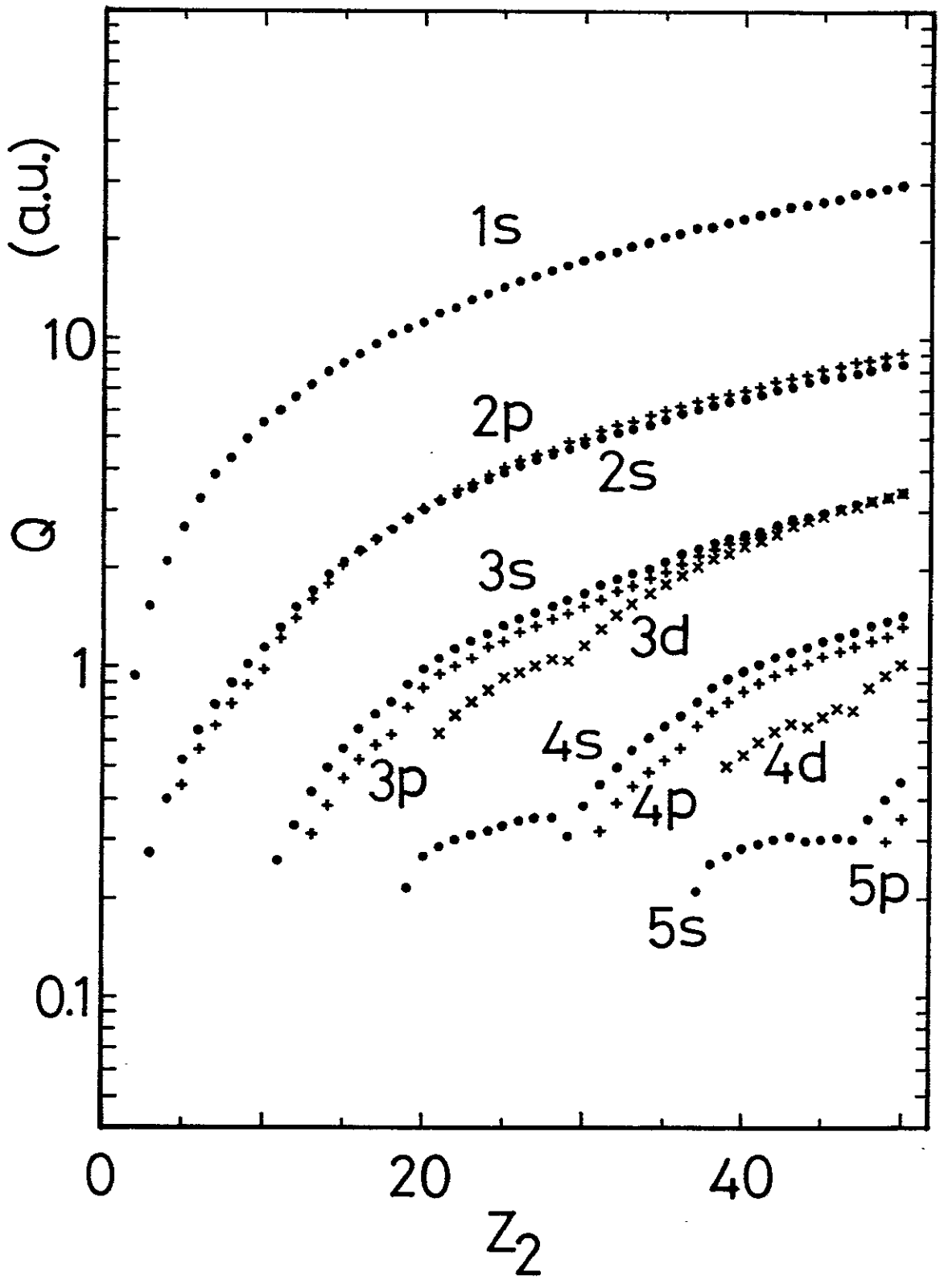

figure 1

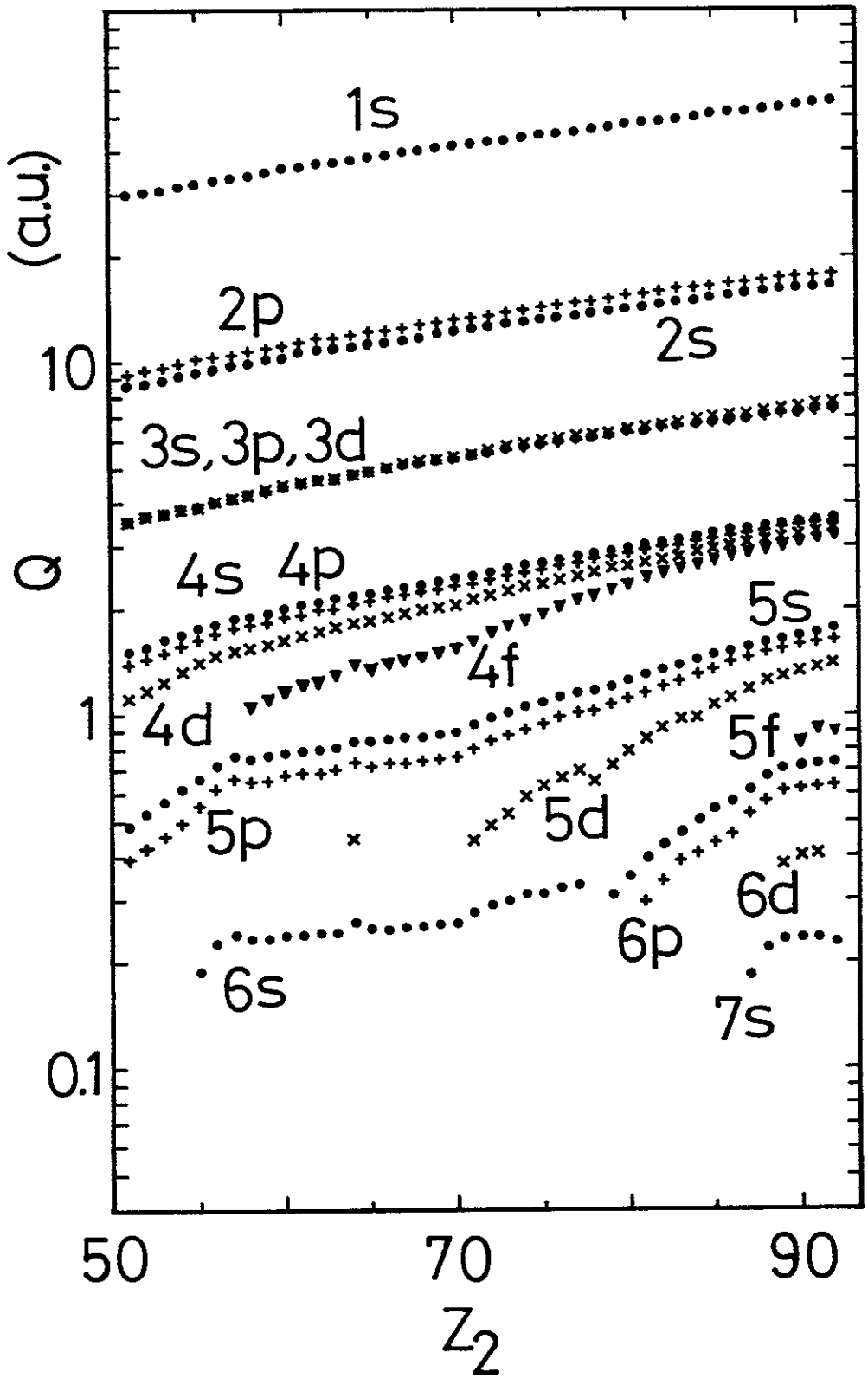
1s
2p
2s
3s, 3p, 3d
4s
4p
4f
4d
5s
5f
5p
5d
6d
6p
6s
7s
Q (a.u.)
10
1
0.1
50
70
90
Z_2

figure 2

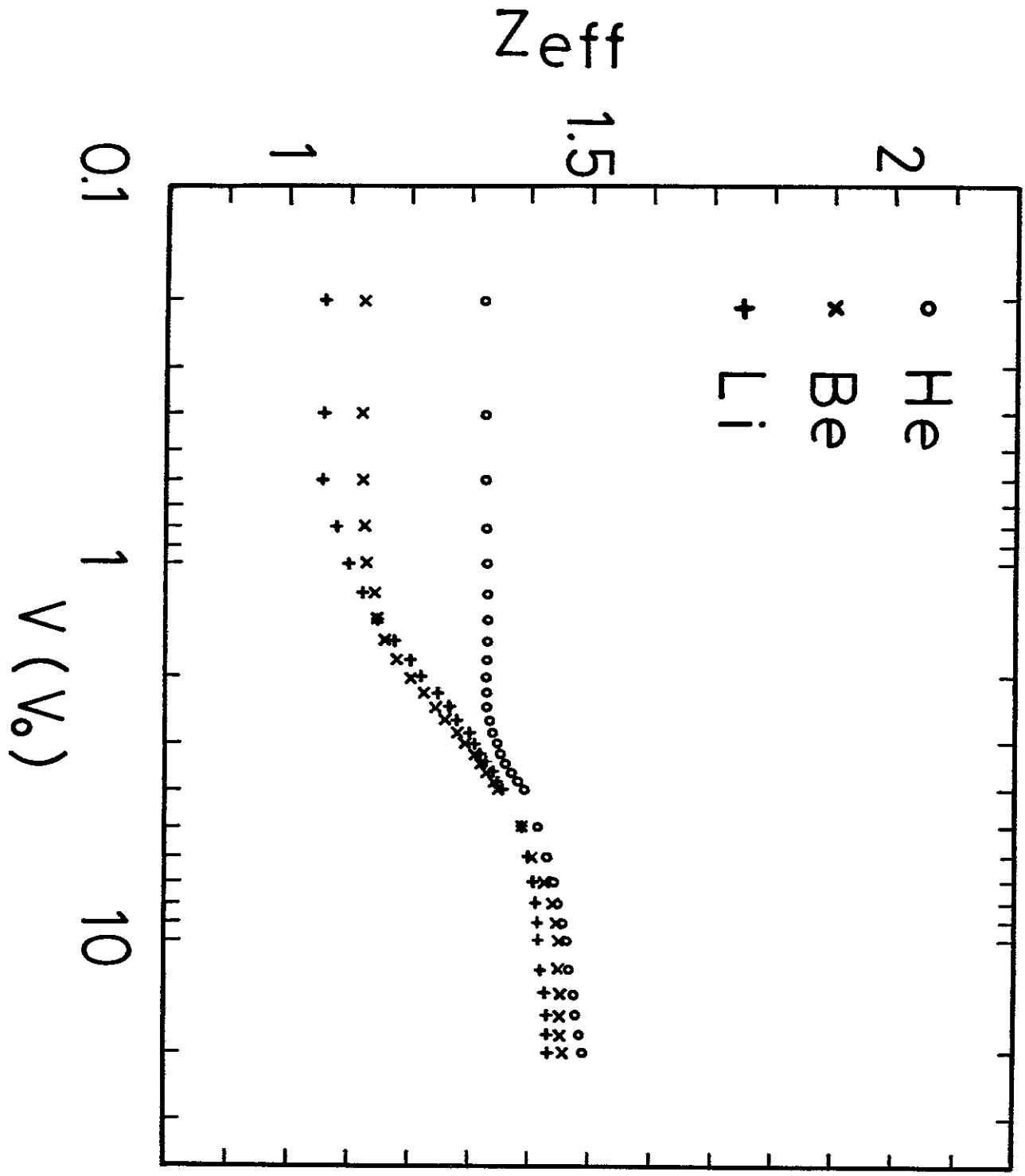

figure 3

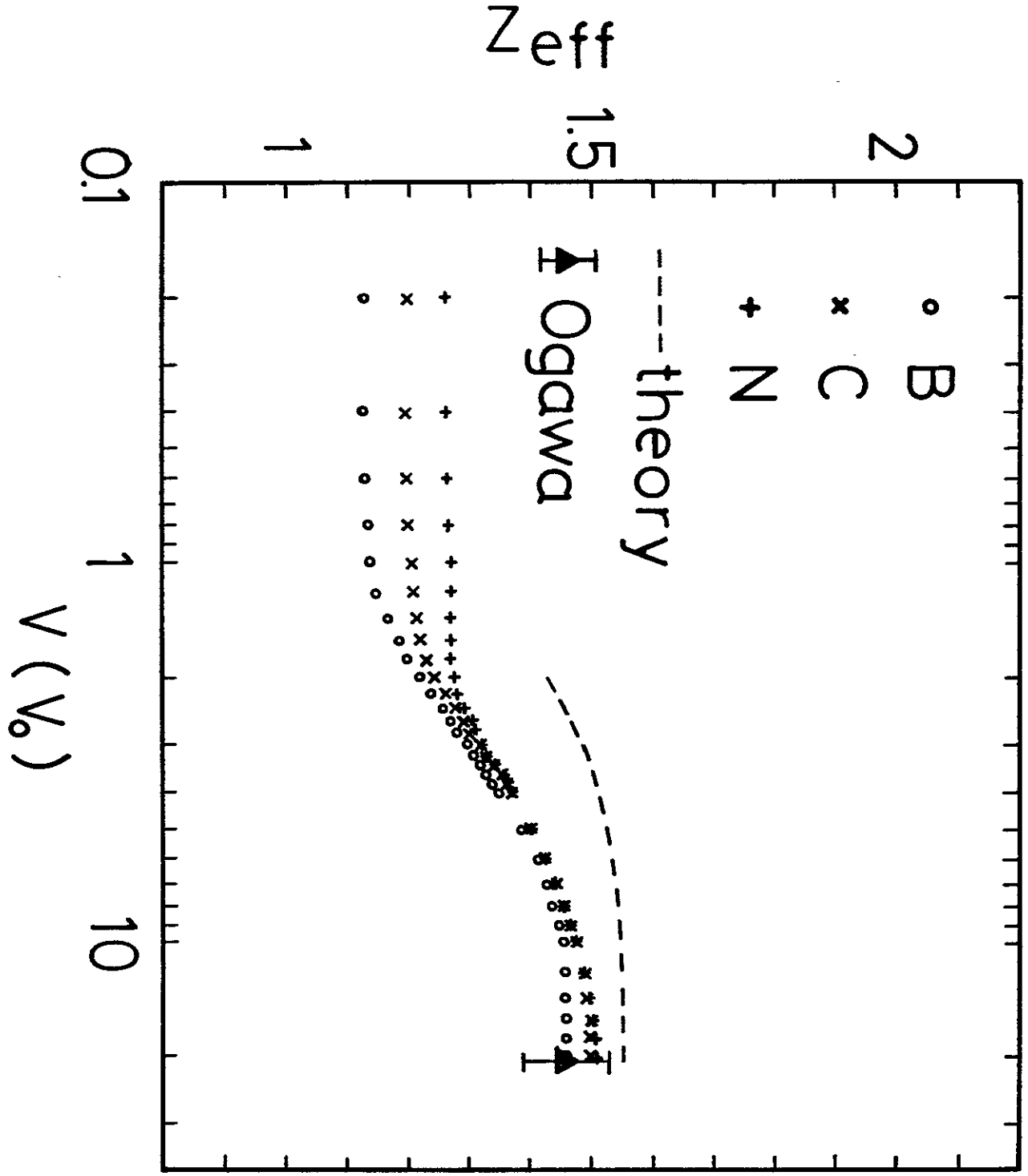

figure 4

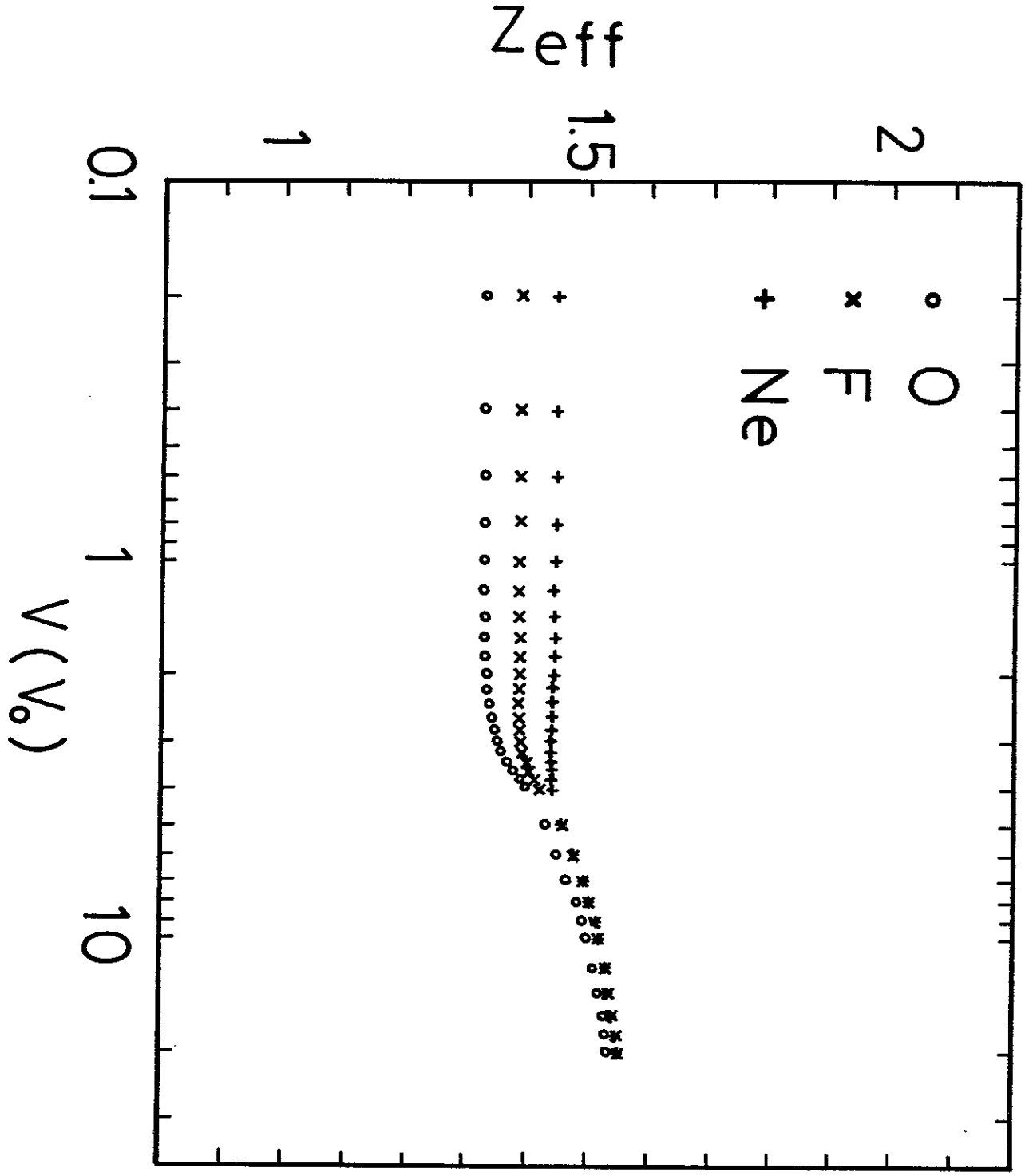

figure 5

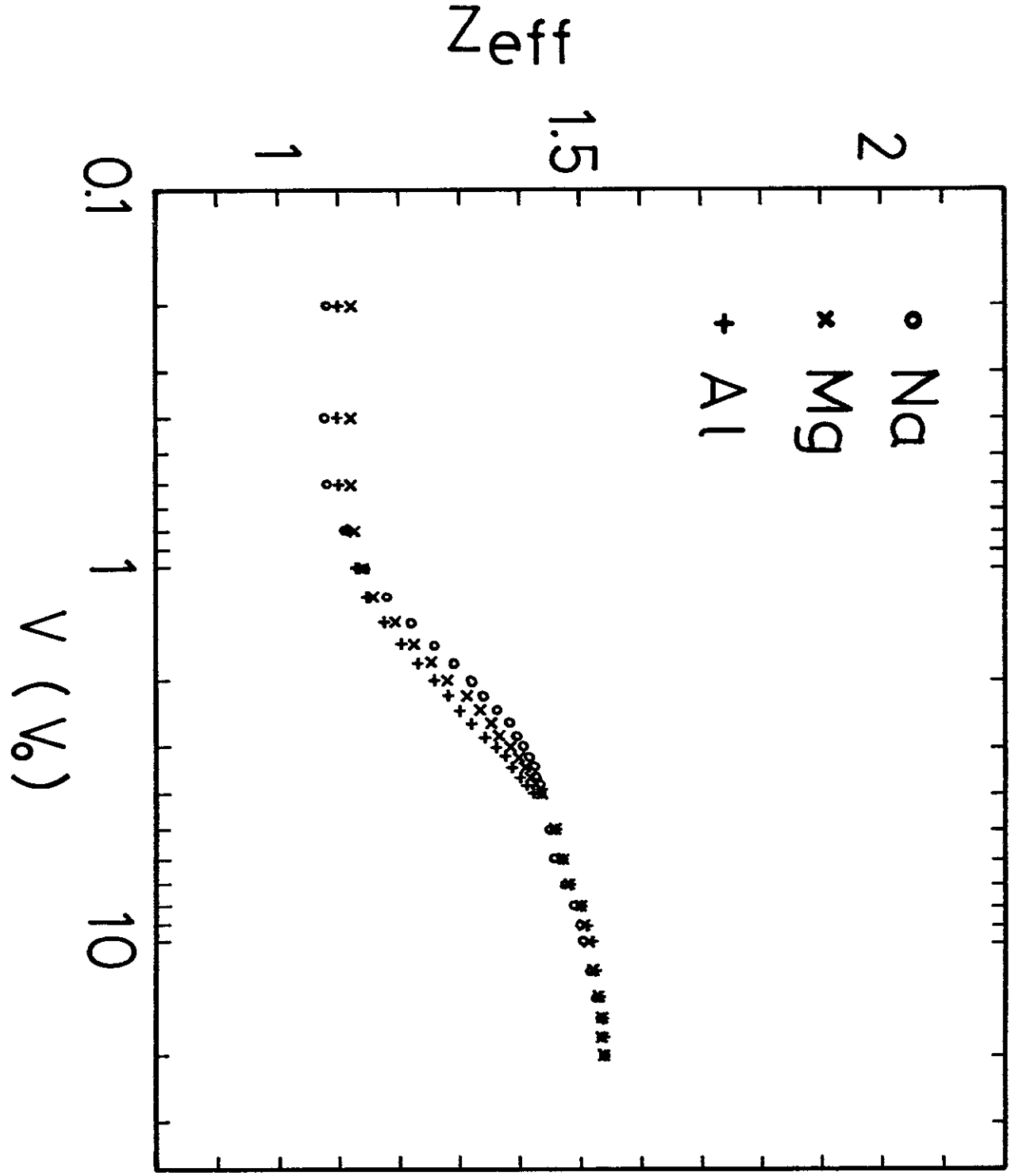

figure 6

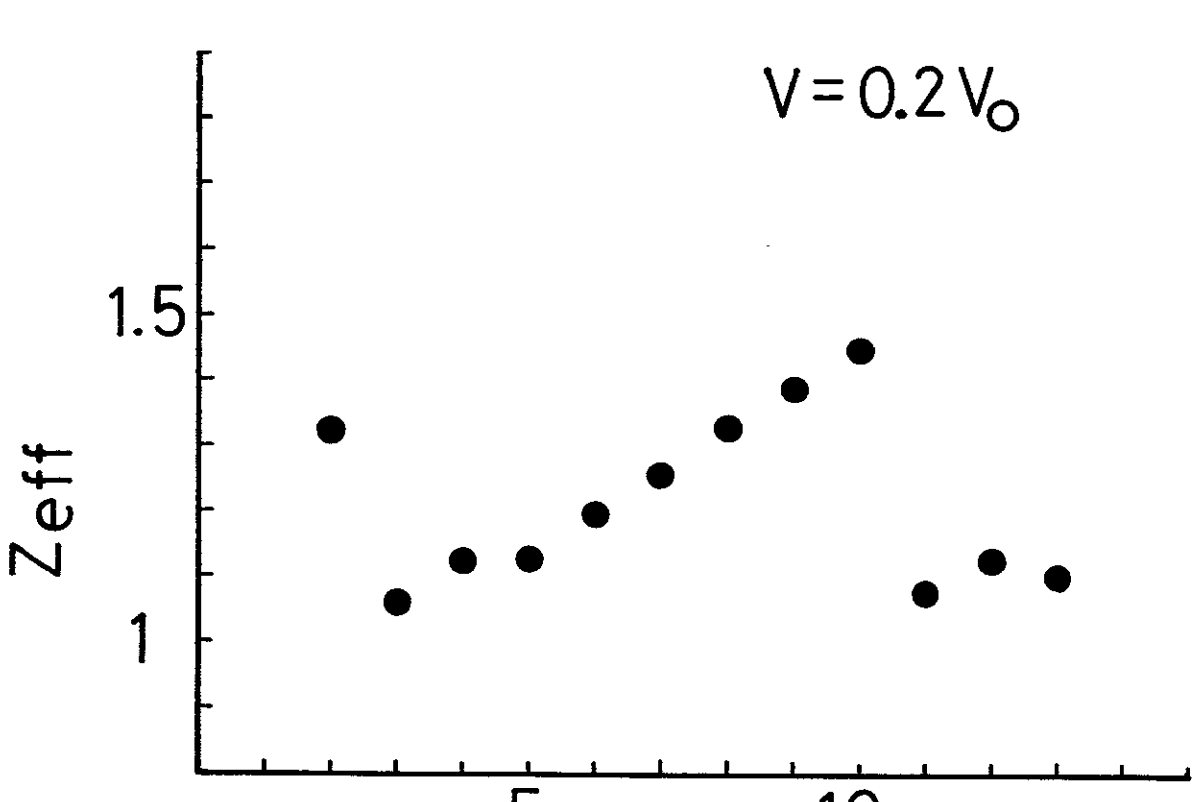

figure 7

EXPLANATION OF TABLES

① Symbol of a target element.

② Electronic state and the number of electrons, N, in each state.

③ The value of the parameter Q for each electronic state in atomic units.

④ The velocity of a He^+ ion in units of V_0 =2.18 x 10^8 cm/s. V=1 corresponds to kinetic energy E=25 keV/amu.

⑤ Stopping cross sections in units of eV $cm^2/10^{15}$ atoms.

① → C (Z=6) 1s(2)2s(2)2p(2) ← ②

③ → Q ----> 3.268 0.6420 0.5725

④ → V TOTAL 1s(2) 2s(2) 2p(2) ← ②

V	TOTAL	1s(2)	2s(2)	2p(2)
0.2	5.89	0.0983	2.57	3.21
0.4	12.0	0.196	5.23	6.55
0.6	18.3	0.295	7.98	10.1
0.8	24.8	0.393	10.8	13.6
1.0	31.0	0.490	13.5	17.0
1.2	36.0	0.587	15.8	19.6
1.4	39.0	0.682	17.4	20.9
1.6	39.8	0.777	18.1	20.9
1.8	38.7	0.870	17.9	19.9
2.0	36.9	0.961	17.1	18.8
2.2	34.1	1.05	16.1	16.9
2.4	31.4	1.14	14.7	15.5
2.6	29.1	1.22	13.6	14.3
2.8	27.0	1.31	12.5	13.2
3.0	25.2	1.39	11.6	12.2
3.2	23.6	1.47	10.8	11.3
3.4	22.2	1.54	10.1	10.5
3.6	20.8	1.61	9.44	9.79
3.8	19.7	1.68	8.82	9.15
4.0	18.6	1.74	8.27	8.56
5	14.5	1.98	6.16	6.34
6	11.7	2.09	4.76	4.89
7	9.76	2.07	3.80	3.89
8	8.25	1.95	3.11	3.18
9	7.04	1.79	2.60	2.65
10	6.05	1.59	2.21	2.25
12	4.58	1.24	1.65	1.68
14	3.60	0.998	1.29	1.31
16	2.88	0.818	1.03	1.02
18	2.33	0.685	0.829	0.815
20	1.92	0.581	0.677	0.665

⑤ → ↑

He (Z=2) 1s(2)

Q	---->	0.9383
V	TOTAL	1s(2)
0.2	1.25	1.25
0.4	2.52	2.52
0.6	3.79	3.79
0.8	5.08	5.08
1.0	6.35	6.35
1.2	7.58	7.58
1.4	8.72	8.72
1.6	9.70	9.70
1.8	10.5	10.5
2.0	11.0	11.0
2.2	11.2	11.2
2.4	11.1	11.1
2.6	10.9	10.9
2.8	10.5	10.5
3.0	9.99	9.99
3.2	9.61	9.61
3.4	8.98	8.98
3.6	8.39	8.39
3.8	7.90	7.90
4.0	7.47	7.47
5	5.68	5.68
6	4.45	4.45
7	3.58	3.58
8	2.94	2.94
9	2.47	2.47
10	2.10	2.10
12	1.58	1.58
14	1.24	1.24
16	0.997	0.997
18	0.823	0.823
20	0.692	0.692

Li (Z=3) 1s(2)2s(1)

Q	---->	1.532	0.2768
V	TOTAL	1s(2)	2s(1)
0.2	12.2	0.486	11.7
0.4	28.0	0.976	27.0
0.6	41.3	1.46	39.8
0.8	39.5	1.95	37.5
1.0	32.1	2.43	29.6
1.2	27.3	2.90	24.4
1.4	23.8	3.36	20.4
1.6	21.2	3.80	17.4
1.8	19.3	4.22	15.1
2.0	17.8	4.61	13.2
2.2	16.7	4.97	11.7
2.4	15.7	5.27	10.5
2.6	14.9	5.53	9.42
2.8	14.3	5.73	8.53
3.0	13.6	5.87	7.77
3.2	13.0	5.94	7.11
3.4	12.5	5.96	6.53
3.6	12.0	5.92	6.03
3.8	11.4	5.84	5.58
4.0	10.9	5.73	5.18
5	8.65	4.92	3.73
6	6.67	3.92	2.75
7	5.27	3.22	2.05
8	4.27	2.68	1.59
9	3.54	2.27	1.27
10	2.98	1.94	1.04
12	2.21	1.47	0.737
14	1.70	1.16	0.543
16	1.36	0.940	0.422
18	1.11	0.777	0.336
20	0.931	0.655	0.276

Be (Z=4) 1s(2)2s(2)

Q	---->	2.116	0.3905
V	TOTAL	1s(2)	2s(2)
0.2	7.14	0.252	6.88
0.4	15.0	0.506	14.5
0.6	23.5	0.758	22.7
0.8	31.5	1.01	30.5
1.0	36.1	1.26	34.8
1.2	36.0	1.50	34.5
1.4	33.3	1.74	31.5
1.6	29.4	1.98	27.4
1.8	26.6	2.21	24.4
2.0	24.3	2.43	21.8
2.2	22.3	2.64	19.6
2.4	20.6	2.84	17.8
2.6	19.2	3.03	16.2
2.8	18.0	3.20	14.8
3.0	16.9	3.36	13.6
3.2	16.0	3.50	12.5
3.4	15.2	3.61	11.6
3.6	14.4	3.71	10.7
3.8	13.8	3.78	9.97
4.0	13.1	3.83	9.29
5	10.6	3.78	6.79
6	8.59	3.39	5.19
7	7.06	2.94	4.11
8	5.81	2.46	3.35
9	4.89	2.10	2.79
10	4.16	1.82	2.34
12	3.04	1.39	1.65
14	2.33	1.10	1.23
16	1.85	0.895	0.950
18	1.50	0.743	0.759
20	1.25	0.628	0.618

B (Z= 5) 1s(2)2s(2)2p(1)

Q	---->	2.693	0.5184	0.4505
V	TOTAL	1s(2)	2s(2)	2p(1)
0.2	8.18	0.151	3.90	4.12
0.4	17.1	0.302	8.00	8.75
0.6	26.7	0.453	12.4	13.8
0.8	35.6	0.603	16.8	18.2
1.0	41.3	0.752	20.7	19.9
1.2	42.8	0.900	23.3	18.6
1.4	41.5	1.05	24.0	16.5
1.6	38.9	1.19	23.2	14.5
1.8	36.0	1.33	21.8	12.8
2.0	32.5	1.47	19.6	11.4
2.2	29.7	1.60	17.9	10.2
2.4	27.3	1.73	16.3	9.23
2.6	25.2	1.86	15.0	8.37
2.8	23.4	1.97	13.8	7.63
3.0	21.8	2.09	12.7	6.99
3.2	20.4	2.19	11.7	6.43
3.4	19.1	2.29	10.9	5.93
3.6	18.0	2.38	10.1	5.50
3.8	17.0	2.46	9.44	5.11
4.0	16.1	2.54	8.82	4.76
5	12.7	2.75	6.50	3.47
6	10.4	2.72	5.00	2.65
7	8.59	2.52	3.97	2.09
8	7.20	2.26	3.24	1.70
9	6.06	1.96	2.70	1.41
10	5.14	1.69	2.29	1.16
12	3.83	1.31	1.71	0.817
14	2.95	1.05	1.30	0.605
16	2.33	0.853	1.01	0.469
18	1.89	0.712	0.803	0.373
20	1.56	0.603	0.655	0.304

C (Z=6) 1s(2)2s(2)2p(2)

Q	---->	3.268	0.6420	0.5725
V	TOTAL	1s(2)	2s(2)	2p(2)
0.2	5.89	0.0983	2.57	3.21
0.4	12.0	0.196	5.23	6.55
0.6	18.3	0.295	7.98	10.1
0.8	24.8	0.393	10.8	13.6
1.0	31.0	0.490	13.5	17.0
1.2	36.0	0.587	15.8	19.6
1.4	39.0	0.682	17.4	20.9
1.6	39.8	0.777	18.1	20.9
1.8	38.7	0.870	17.9	19.9
2.0	36.9	0.961	17.1	18.8
2.2	34.1	1.05	16.1	16.9
2.4	31.4	1.14	14.7	15.5
2.6	29.1	1.22	13.6	14.3
2.8	27.0	1.31	12.5	13.2
3.0	25.2	1.39	11.6	12.2
3.2	23.6	1.47	10.8	11.3
3.4	22.2	1.54	10.1	10.5
3.6	20.8	1.61	9.44	9.79
3.8	19.7	1.68	8.82	9.15
4.0	18.6	1.74	8.27	8.56
5	14.5	1.98	6.16	6.34
6	11.7	2.09	4.76	4.89
7	9.76	2.07	3.80	3.89
8	8.25	1.95	3.11	3.18
9	7.04	1.79	2.60	2.65
10	6.05	1.59	2.21	2.25
12	4.58	1.24	1.65	1.68
14	3.60	0.998	1.29	1.31
16	2.88	0.818	1.03	1.02
18	2.33	0.685	0.829	0.815
20	1.92	0.581	0.677	0.665

N (Z=7) 1s(2)2s(2)2p(3)

Q	---->	3.873	0.7680	0.6656
V	TOTAL	1s(2)	2s(2)	2p(3)
0.2	4.68	0.0667	1.83	2.78
0.4	9.44	0.133	3.69	5.62
0.6	14.3	0.200	5.59	8.52
0.8	19.3	0.267	7.52	11.5
1.0	24.1	0.333	9.42	14.4
1.2	28.7	0.399	11.2	17.1
1.4	32.5	0.464	12.7	19.3
1.6	35.2	0.529	13.8	20.9
1.8	36.7	0.592	14.3	21.8
2.0	36.8	0.656	14.4	21.8
2.2	35.9	0.718	14.0	21.2
2.4	34.5	0.789	13.5	20.3
2.6	32.3	0.839	12.6	18.9
2.8	31.4	0.898	12.2	18.3
3.0	29.1	0.955	11.2	16.9
3.2	27.3	1.01	10.5	15.8
3.4	25.7	1.07	9.82	14.8
3.6	24.1	1.12	9.19	13.8
3.8	22.7	1.17	8.60	13.0
4.0	21.5	1.22	8.09	12.2
5	16.6	1.42	6.05	9.10
6	13.3	1.56	4.70	7.06
7	11.0	1.63	3.76	5.65
8	9.32	1.62	3.08	4.63
9	7.99	1.55	2.57	3.87
10	6.91	1.45	2.18	3.29
12	5.28	1.18	1.64	2.47
14	4.15	0.952	1.28	1.92
16	3.36	0.785	1.03	1.55
18	2.78	0.660	0.850	1.27
20	2.32	0.562	0.704	1.06

O (Z=8) 1s(2)2s(2)2p(4)

Q	---->	4.421	0.8894	0.7787
V	TOTAL	1s(2)	2s(2)	2p(4)
0.2	3.73	0.0489	1.38	2.30
0.4	7.51	0.0979	2.79	4.62
0.6	11.3	0.147	4.21	6.96
0.8	15.1	0.196	5.64	9.31
1.0	18.9	0.245	7.05	11.6
1.2	22.6	0.293	8.41	13.9
1.4	26.0	0.341	9.65	16.0
1.6	28.9	0.389	10.7	17.9
1.8	31.3	0.436	11.4	19.4
2.0	32.8	0.483	11.9	20.4
2.2	33.5	0.529	12.0	21.0
2.4	33.5	0.575	11.8	21.1
2.6	32.9	0.620	11.4	20.8
2.8	31.8	0.664	10.9	20.2
3.0	30.6	0.707	10.5	19.4
3.2	29.3	0.750	9.83	18.7
3.4	27.6	0.792	9.15	17.7
3.6	26.0	0.832	8.59	16.5
3.8	24.5	0.872	8.09	15.5
4.0	23.2	0.910	7.63	14.7
5	18.1	1.08	5.78	11.2
6	14.5	1.21	4.51	8.80
7	12.0	1.30	3.63	7.09
8	10.2	1.33	2.98	5.84
9	8.72	1.32	2.50	4.90
10	7.57	1.28	2.13	4.17
12	5.85	1.11	1.60	3.14
14	4.62	0.917	1.25	2.46
16	3.75	0.757	1.01	1.98
18	3.10	0.636	0.829	1.64
20	2.62	0.545	0.697	1.38

F (Z=9) 1s(2)2s(2)2p(5)

Q	---->	4.995	1.014	0.8776
V	TOTAL	1s(2)	2s(2)	2p(5)
0.2	3.10	0.0366	1.08	1.99
0.4	6.23	0.0733	2.17	3.99
0.6	9.36	0.110	3.27	5.99
0.8	12.5	0.146	4.37	7.98
1.0	15.6	0.183	5.46	9.96
1.2	18.6	0.219	6.52	11.9
1.4	21.5	0.256	7.51	13.8
1.6	24.2	0.291	8.40	15.5
1.8	26.5	0.327	9.14	17.1
2.0	28.5	0.362	9.69	18.4
2.2	29.9	0.397	10.0	19.5
2.4	30.7	0.432	10.1	20.2
2.6	31.1	0.466	10.1	20.6
2.8	31.0	0.500	9.83	20.6
3.0	30.4	0.533	9.46	20.4
3.2	29.6	0.566	9.10	20.0
3.4	28.7	0.598	8.70	19.3
3.6	27.6	0.629	8.17	18.8
3.8	26.3	0.660	7.67	18.0
4.0	25.0	0.690	7.23	17.0
5	19.6	0.829	5.54	13.2
6	15.8	0.944	4.36	10.5
7	13.1	1.03	3.52	8.50
8	11.0	1.08	2.90	7.03
9	9.44	1.11	2.43	5.91
10	8.22	1.10	2.07	5.05
12	6.39	1.01	1.56	3.82
14	5.08	0.871	1.22	2.99
16	4.14	0.732	0.987	2.42
18	3.43	0.617	0.814	1.99
20	2.89	0.528	0.684	1.68

Ne (Z=10) 1s(2)2s(2)2p(6)

Q	---->	5.572	1.136	0.9814
V	TOTAL	1s(2)	2s(2)	2p(6)
0.2	2.60	0.0281	0.870	1.70
0.4	5.22	0.0563	1.75	3.42
0.6	7.84	0.0844	2.62	5.13
0.8	10.5	0.113	3.50	6.83
1.0	13.0	0.141	4.37	8.52
1.2	15.6	0.169	5.22	10.2
1.4	18.0	0.196	6.03	11.8
1.6	20.3	0.224	6.79	13.3
1.8	22.5	0.252	7.45	14.8
2.0	24.4	0.279	8.00	16.1
2.2	26.0	0.306	8.41	17.3
2.4	27.2	0.333	8.67	18.2
2.6	28.1	0.359	8.77	19.0
2.8	28.6	0.386	8.73	19.5
3.0	28.8	0.412	8.58	19.8
3.2	28.6	0.437	8.33	19.8
3.4	28.2	0.462	8.03	19.7
3.6	27.6	0.487	7.76	19.4
3.8	26.8	0.512	7.35	18.9
4.0	25.9	0.536	6.94	18.4
5	21.5	0.648	5.34	15.5
6	17.3	0.745	4.23	12.3
7	14.3	0.824	3.43	10.1
8	12.0	0.883	2.83	8.33
9	10.3	0.918	2.38	7.03
10	8.97	0.932	2.03	6.01
12	6.98	0.901	1.53	4.55
14	5.59	0.813	1.20	3.57
16	4.56	0.702	0.971	2.89
18	3.79	0.599	0.801	2.39
20	3.20	0.513	0.675	2.01

Na (Z=11) 1s(2)2s(2)3s(1)2p(6)

Q	---->	6.121	1.312	0.2617	1.205
V	TOTAL	1s(2)	2s(2)	3s(1)	2p(6)
0.2	15.1	0.0224	0.659	13.3	1.13
0.4	34.6	0.0448	1.32	30.9	2.27
0.6	49.4	0.0671	1.98	43.9	3.41
0.8	45.5	0.0894	2.64	38.3	4.54
1.0	39.6	0.112	3.30	30.5	5.65
1.2	35.7	0.134	3.94	24.9	6.75
1.4	33.4	0.156	4.56	20.8	7.83
1.6	31.9	0.178	5.15	17.7	8.88
1.8	31.1	0.200	5.69	15.3	9.88
2.0	30.6	0.222	6.18	13.4	10.8
2.2	30.4	0.244	6.59	11.9	11.7
2.4	30.3	0.265	6.91	10.6	12.5
2.6	30.2	0.287	7.13	9.53	13.2
2.8	30.1	0.308	7.26	8.63	13.9
3.0	29.8	0.329	7.29	7.85	14.4
3.2	29.5	0.349	7.24	7.18	14.7
3.4	29.1	0.370	7.11	6.60	15.0
3.6	28.5	0.390	6.92	6.09	15.1
3.8	27.9	0.410	6.72	5.63	15.1
4.0	27.2	0.429	6.50	5.23	15.0
5	23.1	0.522	5.32	3.76	13.5
6	19.0	0.604	4.23	2.71	11.5
7	15.5	0.675	3.43	2.02	9.41
8	13.0	0.731	2.84	1.57	7.85
9	11.1	0.771	2.39	1.25	6.66
10	9.58	0.795	2.04	1.02	5.72
12	7.42	0.797	1.54	0.725	4.36
14	5.93	0.748	1.21	0.538	3.43
16	4.84	0.667	0.975	0.416	2.78
18	4.03	0.579	0.806	0.336	2.31
20	3.39	0.500	0.678	0.272	1.94

Mg (Z=12) 1s(2)2s(2)3s(2)2p(6)

Q	---->	6.689	1.518	0.3340	1.420
V	TOTAL	1s(2)	2s(2)	3s(2)	2p(6)
0.2	10.8	0.0180	0.495	9.46	0.811
0.4	22.9	0.0360	0.994	20.2	1.62
0.6	36.1	0.0540	1.49	32.1	2.44
0.8	46.8	0.0718	1.98	41.5	3.24
1.0	50.0	0.0898	2.47	43.4	4.04
1.2	48.2	0.108	2.95	40.3	4.83
1.4	43.7	0.126	3.42	34.6	5.60
1.6	40.6	0.143	3.87	30.2	6.36
1.8	38.1	0.161	4.30	26.5	7.09
2.0	36.2	0.179	4.70	23.6	7.80
2.2	34.8	0.196	5.05	21.1	8.47
2.4	33.6	0.214	5.36	19.0	9.11
2.6	32.7	0.231	5.62	17.2	9.70
2.8	31.9	0.248	5.81	15.6	10.2
3.0	31.2	0.265	5.95	14.3	10.7
3.2	30.6	0.282	6.02	13.1	11.1
3.4	29.9	0.298	6.03	12.1	11.5
3.6	29.3	0.315	5.99	11.2	11.8
3.8	28.6	0.331	5.90	10.4	12.0
4.0	27.9	0.347	5.77	9.70	12.1
5	24.1	0.424	4.86	7.04	11.8
6	20.3	0.493	4.00	5.37	10.4
7	17.0	0.554	3.28	4.25	8.93
8	14.2	0.606	2.73	3.44	7.45
9	12.1	0.646	2.30	2.80	6.36
10	10.4	0.675	1.97	2.29	5.50
12	8.01	0.697	1.49	1.61	4.21
14	6.37	0.677	1.18	1.20	3.32
16	5.20	0.624	0.950	0.927	2.70
18	4.32	0.554	0.786	0.743	2.24
20	3.65	0.485	0.662	0.609	1.89

A l (Z=13) 1s(2)2s(2)3s(2)2p(6)3p(1)

Q	---->	7.276	1.713	0.4228	1.625	0.3202
V	TOTAL	1s(2)	2s(2)	3s(2)	2p(6)	3p(1)
0.2	15.4	0.0146	0.389	5.86	0.611	8.50
0.4	33.3	0.0292	0.781	12.2	1.22	19.0
0.6	51.9	0.0438	1.17	19.1	1.83	29.7
0.8	62.0	0.0583	1.56	25.8	2.44	32.2
1.0	63.1	0.0729	1.94	30.4	3.04	27.6
1.2	60.5	0.0874	2.32	31.4	3.64	23.0
1.4	56.3	0.102	2.69	29.9	4.22	19.4
1.6	51.0	0.116	3.05	26.3	4.80	16.7
1.8	46.8	0.131	3.39	23.4	5.36	14.5
2.0	43.6	0.145	3.72	21.0	5.90	12.8
2.2	41.0	0.159	4.02	19.1	6.43	11.3
2.4	38.8	0.174	4.29	17.3	6.94	10.2
2.6	37.0	0.188	4.53	15.8	7.41	9.16
2.8	35.5	0.202	4.74	14.4	7.86	8.30
3.0	34.2	0.215	4.90	13.3	8.28	7.57
3.2	33.1	0.229	5.02	12.2	8.66	6.94
3.4	32.0	0.243	5.10	11.3	8.99	6.38
3.6	31.1	0.256	5.14	10.5	9.29	5.89
3.8	30.2	0.270	5.14	9.77	9.54	5.46
4.0	29.3	0.283	5.10	9.13	9.74	5.08
5	25.3	0.346	4.54	6.68	10.1	3.66
6	21.6	0.405	3.85	5.12	9.42	2.78
7	18.2	0.458	3.15	4.06	8.41	2.13
8	15.3	0.504	2.63	3.31	7.18	1.65
9	13.0	0.542	2.23	2.75	6.11	1.32
10	11.2	0.572	1.92	2.33	5.29	1.08
12	8.58	0.605	1.46	1.68	4.08	0.757
14	6.80	0.604	1.15	1.25	3.23	0.567
16	5.54	0.574	0.929	0.964	2.63	0.437
18	4.61	0.524	0.770	0.770	2.19	0.351
20	3.88	0.467	0.650	0.627	1.85	0.284

Si (Z=14) 1s(2)2s(2)3s(2)2p(2)3p(2)

Q	---->	7.988	1.890	0.5014	1.797	0.3833
V	TOTAL	1s(2)	2s(2)	3s(2)	2p(6)	3p(2)
0.2	12.1	0.0115	0.319	4.17	0.492	7.15
0.4	25.3	0.0231	0.639	8.56	0.985	15.0
0.6	39.4	0.0347	0.958	13.3	1.48	23.7
0.8	52.9	0.0462	1.28	18.0	1.97	31.7
1.0	62.1	0.0576	1.59	22.1	2.45	35.9
1.2	64.7	0.0692	1.90	24.6	2.93	35.2
1.4	62.5	0.0807	2.20	25.0	3.41	31.8
1.6	58.0	0.0922	2.50	23.9	3.87	27.7
1.8	54.3	0.104	2.78	22.4	4.33	24.7
2.0	50.1	0.115	3.06	20.1	4.78	22.1
2.2	46.7	0.126	3.32	18.2	5.21	19.8
2.4	43.9	0.138	3.55	16.6	5.63	17.9
2.6	41.5	0.149	3.77	15.2	6.03	16.3
2.8	39.4	0.160	3.97	14.0	6.41	14.9
3.0	37.6	0.171	4.13	12.9	6.77	13.7
3.2	36.0	0.182	4.27	11.9	7.11	12.6
3.4	34.6	0.193	4.38	11.0	7.42	11.6
3.6	33.4	0.204	4.45	10.2	7.70	10.8
3.8	32.2	0.214	4.50	9.54	7.95	10.0
4.0	31.2	0.225	4.51	8.91	8.17	9.33
5	26.6	0.276	4.22	6.55	8.75	6.82
6	22.8	0.324	3.68	5.03	8.53	5.21
7	19.4	0.369	3.05	4.00	7.80	4.13
8	16.5	0.408	2.55	3.26	6.92	3.36
9	14.1	0.442	2.17	2.72	5.94	2.80
10	12.1	0.471	1.87	2.30	5.13	2.34
12	9.27	0.509	1.43	1.72	3.97	1.65
14	7.34	0.522	1.13	1.30	3.17	1.23
16	5.96	0.512	0.913	1.00	2.59	0.949
18	4.95	0.482	0.757	0.801	2.15	0.754
20	4.17	0.440	0.639	0.653	1.82	0.616

P (Z=15) 1s(2)2s(2)3s(2)2p(6)3p(3)

Q	---->	8.467	2.083	0.5759	2.050	0.4647
V	TOTAL	1s(2)	2s(2)	3s(2)	2p(6)	3p(3)
0.2	9.41	0.00994	0.261	3.21	0.369	5.56
0.4	19.2	0.0200	0.523	6.54	0.737	11.4
0.6	29.5	0.0299	0.784	10.1	1.11	17.6
0.8	40.0	0.0399	1.04	13.6	1.47	23.8
1.0	49.6	0.0498	1.30	17.0	1.84	29.5
1.2	56.8	0.0597	1.55	19.5	2.20	33.4
1.4	60.1	0.0697	1.80	20.9	2.56	34.8
1.6	59.8	0.0796	2.05	20.9	2.91	33.9
1.8	57.3	0.0895	2.28	19.9	3.26	31.7
2.0	54.1	0.0993	2.51	18.8	3.60	29.1
2.2	50.1	0.109	2.73	16.9	3.93	26.4
2.4	47.0	0.119	2.94	15.5	4.25	24.2
2.6	44.3	0.129	3.13	14.3	4.56	22.2
2.8	41.9	0.138	3.30	13.2	4.87	20.4
3.0	39.8	0.148	3.46	12.2	5.16	18.8
3.2	37.9	0.157	3.60	11.3	5.43	17.4
3.4	36.3	0.167	3.71	10.5	5.69	16.2
3.6	34.7	0.176	3.81	9.78	5.93	15.0
3.8	33.4	0.186	3.88	9.13	6.16	14.1
4.0	32.2	0.195	3.93	8.56	6.37	13.1
5	27.2	0.240	3.85	6.34	7.09	9.67
6	23.3	0.282	3.43	4.88	7.25	7.46
7	20.0	0.321	2.96	3.89	6.95	5.92
8	17.2	0.357	2.47	3.18	6.39	4.84
9	14.9	0.388	2.11	2.65	5.68	4.03
10	12.9	0.415	1.82	2.25	4.95	3.42
12	9.91	0.455	1.40	1.68	3.83	2.55
14	7.92	0.473	1.11	1.31	3.07	1.96
16	6.43	0.471	0.899	1.02	2.51	1.52
18	5.32	0.452	0.746	0.815	2.09	1.21
20	4.48	0.420	0.629	0.664	1.78	0.988

S (Z=16) 1s(2)2s(2)3s(2)2p(6)3p(4)

Q	---->	9.065	2.263	0.6495	2.246	0.5167
V	TOTAL	1s(2)	2s(2)	3s(2)	2p(6)	3p(4)
0.2	8.06	0.00836	0.219	2.52	0.301	5.01
0.4	16.3	0.0168	0.439	5.11	0.601	10.2
0.6	24.9	0.0252	0.658	7.79	0.903	15.5
0.8	33.6	0.0335	0.876	10.5	1.20	21.0
1.0	42.0	0.0419	1.09	13.2	1.50	26.2
1.2	49.4	0.0502	1.31	15.5	1.80	30.8
1.4	54.8	0.0586	1.52	17.1	2.09	34.0
1.6	57.5	0.0670	1.72	17.8	2.38	35.5
1.8	57.7	0.0753	1.92	17.7	2.66	35.3
2.0	55.9	0.0836	2.12	17.0	2.94	33.8
2.2	53.6	0.0918	2.30	16.0	3.22	32.0
2.4	50.0	0.100	2.48	14.7	3.48	29.3
2.6	46.9	0.108	2.65	13.5	3.75	26.9
2.8	44.4	0.116	2.81	12.5	4.00	24.9
3.0	42.1	0.125	2.95	11.6	4.24	23.2
3.2	40.1	0.133	3.08	10.8	4.48	21.6
3.4	38.2	0.141	3.20	10.1	4.70	20.1
3.6	36.6	0.149	3.30	9.40	4.92	18.8
3.8	35.0	0.156	3.38	8.78	5.12	17.6
4.0	33.7	0.164	3.44	8.25	5.31	16.5
5	28.2	0.202	3.50	6.14	6.03	12.3
6	24.1	0.239	3.23	4.76	6.35	9.51
7	20.8	0.273	2.86	3.80	6.27	7.59
8	18.0	0.304	2.42	3.11	5.91	6.21
9	15.6	0.332	2.06	2.59	5.41	5.19
10	13.5	0.357	1.78	2.20	4.80	4.40
12	10.5	0.395	1.37	1.65	3.73	3.30
14	8.36	0.418	1.09	1.29	3.00	2.58
16	6.87	0.424	0.884	1.03	2.46	2.07
18	5.70	0.414	0.736	0.831	2.06	1.66
20	4.79	0.393	0.621	0.678	1.75	1.36

C l (Z=17) 1s(2) 2s(2) 3s(2) 2p(6) 3p(5)

Q	---->	9.665	2.443	0.7195	2.440	0.5761
V	TOTAL	1s(2)	2s(2)	3s(2)	2p(6)	3p(5)
0.2	6.93	0.00709	0.186	2.07	0.249	4.42
0.4	14.0	0.0142	0.373	4.19	0.498	8.91
0.6	21.2	0.0214	0.559	6.36	0.748	13.5
0.8	28.5	0.0285	0.745	8.57	0.997	18.2
1.0	35.7	0.0356	0.928	10.7	1.24	22.7
1.2	42.4	0.0426	1.11	12.7	1.49	27.0
1.4	48.1	0.0498	1.29	14.3	1.73	30.7
1.6	52.2	0.0569	1.47	15.3	1.97	33.4
1.8	54.5	0.0640	1.64	15.7	2.21	34.9
2.0	55.0	0.0710	1.80	15.5	2.44	35.2
2.2	54.0	0.0780	1.97	14.9	2.67	34.4
2.4	52.3	0.0850	2.12	14.0	2.90	33.2
2.6	49.9	0.0920	2.27	13.3	3.12	31.1
2.8	48.5	0.0989	2.41	12.5	3.34	30.1
3.0	45.7	0.106	2.54	11.6	3.54	27.8
3.2	43.3	0.113	2.66	10.8	3.75	26.0
3.4	41.2	0.120	2.77	10.1	3.94	24.3
3.6	39.4	0.126	2.87	9.43	4.13	22.8
3.8	37.6	0.133	2.95	8.85	4.31	21.4
4.0	36.0	0.140	3.02	8.28	4.47	20.1
5	29.7	0.173	3.17	6.18	5.16	15.0
6	25.2	0.204	3.02	4.78	5.55	11.7
7	21.8	0.233	2.72	3.82	5.63	9.36
8	18.9	0.261	2.36	3.13	5.44	7.67
9	16.4	0.286	2.01	2.61	5.08	6.41
10	14.3	0.309	1.74	2.22	4.62	5.45
12	11.1	0.345	1.34	1.66	3.66	4.09
14	8.85	0.369	1.07	1.29	2.93	3.19
16	7.27	0.380	0.871	1.04	2.41	2.57
18	6.09	0.378	0.724	0.854	2.02	2.11
20	5.17	0.365	0.613	0.704	1.72	1.77

Ar (Z=18) 1s(2)2s(2)3s(2)2p(6)3p(6)

Q	---->	10.37	2.610	0.7869	2.635	0.6231
V	TOTAL	1s(2)	2s(2)	3s(2)	2p(6)	3p(6)
0.2	6.20	0.00592	0.162	1.75	0.209	4.07
0.4	12.5	0.0119	0.323	3.52	0.418	8.19
0.6	18.8	0.0179	0.485	5.33	0.627	12.4
0.8	25.2	0.0238	0.646	7.17	0.836	16.6
1.0	31.6	0.0297	0.805	8.98	1.04	20.7
1.2	37.7	0.0356	0.963	10.7	1.25	24.7
1.4	43.1	0.0415	1.12	12.1	1.45	28.4
1.6	47.7	0.0475	1.27	13.2	1.66	31.5
1.8	50.9	0.0534	1.42	13.8	1.86	33.7
2.0	52.7	0.0593	1.57	14.0	2.05	35.1
2.2	53.2	0.0652	1.71	13.7	2.25	35.4
2.4	52.5	0.0710	1.85	13.2	2.44	35.0
2.6	51.1	0.0769	1.98	12.4	2.63	34.0
2.8	49.4	0.0827	2.11	12.0	2.81	32.4
3.0	47.6	0.0885	2.23	11.1	2.99	31.2
3.2	45.3	0.0942	2.34	10.4	3.16	29.4
3.4	42.9	0.100	2.44	9.69	3.33	27.4
3.6	40.9	0.106	2.53	9.08	3.50	25.7
3.8	39.1	0.111	2.61	8.52	3.65	24.2
4.0	37.4	0.117	2.69	8.00	3.80	22.8
5	30.8	0.145	2.89	6.01	4.44	17.3
6	26.0	0.171	2.82	4.67	4.85	13.5
7	22.4	0.196	2.59	3.73	5.02	10.9
8	19.5	0.220	2.30	3.06	4.96	8.92
9	17.0	0.242	1.98	2.56	4.73	7.47
10	14.9	0.262	1.71	2.17	4.40	6.36
12	11.6	0.296	1.32	1.63	3.57	4.79
14	9.26	0.320	1.05	1.27	2.87	3.74
16	7.60	0.334	0.859	1.03	2.36	3.01
18	6.37	0.338	0.717	0.844	1.99	2.48
20	5.42	0.332	0.607	0.707	1.69	2.09

Sc (Z=21) 1s(2)2s(2)3s(2)4s(2)2p(6)3p(6)4p(1)

Q	---->	11.96	3.181	1.071	0.2859	3.273	0.9463	0.6286
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	2p(6)	3p(6)	4P(1)
0.2	18.3	0.00409	0.104	0.973	13.2	0.126	1.83	2.10
0.4	39.3	0.00822	0.207	1.95	28.9	0.252	3.67	4.33
0.6	61.7	0.0124	0.313	2.94	45.9	0.377	5.51	6.70
0.8	76.0	0.0165	0.418	3.93	54.7	0.503	7.34	9.09
1.0	77.7	0.0206	0.521	4.90	51.4	0.628	9.15	11.2
1.2	73.1	0.0247	0.623	5.86	42.5	0.753	10.9	12.4
1.4	70.0	0.0288	0.725	6.76	36.3	0.877	12.7	12.6
1.6	67.2	0.0328	0.825	7.59	31.5	1.00	14.3	12.0
1.8	65.0	0.0370	0.924	8.29	27.5	1.12	15.8	11.3
2.0	62.8	0.0411	1.02	8.85	24.3	1.24	17.2	10.1
2.2	61.0	0.0451	1.12	9.23	21.7	1.36	18.4	9.14
2.4	59.3	0.0492	1.21	9.42	19.5	1.48	19.4	8.31
2.6	57.7	0.0533	1.30	9.44	17.6	1.60	20.1	7.61
2.8	56.0	0.0573	1.39	9.31	16.0	1.71	20.6	6.99
3.0	54.3	0.0613	1.47	9.06	14.6	1.82	20.8	6.44
3.2	52.4	0.0654	1.55	8.71	13.4	1.94	20.7	5.95
3.4	50.5	0.0694	1.63	8.43	12.4	2.04	20.5	5.52
3.6	48.5	0.0733	1.70	8.00	11.4	2.15	20.1	5.13
3.8	46.5	0.0773	1.77	7.53	10.6	2.25	19.5	4.78
4.0	44.6	0.0813	1.84	7.08	9.86	2.36	19.0	4.46
5	36.6	0.101	2.08	5.44	7.15	2.82	15.7	3.28
6	30.2	0.120	2.18	4.29	5.45	3.19	12.5	2.52
7	25.6	0.138	2.14	3.47	4.29	3.45	10.2	2.00
8	22.0	0.155	2.00	2.86	3.36	3.59	8.43	1.63
9	19.2	0.171	1.82	2.41	2.69	3.62	7.09	1.36
10	16.8	0.187	1.61	2.05	2.20	3.54	6.06	1.15
12	13.2	0.214	1.30	1.55	1.55	3.18	4.58	0.858
14	10.5	0.235	1.01	1.21	1.15	2.68	3.60	0.648
16	8.59	0.251	0.824	0.979	0.895	2.23	2.90	0.501
18	7.15	0.261	0.670	0.808	0.715	1.88	2.40	0.401
20	6.06	0.265	0.585	0.680	0.580	1.61	2.02	0.327

Ti (Z=22) 1s(2)2s(2)3s(2)4s(2)2p(6)3p(6)

Q	---->	12.54	3.364	1.140	0.2970	3.473	1.010	0.7180
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	2P(6)	3p(6)	4p(2)
0.2	16.9	0.00362	0.0921	0.864	12.1	0.109	1.61	2.08
0.4	36.0	0.00727	0.184	1.73	26.4	0.218	3.23	4.20
0.6	56.4	0.0109	0.276	2.61	42.0	0.327	4.85	6.38
0.8	70.7	0.0146	0.368	3.48	51.4	0.436	6.46	8.60
1.0	73.9	0.0182	0.459	4.34	49.7	0.545	8.05	10.8
1.2	70.3	0.0218	0.550	5.19	41.6	0.654	9.61	12.8
1.4	68.5	0.0254	0.639	5.99	35.6	0.761	11.1	14.4
1.6	67.3	0.0290	0.728	6.74	31.0	0.868	12.6	15.4
1.8	66.1	0.0327	0.815	7.40	27.2	0.974	14.0	15.7
2.0	64.7	0.0363	0.901	7.95	24.0	1.08	15.2	15.5
2.2	63.3	0.0399	0.986	8.36	21.4	1.18	16.4	14.9
2.4	61.6	0.0435	1.07	8.62	19.3	1.29	17.3	14.0
2.6	60.2	0.0471	1.15	8.73	17.4	1.39	18.1	13.4
2.8	58.5	0.0507	1.23	8.69	15.9	1.49	18.6	12.5
3.0	56.6	0.0543	1.30	8.55	14.5	1.59	19.0	11.6
3.2	54.7	0.0578	1.38	8.30	13.3	1.69	19.1	10.8
3.4	52.7	0.0614	1.45	8.01	12.3	1.78	19.0	10.1
3.6	50.8	0.0649	1.51	7.74	11.4	1.88	18.8	9.44
3.8	48.7	0.0684	1.58	7.34	10.5	1.97	18.4	8.84
4.0	46.7	0.0719	1.64	6.93	9.79	2.06	18.0	8.29
5	38.2	0.0892	1.88	5.34	7.11	2.47	15.2	6.18
6	31.5	0.106	1.99	4.22	5.41	2.81	12.2	4.79
7	26.7	0.122	1.99	3.42	4.27	3.07	9.97	3.82
8	22.9	0.138	1.90	2.83	3.39	3.23	8.27	3.13
9	19.9	0.152	1.76	2.38	2.71	3.30	6.98	2.61
10	17.5	0.166	1.57	2.03	2.22	3.28	5.97	2.22
12	13.7	0.191	1.23	1.53	1.56	3.03	4.52	1.66
14	11.0	0.212	0.989	1.20	1.16	2.61	3.55	1.29
16	9.01	0.227	0.812	0.971	0.898	2.20	2.87	1.04
18	7.51	0.238	0.680	0.801	0.717	1.85	2.37	0.855
20	6.37	0.243	0.578	0.675	0.586	1.58	2.00	0.740

V (Z=23) 1s(2) 2s(2) 3s(2) 4s(2) 2p(6) 3p(6) 4p(3)

Q	---->	13.15	3.546	1.207	0.3078	3.673	1.075	0.7885
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	2P(6)	3p(6)	4p(3)
0.2	15.7	0.00319	0.0817	0.774	11.3	0.0953	1.42	2.02
0.4	33.3	0.00642	0.163	1.55	24.4	0.191	2.86	4.06
0.6	52.1	0.00965	0.245	2.33	38.8	0.286	4.29	6.13
0.8	66.2	0.0129	0.327	3.11	48.4	0.381	5.71	8.21
1.0	69.8	0.0161	0.408	3.88	47.7	0.477	7.11	10.3
1.2	68.2	0.0193	0.488	4.64	41.7	0.572	8.49	12.3
1.4	66.7	0.0225	0.568	5.37	36.1	0.666	9.84	14.1
1.6	65.5	0.0257	0.646	6.05	31.2	0.759	11.1	15.6
1.8	64.7	0.0289	0.724	6.66	27.3	0.852	12.4	16.7
2.0	64.1	0.0321	0.801	7.19	24.2	0.945	13.5	17.4
2.2	63.2	0.0353	0.876	7.61	21.5	1.04	14.6	17.6
2.4	62.2	0.0385	0.950	7.90	19.3	1.13	15.5	17.4
2.6	61.0	0.0417	1.02	8.07	17.4	1.22	16.3	16.9
2.8	59.5	0.0448	1.09	8.12	15.9	1.31	16.9	16.1
3.0	58.1	0.0480	1.16	8.05	14.6	1.39	17.3	15.5
3.2	56.3	0.0511	1.23	7.89	13.4	1.48	17.5	14.7
3.4	54.1	0.0543	1.29	7.66	12.3	1.56	17.6	13.7
3.6	52.2	0.0574	1.35	7.42	11.4	1.65	17.5	12.8
3.8	50.3	0.0605	1.41	7.14	10.6	1.73	17.3	12.1
4.0	48.3	0.0636	1.47	6.78	9.80	1.81	17.0	11.4
5	39.4	0.0789	1.70	5.27	7.12	2.18	14.4	8.63
6	32.7	0.0938	1.83	4.19	5.47	2.50	11.9	6.75
7	27.6	0.108	1.86	3.39	4.34	2.75	9.76	5.42
8	23.7	0.122	1.80	2.81	3.42	2.92	8.13	4.46
9	20.6	0.135	1.68	2.37	2.78	3.01	6.86	3.73
10	18.0	0.148	1.53	2.02	2.26	3.02	5.88	3.18
12	14.2	0.171	1.22	1.52	1.58	2.86	4.46	2.39
14	11.4	0.190	0.972	1.20	1.17	2.53	3.51	1.87
16	9.38	0.205	0.803	0.970	0.911	2.15	2.84	1.51
18	7.85	0.216	0.673	0.798	0.749	1.82	2.35	1.24
20	6.65	0.223	0.572	0.672	0.605	1.56	1.98	1.04

Cr (Z=24) 1s(2)2s(2)3s(2)4s(2)2p(6)3p(6)3d(4)

Q	---->	13.77	3.728	1.273	0.3175	3.872	1.139	0.8529
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	2p(6)	3p(6)	3d(4)
0.2	14.6	0.00283	0.0728	0.699	10.6	0.0839	1.27	1.93
0.4	30.9	0.00569	0.146	1.40	22.8	0.168	2.55	3.88
0.6	48.4	0.00855	0.219	2.10	36.2	0.252	3.82	5.84
0.8	62.2	0.0114	0.291	2.80	45.8	0.336	5.08	7.80
1.0	66.4	0.0143	0.364	3.50	46.0	0.420	6.33	9.74
1.2	66.5	0.0171	0.435	4.18	42.1	0.503	7.57	11.6
1.4	64.1	0.0199	0.506	4.84	35.9	0.586	8.77	13.4
1.6	62.9	0.0228	0.577	5.46	31.2	0.669	9.94	15.1
1.8	62.3	0.0256	0.646	6.03	27.3	0.751	11.1	16.5
2.0	62.0	0.0284	0.715	6.53	24.2	0.832	12.1	17.6
2.2	61.6	0.0313	0.783	6.94	21.5	0.913	13.1	18.4
2.4	61.2	0.0341	0.850	7.26	19.4	0.993	13.9	18.8
2.6	60.5	0.0369	0.914	7.47	17.6	1.07	14.7	18.8
2.8	59.5	0.0398	0.978	7.57	16.0	1.15	15.3	18.6
3.0	58.3	0.0426	1.04	7.57	14.6	1.23	15.8	18.1
3.2	56.8	0.0454	1.10	7.48	13.4	1.31	16.1	17.4
3.4	55.3	0.0481	1.16	7.32	12.3	1.38	16.3	16.8
3.6	53.5	0.0509	1.22	7.10	11.4	1.45	16.3	16.0
3.8	51.6	0.0537	1.27	6.89	10.6	1.53	16.2	15.0
4.0	49.6	0.0565	1.32	6.61	9.85	1.60	16.0	14.1
5	40.9	0.0701	1.54	5.39	7.13	1.93	14.0	10.9
6	34.0	0.0834	1.67	4.28	5.43	2.23	11.7	8.58
7	28.5	0.0963	1.72	3.46	4.28	2.46	9.58	6.93
8	24.5	0.109	1.70	2.86	3.46	2.64	8.01	5.72
9	21.2	0.121	1.61	2.41	2.77	2.74	6.76	4.81
10	18.6	0.132	1.49	2.05	2.27	2.79	5.80	4.10
12	14.7	0.153	1.20	1.55	1.62	2.70	4.41	3.09
14	11.9	0.171	0.961	1.22	1.20	2.44	3.47	2.43
16	9.75	0.185	0.793	0.980	0.920	2.10	2.82	1.96
18	8.14	0.196	0.666	0.808	0.732	1.80	2.32	1.61
20	6.90	0.203	0.566	0.683	0.595	1.54	1.96	1.36

Mn (Z=25) 1s(2) 2s(2) 3s(2) 4s(2) 2p(6) 3p(6) 3d(5)

Q	---->	14.38	3.908	1.339	0.3263	4.070	1.201	0.9177
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	2p(6)	3p(6)	3d(5)
0.2	13.7	0.00253	0.0653	0.633	9.98	0.0743	1.14	1.82
0.4	28.9	0.00508	0.131	1.27	21.4	0.149	2.29	3.66
0.6	45.3	0.00763	0.196	1.91	34.0	0.223	3.43	5.49
0.8	58.6	0.0102	0.261	2.54	43.6	0.297	4.57	7.32
1.0	63.4	0.0127	0.326	3.17	44.7	0.372	5.69	9.13
1.2	63.7	0.0153	0.391	3.78	41.4	0.446	6.80	10.9
1.4	61.1	0.0178	0.454	4.38	35.2	0.519	7.88	12.6
1.6	59.9	0.0203	0.518	4.95	30.7	0.593	8.94	14.2
1.8	59.3	0.0228	0.580	5.48	26.9	0.665	9.95	15.7
2.0	59.1	0.0254	0.642	5.95	23.9	0.738	10.9	17.0
2.2	59.0	0.0279	0.703	6.35	21.3	0.810	11.8	18.0
2.4	58.9	0.0305	0.763	6.68	19.2	0.881	12.6	18.8
2.6	58.7	0.0330	0.822	6.91	17.4	0.951	13.3	19.3
2.8	58.2	0.0355	0.880	7.05	15.8	1.02	13.9	19.5
3.0	57.4	0.0380	0.936	7.10	14.4	1.09	14.4	19.4
3.2	56.5	0.0405	0.991	7.07	13.3	1.16	14.8	19.1
3.4	55.2	0.0430	1.04	6.97	12.2	1.23	15.1	18.7
3.6	53.8	0.0455	1.10	6.80	11.3	1.29	15.2	18.1
3.8	52.3	0.0480	1.14	6.61	10.5	1.36	15.2	17.5
4.0	50.6	0.0504	1.19	6.41	9.76	1.42	15.1	16.7
5	42.6	0.0626	1.40	5.28	7.08	1.73	13.5	13.5
6	35.4	0.0746	1.54	4.19	5.40	1.99	11.5	10.7
7	29.7	0.0862	1.60	3.41	4.26	2.22	9.41	8.69
8	25.4	0.0974	1.60	2.82	3.47	2.39	7.88	7.16
9	22.0	0.108	1.53	2.38	2.80	2.51	6.67	6.03
10	19.3	0.119	1.43	2.03	2.28	2.57	5.74	5.15
12	15.2	0.138	1.18	1.53	1.60	2.53	4.36	3.88
14	12.3	0.154	0.950	1.20	1.20	2.34	3.43	3.05
16	10.1	0.168	0.781	0.972	0.935	2.05	2.79	2.45
18	8.48	0.179	0.657	0.802	0.733	1.77	2.31	2.03
20	7.19	0.186	0.561	0.676	0.599	1.52	1.94	1.70

Fe (Z=26) 1s(2)2s(2)3s(2)4s(2)2p(6)3p(6)3d(6)

Q	---->	14.97	4.089	1.406	0.3365	4.269	1.266	0.9630
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	2p(6)	3p(6)	3d(6)
0.2	12.9	0.00227	0.0588	0.576	9.36	0.0661	1.03	1.77
0.4	27.0	0.00457	0.118	1.16	20.0	0.132	2.06	3.55
0.6	42.3	0.00687	0.176	1.73	31.7	0.199	3.08	5.33
0.8	55.1	0.00916	0.235	2.31	41.1	0.264	4.10	7.09
1.0	60.6	0.0115	0.294	2.88	43.1	0.331	5.11	8.84
1.2	60.9	0.0137	0.352	3.44	40.0	0.397	6.11	10.6
1.4	58.6	0.0160	0.409	3.98	34.4	0.462	7.09	12.2
1.6	57.4	0.0183	0.466	4.50	30.0	0.527	8.04	13.8
1.8	56.9	0.0206	0.523	4.99	26.5	0.592	8.95	15.3
2.0	56.7	0.0228	0.579	5.43	23.5	0.657	9.82	16.7
2.2	56.7	0.0251	0.634	5.82	21.0	0.721	10.6	17.9
2.4	56.8	0.0274	0.688	6.14	18.9	0.784	11.4	18.8
2.6	56.8	0.0297	0.742	6.39	17.1	0.848	12.1	19.6
2.8	56.6	0.0320	0.794	6.56	15.6	0.910	12.7	20.0
3.0	56.2	0.0342	0.845	6.65	14.3	0.972	13.2	20.3
3.2	55.6	0.0365	0.895	6.66	13.1	1.03	13.6	20.3
3.4	54.8	0.0382	0.944	6.61	12.1	1.09	13.9	20.1
3.6	53.7	0.0410	0.991	6.50	11.2	1.15	14.1	19.7
3.8	52.4	0.0432	1.04	6.34	10.4	1.21	14.2	19.2
4.0	51.1	0.0454	1.08	6.17	9.67	1.27	14.2	18.7
5	43.7	0.0564	1.27	5.18	7.03	1.54	13.0	15.6
6	36.4	0.0672	1.41	4.12	5.36	1.79	11.3	12.4
7	30.5	0.0777	1.49	3.36	4.24	2.00	9.24	10.1
8	26.1	0.0879	1.50	2.79	3.44	2.17	7.76	8.38
9	22.6	0.0977	1.46	2.35	2.80	2.29	6.59	7.06
10	19.8	0.107	1.38	2.01	2.29	2.36	5.66	6.03
12	15.7	0.125	1.16	1.52	1.62	2.37	4.31	4.56
14	12.7	0.140	0.939	1.19	1.20	2.23	3.40	3.58
16	10.5	0.153	0.772	0.963	0.924	1.99	2.76	2.90
18	8.76	0.164	0.650	0.796	0.746	1.73	2.28	2.39
20	7.45	0.172	0.556	0.670	0.612	1.50	1.93	2.01

Co (Z=27) 1s(2) 2s(2) 3s(2) 4s(2) 2p(6) 3p(6) 3d(7)

Q	---->	15.58	4.269	1.472	0.3457	4.467	1.329	1.014
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	2p(6)	3p(6)	3d(7)
0.2	12.1	0.00204	0.0531	0.526	8.85	0.0591	0.929	1.68
0.4	25.4	0.00411	0.106	1.06	18.8	0.119	1.86	3.38
0.6	39.6	0.00618	0.159	1.58	29.9	0.178	2.79	5.07
0.8	52.0	0.00825	0.213	2.11	39.0	0.236	3.72	6.75
1.0	57.9	0.0103	0.265	2.63	41.6	0.296	4.63	8.41
1.2	57.9	0.0124	0.318	3.14	38.5	0.355	5.53	10.1
1.4	56.3	0.0144	0.370	3.64	33.8	0.414	6.42	11.6
1.6	55.0	0.0165	0.422	4.11	29.6	0.472	7.28	13.2
1.8	54.4	0.0185	0.473	4.57	26.1	0.530	8.12	14.6
2.0	54.2	0.0206	0.524	4.98	23.2	0.588	8.91	16.0
2.2	54.2	0.0226	0.574	5.35	20.7	0.645	9.67	17.2
2.4	54.4	0.0247	0.623	5.67	18.7	0.702	10.4	18.3
2.6	54.5	0.0267	0.672	5.92	17.0	0.759	11.0	19.2
2.8	54.6	0.0288	0.720	6.11	15.4	0.815	11.6	19.9
3.0	54.5	0.0308	0.766	6.23	14.1	0.871	12.1	20.4
3.2	54.2	0.0328	0.812	6.28	13.0	0.926	12.5	20.7
3.4	53.7	0.0349	0.857	6.26	12.0	0.980	12.8	20.7
3.6	53.0	0.0369	0.900	6.20	11.1	1.03	13.1	20.6
3.8	52.0	0.0389	0.943	6.08	10.3	1.09	13.2	20.4
4.0	50.9	0.0409	0.983	5.93	9.61	1.14	13.3	19.9
5	43.9	0.0509	1.17	4.99	6.99	1.39	12.5	16.9
6	37.2	0.0606	1.29	4.05	5.33	1.61	10.9	13.9
7	31.3	0.0701	1.38	3.31	4.22	1.81	9.11	11.4
8	26.8	0.0794	1.41	2.75	3.42	1.97	7.63	9.50
9	23.2	0.0883	1.38	2.32	2.81	2.09	6.50	8.03
10	20.3	0.0969	1.32	1.98	2.30	2.17	5.59	6.88
12	16.1	0.113	1.13	1.50	1.62	2.22	4.27	5.21
14	13.0	0.127	0.927	1.18	1.21	2.12	3.37	4.10
16	10.8	0.140	0.763	0.955	0.932	1.93	2.74	3.31
18	9.03	0.150	0.643	0.790	0.746	1.70	2.27	2.74
20	7.68	0.158	0.548	0.665	0.609	1.48	1.92	2.31

Ni (Z=28) 1s(2)2s(2)3s(2)4s(2)2p(6)3p(6)3d(8)

Q	---->	16.18	4.448	1.538	0.3546	4.664	1.392	1.065
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	2p(6)	3p(6)	3d(8)
0.2	11.4	0.00185	0.0482	0.482	8.39	0.0531	0.845	1.60
0.4	23.9	0.00373	0.0965	0.968	17.8	0.107	1.69	3.21
0.6	37.3	0.00560	0.145	1.45	28.2	0.160	2.54	4.81
0.8	49.2	0.00747	0.193	1.93	37.1	0.213	3.38	6.40
1.0	55.3	0.00933	0.241	2.41	40.2	0.266	4.21	7.97
1.2	55.6	0.0112	0.289	2.88	37.5	0.319	5.03	9.52
1.4	54.1	0.0131	0.336	3.33	33.2	0.372	5.83	11.0
1.6	52.8	0.0149	0.383	3.77	29.1	0.424	6.62	12.5
1.8	52.1	0.0168	0.430	4.19	25.7	0.477	7.39	13.9
2.0	51.9	0.0186	0.476	4.58	22.9	0.529	8.12	15.3
2.2	51.8	0.0205	0.522	4.93	20.5	0.581	8.82	16.5
2.4	52.0	0.0223	0.567	5.24	18.5	0.632	9.47	17.6
2.6	52.2	0.0242	0.611	5.49	16.8	0.683	10.1	18.6
2.8	52.4	0.0260	0.655	5.69	15.3	0.734	10.6	19.4
3.0	52.5	0.0279	0.698	5.83	14.0	0.784	11.1	20.1
3.2	52.4	0.0297	0.740	5.91	12.9	0.833	11.5	20.5
3.4	52.2	0.0316	0.781	5.93	11.9	0.883	11.9	20.8
3.6	51.8	0.0334	0.821	5.90	11.0	0.931	12.1	20.9
3.8	51.1	0.0352	0.860	5.82	10.2	0.979	12.3	20.9
4.0	50.3	0.0371	0.898	5.70	9.54	1.03	12.4	20.7
5	44.4	0.0461	1.07	4.82	6.94	1.25	12.0	18.3
6	38.0	0.0549	1.20	3.98	5.30	1.46	10.6	15.5
7	32.1	0.0636	1.28	3.26	4.19	1.64	8.98	12.7
8	27.4	0.0720	1.32	2.71	3.41	1.80	7.51	10.6
9	23.8	0.0802	1.31	2.30	2.82	1.92	6.41	8.95
10	20.8	0.0880	1.27	1.97	2.31	2.04	5.52	7.68
12	16.5	0.103	1.11	1.49	1.63	2.07	4.22	5.84
14	13.4	0.116	0.915	1.17	1.21	2.02	3.34	4.60
16	11.1	0.128	0.756	0.947	0.941	1.86	2.71	3.73
18	9.30	0.138	0.636	0.784	0.743	1.66	2.25	3.09
20	7.91	0.145	0.543	0.661	0.607	1.45	1.90	2.60

Cu (Z=29) 1s(2)2s(2)3s(2)4s(1)2p(6)3p(6)3d(10)

Q	---->	16.77	4.625	1.584	0.3130	4.856	1.436	1.035
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(1)	2p(6)	3p(6)	3d(10)
0.2	12.1	0.00168	0.0440	0.455	8.93	0.0480	0.792	1.82
0.4	26.4	0.00339	0.0880	0.913	20.1	0.0963	1.59	3.65
0.6	40.7	0.00509	0.132	1.37	31.2	0.144	2.38	5.48
0.8	45.8	0.00679	0.176	1.82	33.1	0.192	3.17	7.29
1.0	43.9	0.00849	0.220	2.27	28.2	0.240	3.95	9.08
1.2	42.2	0.0102	0.263	2.71	23.4	0.289	4.71	10.9
1.4	41.6	0.0119	0.307	3.14	19.7	0.336	5.47	12.6
1.6	41.7	0.0136	0.350	3.56	16.9	0.384	6.21	14.3
1.8	42.3	0.0153	0.392	3.96	14.7	0.432	6.93	15.9
2.0	43.2	0.0169	0.435	4.33	12.9	0.479	7.62	17.4
2.2	44.3	0.0186	0.476	4.67	11.4	0.526	8.28	18.9
2.4	45.4	0.0203	0.517	4.96	10.2	0.572	8.91	20.2
2.6	46.5	0.0220	0.558	5.22	9.23	0.618	9.49	21.3
2.8	47.4	0.0237	0.598	5.42	8.37	0.664	10.0	22.4
3.0	48.3	0.0254	0.638	5.57	7.63	0.710	10.5	23.2
3.2	48.9	0.0271	0.676	5.66	6.99	0.755	10.9	23.8
3.4	49.2	0.0287	0.714	5.70	6.43	0.800	11.3	24.3
3.6	49.3	0.0304	0.751	5.69	5.93	0.844	11.5	24.6
3.8	49.2	0.0321	0.787	5.64	5.50	0.888	11.7	24.6
4.0	48.8	0.0337	0.822	5.54	5.11	0.931	11.9	24.5
5	44.4	0.0420	0.981	4.74	3.69	1.14	11.6	22.2
6	38.6	0.0500	1.11	3.94	2.80	1.33	10.3	19.0
7	32.6	0.0579	1.19	3.23	2.12	1.50	8.89	15.6
8	27.8	0.0656	1.24	2.69	1.65	1.65	7.43	13.0
9	24.1	0.0731	1.24	2.28	1.31	1.76	6.35	11.1
10	21.1	0.0804	1.21	1.95	1.07	1.85	5.47	9.51
12	16.8	0.0940	1.08	1.48	0.762	1.94	4.19	7.23
14	13.7	0.106	0.902	1.16	0.568	1.91	3.32	5.71
16	11.4	0.117	0.749	0.943	0.435	1.79	2.70	4.62
18	9.56	0.127	0.629	0.779	0.346	1.62	2.24	3.83
20	8.16	0.134	0.539	0.657	0.285	1.43	1.89	3.23

Zn (Z=30) 1s(2)2s(2)3s(2)4s(2)2p(6)3p(6)3d(10)

Q	---->	17.37	4.803	1.668	0.3840	5.055	1.520	1.170
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	2p(6)	3p(6)	3d(10)
0.2	9.74	0.00153	0.0402	0.410	7.12	0.0435	0.703	1.42
0.4	20.2	0.00309	0.0805	0.823	15.0	0.0872	1.41	2.84
0.6	31.5	0.00464	0.121	1.23	23.6	0.131	2.11	4.26
0.8	42.0	0.00619	0.161	1.64	31.6	0.174	2.81	5.67
1.0	48.8	0.00774	0.201	2.05	35.8	0.218	3.50	7.06
1.2	50.7	0.00928	0.241	2.45	35.1	0.261	4.19	8.44
1.4	41.9	0.0108	0.280	2.84	31.8	0.304	4.86	9.79
1.6	48.2	0.0124	0.320	3.21	27.7	0.348	5.52	11.1
1.8	47.5	0.0139	0.359	3.57	24.6	0.391	6.16	12.4
2.0	47.2	0.0154	0.398	3.91	22.0	0.433	6.78	13.6
2.2	47.2	0.0170	0.436	4.23	19.8	0.476	7.38	14.8
2.4	47.3	0.0185	0.474	4.51	17.9	0.518	7.95	15.9
2.6	47.5	0.0201	0.511	4.76	16.3	0.560	8.48	16.9
2.8	47.8	0.0216	0.548	4.96	14.9	0.602	8.97	17.8
3.0	48.1	0.0231	0.584	5.12	13.6	0.643	9.42	18.6
3.2	48.3	0.0247	0.620	5.24	12.6	0.684	9.82	19.3
3.4	48.4	0.0262	0.655	5.31	11.6	0.725	10.2	19.9
3.6	48.4	0.0277	0.689	5.33	10.8	0.765	10.5	20.4
3.8	48.2	0.0292	0.722	5.31	10.0	0.805	10.7	20.7
4.0	47.9	0.0307	0.755	5.25	9.33	0.844	10.9	20.8
5	44.4	0.0383	0.904	4.61	6.82	1.03	10.9	20.0
6	38.9	0.0456	1.02	3.88	5.21	1.21	9.93	17.6
7	33.5	0.0529	1.11	3.17	4.13	1.37	8.71	15.0
8	29.6	0.0599	1.16	2.65	3.36	1.51	7.32	12.5
9	24.8	0.0668	1.18	2.25	2.79	1.62	6.24	10.7
10	21.8	0.0735	1.16	1.93	2.34	1.71	5.39	9.22
12	17.3	0.0861	1.05	1.46	1.652	1.81	4.15	7.06
14	14.0	0.0976	0.888	1.16	1.238	1.81	3.28	5.57
16	11.6	0.108	0.741	0.934	0.949	1.72	2.67	4.53
18	9.80	0.117	0.623	0.774	0.755	1.57	2.22	3.75
20	8.37	0.124	0.534	0.651	0.616	1.40	1.87	3.17

Ge (Z=32) 1s(2) 2s(2) 3s(2) 4s(2) 2p(6) 3p(6) 4p(2) 3d(10)

Q	---->	18.60	5.163	1.843	0.5034	5.491	1.686	0.3851	1.427
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	2p(6)	3p(6)	4p(2)	3d(10)
0.2	13.1	0.00128	0.0338	0.336	4.13	0.0353	0.565	7.08	0.934
0.4	27.2	0.00257	0.0677	0.673	8.49	0.0708	1.13	14.9	1.87
0.6	42.3	0.00387	0.101	1.01	13.1	0.106	1.70	23.5	2.80
0.8	56.8	0.00516	0.135	1.34	17.8	0.142	2.26	31.4	3.73
1.0	67.0	0.00645	0.169	1.67	21.9	0.177	2.81	35.6	4.65
1.2	70.8	0.00774	0.203	2.00	24.4	0.212	3.36	35.0	5.56
1.4	69.8	0.00903	0.236	2.32	24.9	0.247	3.91	31.8	6.46
1.6	66.4	0.0103	0.269	2.63	23.8	0.283	4.44	27.6	7.34
1.8	63.7	0.0116	0.302	2.93	22.4	0.318	4.96	24.6	8.20
2.0	60.3	0.0129	0.335	3.21	20.0	0.353	5.47	22.0	9.04
2.2	58.0	0.0142	0.367	3.48	18.2	0.387	5.96	19.8	9.85
2.4	56.1	0.0154	0.399	3.73	16.6	0.422	6.43	17.9	10.6
2.6	54.6	0.0167	0.431	3.96	15.2	0.456	6.88	16.3	11.4
2.8	53.3	0.0180	0.462	4.16	13.9	0.490	7.30	14.9	12.1
3.0	52.2	0.0193	0.493	4.32	12.8	0.524	7.70	13.6	12.7
3.2	51.4	0.0206	0.523	4.46	11.9	0.558	8.06	12.6	13.3
3.4	50.6	0.0219	0.553	4.56	11.0	0.591	8.39	11.6	13.9
3.6	49.9	0.0231	0.583	4.63	10.2	0.624	8.68	10.8	14.4
3.8	49.2	0.0244	0.611	4.66	9.53	0.657	8.94	10.0	14.8
4.0	48.5	0.0257	0.640	4.66	8.91	0.689	9.15	9.32	15.2
5	44.8	0.0319	0.770	4.31	6.54	0.847	9.58	6.81	15.9
6	40.1	0.0381	0.879	3.74	5.03	0.994	9.11	5.21	15.1
7	35.1	0.0442	0.964	3.08	4.00	1.13	8.20	4.13	13.6
8	30.4	0.0502	1.02	2.57	3.26	1.25	7.09	3.36	11.8
9	26.3	0.0560	1.05	2.19	2.72	1.35	6.05	2.79	10.1
10	23.0	0.0616	1.05	1.88	2.30	1.44	5.23	2.34	8.72
12	18.2	0.0724	0.980	1.43	1.72	1.55	4.04	1.64	6.72
14	14.7	0.0823	0.856	1.13	1.30	1.59	3.21	1.23	5.35
16	12.2	0.0913	0.724	0.918	1.01	1.55	2.62	0.949	4.36
18	10.3	0.0993	0.612	0.761	0.801	1.46	2.18	0.755	3.62
20	8.77	0.106	0.523	0.642	0.653	1.33	1.84	0.616	3.06

Ga (Z=31) 1s(2) 2s(2) 3s(2) 4s(2) 2p(6) 3p(6) 4p(1) 3d(10)

Q	---->	17.94	4.982	1.755	0.443	5.292	1.594	0.3215	1.302
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	2p(6)	3p(6)	4p(1)	3d(10)
0.2	16.0	0.00140	0.0368	0.370	5.33	0.0387	0.636	8.42	1.14
0.4	34.3	0.00282	0.0738	0.743	11.1	0.0777	1.27	18.8	2.27
0.6	53.4	0.00424	0.110	1.11	17.3	0.117	1.91	29.5	3.41
0.8	64.2	0.00566	0.147	1.48	23.4	0.155	2.54	32.0	4.54
1.0	66.5	0.00707	0.184	1.85	28.0	0.194	3.17	27.5	5.65
1.2	65.7	0.00848	0.221	2.21	29.6	0.233	3.79	22.9	6.76
1.4	63.2	0.00990	0.257	2.56	28.5	0.272	4.40	19.4	7.84
1.6	59.9	0.0113	0.293	2.90	25.8	0.310	4.50	16.7	8.91
1.8	57.6	0.0127	0.329	3.23	23.7	0.348	5.58	14.5	9.94
2.0	55.3	0.0141	0.365	3.54	21.1	0.387	6.15	12.7	11.0
2.2	53.8	0.0155	0.400	3.83	19.2	0.425	6.69	11.3	11.9
2.4	52.5	0.0169	0.435	4.10	17.3	0.462	7.21	10.1	12.8
2.6	51.8	0.0183	0.469	4.34	15.9	0.500	7.71	9.14	13.7
2.8	51.1	0.0197	0.503	4.54	14.5	0.537	8.17	8.29	14.5
3.0	50.5	0.0211	0.536	4.71	13.3	0.574	8.60	7.56	15.2
3.2	50.1	0.0225	0.569	4.83	12.3	0.611	8.98	6.93	15.9
3.4	49.7	0.0239	0.601	4.92	11.4	0.648	9.32	6.38	16.5
3.6	49.3	0.0253	0.633	4.97	10.5	0.684	9.62	5.89	17.0
3.8	48.9	0.0267	0.664	4.98	9.84	0.719	9.87	5.54	17.4
4.0	48.4	0.0281	0.694	4.96	9.12	0.755	10.1	5.07	17.7
5	44.8	0.0350	0.834	4.47	6.73	0.926	10.7	3.66	17.9
6	39.7	0.0418	0.949	3.82	5.11	1.09	9.58	2.78	16.4
7	34.6	0.0484	1.04	3.12	4.10	1.23	8.51	2.13	14.4
8	29.4	0.0549	1.09	2.61	3.32	1.36	7.22	1.65	12.2
9	25.4	0.0612	1.11	2.22	2.75	1.47	6.14	1.32	10.3
10	22.3	0.0673	1.10	1.90	2.36	1.56	5.32	1.08	8.95
12	17.6	0.0790	1.01	1.45	1.69	1.67	4.09	0.757	6.88
14	14.3	0.0897	0.873	1.14	1.29	1.69	3.25	0.566	5.45
16	11.9	0.0993	0.733	0.927	0.973	1.63	2.63	0.438	4.44
18	10.0	0.108	0.617	0.768	0.783	1.51	2.20	0.352	3.68
20	8.54	0.115	0.528	0.647	0.634	1.36	1.86	0.284	3.12

As (Z=33) 1s(2) 2s(2) 3s(2) 4s(2) 2p(6) 3p(6) 4p(3) 3d(10)

Q	---->	19.20	5.342	1.932	0.5583	5.691	1.784	0.4416	1.548
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	2p(6)	3P(6)	4p(3)	3d(10)
0.2	11.2	0.00117	0.0311	0.305	3.37	0.0323	0.500	6.15	0.784
0.4	22.8	0.00236	0.0624	0.611	6.89	0.0647	1.00	12.6	1.57
0.6	35.1	0.00355	0.0934	0.916	10.6	0.0971	1.50	19.5	2.35
0.8	47.5	0.00474	0.125	1.22	14.4	0.129	2.00	26.5	3.13
1.0	58.7	0.00593	0.156	1.512	17.9	0.162	2.49	32.6	3.90
1.2	66.7	0.00712	0.187	1.81	20.5	0.194	2.98	36.4	4.67
1.4	70.2	0.00830	0.218	2.10	21.7	0.226	3.46	37.1	5.42
1.6	70.1	0.00948	0.248	2.39	21.5	0.258	3.93	35.6	6.17
1.8	68.3	0.0107	0.279	2.66	20.3	0.290	4.40	33.5	6.90
2.0	64.9	0.0118	0.309	2.92	19.0	0.322	4.85	29.9	7.61
2.2	61.8	0.0130	0.339	3.17	17.1	0.354	5.29	27.2	8.30
2.4	59.4	0.0142	0.368	3.41	15.7	0.356	5.71	24.8	9.00
2.6	57.3	0.0154	0.397	3.62	14.5	0.417	6.12	22.7	9.61
2.8	55.6	0.0166	0.426	3.81	13.3	0.448	6.51	20.8	10.2
3.0	54.1	0.0177	0.455	3.97	12.3	0.479	6.87	19.2	10.8
3.2	52.9	0.0189	0.483	4.11	11.4	0.510	7.21	17.8	11.4
3.4	51.7	0.0201	0.511	4.22	10.6	0.541	7.52	16.5	11.9
3.6	50.7	0.0213	0.538	4.30	9.88	0.571	7.80	15.3	12.3
3.8	49.8	0.0224	0.565	4.35	9.22	0.601	8.06	14.3	12.7
4.0	49.0	0.0236	0.591	4.38	8.62	0.631	8.27	13.4	13.1
5	44.8	0.0294	0.713	4.14	6.37	0.776	8.84	9.81	14.1
6	40.3	0.0351	0.817	3.62	4.91	0.912	8.60	7.54	13.9
7	35.6	0.0407	0.899	3.03	3.91	1.04	7.85	5.99	12.8
8	31.1	0.0462	0.957	2.53	3.20	1.15	6.94	4.88	11.4
9	27.0	0.0516	0.989	2.16	2.66	1.25	5.96	4.07	9.85
10	23.6	0.0568	0.995	1.86	2.26	1.33	5.14	3.45	8.50
12	18.7	0.0668	0.946	1.42	1.69	1.45	3.99	2.58	6.59
14	15.2	0.0760	0.838	1.12	1.31	1.50	3.17	1.95	5.25
16	12.6	0.0845	0.715	0.911	1.02	1.48	2.59	1.51	4.29
18	10.6	0.0920	0.607	0.755	0.813	1.41	2.15	1.20	3.57
20	9.03	0.0986	0.518	0.637	0.664	1.29	1.82	0.979	3.02

Se (Z=34) 1s(2)2s(2)3s(2)4s(2)2p(6)3p(6)4p(4)3d(10)

Q	---->	19.81	5.525	2.020	0.6112	5.893	1.870	0.4809	1.671
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	2p(6)	3P(6)	4p(4)	3d(10)
0.2	10.0	0.00108	0.0287	0.278	2.83	0.0295	0.451	5.76	0.663
0.4	20.4	0.00218	0.0575	0.557	5.76	0.0593	0.903	11.7	1.33
0.6	31.1	0.00327	0.0861	0.835	8.81	0.0889	1.36	17.9	1.99
0.8	42.0	0.00436	0.115	1.11	11.9	0.119	1.80	24.3	2.65
1.0	52.4	0.00546	0.144	1.38	14.9	0.148	2.25	30.3	3.30
1.2	61.2	0.00655	0.172	1.66	17.3	0.178	2.69	35.3	3.95
1.4	67.2	0.00764	0.201	1.92	18.9	0.207	3.13	38.3	4.59
1.6	69.8	0.00873	0.229	2.18	19.3	0.237	3.55	39.1	5.23
1.8	69.7	0.00981	0.257	2.43	18.9	0.266	3.98	38.0	5.85
2.0	68.3	0.0109	0.285	2.67	18.0	0.295	4.39	36.2	6.45
2.2	65.0	0.0120	0.312	2.90	16.5	0.324	4.79	33.1	7.05
2.4	61.7	0.0131	0.340	3.12	15.0	0.353	5.17	30.1	7.62
2.6	59.4	0.0141	0.367	3.32	13.9	0.382	5.55	27.8	8.18
2.8	57.5	0.0152	0.394	3.50	12.8	0.411	5.90	25.7	8.72
3.0	55.7	0.0163	0.420	3.66	11.9	0.439	6.24	23.9	9.23
3.2	54.2	0.0174	0.446	3.80	11.0	0.467	6.56	22.1	9.71
3.4	52.8	0.0185	0.472	3.92	10.3	0.496	6.85	20.6	10.2
3.6	51.6	0.0196	0.497	4.01	9.57	0.524	7.13	19.3	10.6
3.8	50.4	0.0206	0.522	4.07	8.96	0.551	7.37	18.0	11.0
4.0	49.4	0.0217	0.546	4.11	8.39	0.579	7.59	16.8	11.3
5	44.8	0.0270	0.661	3.97	6.23	0.712	8.23	12.5	12.5
6	40.4	0.0323	0.759	3.50	4.82	0.839	8.15	9.64	12.7
7	35.9	0.0375	0.839	2.99	3.84	0.955	7.56	7.69	12.0
8	31.6	0.0426	0.897	2.50	3.14	1.06	6.79	6.29	10.9
9	27.6	0.0475	0.932	2.13	2.62	1.16	5.87	5.25	9.59
10	24.2	0.0524	0.945	1.84	2.22	2.24	5.08	4.45	8.33
12	19.1	0.0616	0.910	1.41	1.66	1.35	3.93	3.33	6.44
14	15.6	0.0703	0.819	1.11	1.30	1.41	3.14	2.60	5.16
16	13.0	0.0782	0.705	0.904	1.03	1.41	2.56	2.06	4.22
18	10.9	0.0853	0.601	0.750	0.823	1.35	2.14	1.64	3.52
20	9.29	0.0916	0.514	0.632	0.671	1.26	1.81	1.34	2.98

Br (Z=35) 1s(2)2s(2)3s(2)4s(2)2p(6)3p(6)4p(5)3d(10)

a	---->	20.41	5.704	2.110	0.6626	6.3665	1.962	0.5237	1.783
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	2p(6)	3p(6)	4p(5)	3d(10)
0.2	9.00	0.000994	0.0266	0.2548	2.42	0.0242	0.406	5.30	0.574
0.4	18.2	0.00201	0.0532	0.509	4.91	0.0487	0.812	10.7	1.15
0.6	27.6	0.00302	0.0797	0.763	7.49	0.0731	1.22	16.3	1.72
0.8	37.2	0.00403	0.106	1.02	10.1	0.0974	1.62	21.9	2.30
1.0	46.6	0.00504	0.133	1.27	12.7	0.122	2.03	27.5	2.86
1.2	55.1	0.00605	0.159	1.51	14.9	0.146	2.42	32.5	3.43
1.4	62.0	0.00705	0.186	1.75	16.5	0.170	2.82	36.5	3.98
1.6	66.5	0.00806	0.212	1.99	17.3	0.195	3.20	39.0	4.53
1.8	68.4	0.00906	0.238	2.22	17.3	0.219	3.58	39.8	5.07
2.0	68.3	0.0101	0.264	2.45	16.7	0.243	3.96	39.1	5.60
2.2	67.1	0.0111	0.289	2.66	15.9	0.267	4.32	37.6	6.12
2.4	64.5	0.0121	0.315	2.86	14.5	0.291	4.67	35.2	6.63
2.6	63.2	0.0131	0.340	3.05	13.4	0.314	5.01	34.0	7.12
2.8	60.7	0.0141	0.365	3.22	12.4	0.338	5.34	31.5	7.59
3.0	58.6	0.0151	0.389	3.38	11.5	0.362	5.65	29.2	8.05
3.2	56.7	0.0161	0.414	3.51	10.7	0.385	5.95	27.2	8.49
3.4	55.0	0.0171	0.437	3.63	10.0	0.408	6.22	25.4	8.90
3.6	53.5	0.0181	0.461	3.73	9.35	0.431	6.48	23.7	9.29
3.8	52.0	0.0191	0.484	3.80	8.74	0.454	6.72	22.2	9.65
4.0	50.8	0.0201	0.507	3.85	8.22	0.477	6.93	20.8	9.99
5	45.5	0.0250	0.614	3.80	6.12	0.588	7.63	15.5	11.2
6	40.8	0.0299	0.708	3.40	4.74	0.694	7.69	12.0	11.6
7	36.4	0.0346	0.785	2.95	3.79	0.793	7.25	9.58	11.2
8	32.1	0.0394	0.843	2.46	3.10	0.885	6.59	7.84	10.4
9	28.2	0.0440	0.880	2.10	2.59	0.967	5.78	6.55	9.33
10	24.7	0.0485	0.897	1.82	2.20	1.04	5.01	5.54	8.17
12	19.5	0.0571	0.876	1.39	1.65	1.16	3.88	4.15	6.32
14	15.9	0.0652	0.798	1.10	1.29	1.22	3.10	3.24	5.08
16	13.2	0.0726	0.694	0.895	1.03	1.24	2.54	2.60	4.16
18	11.2	0.0794	0.594	0.743	0.834	1.22	2.12	2.14	3.48
20	9.56	0.0854	0.510	0.628	0.680	1.16	1.79	1.75	2.95

Kr (Z=36) 1s(2)2s(2)3s(2)4s(2)2p(6)3p(6)4p(6)3d(10)

Q	---->	21.00	5.888	2.199	0.7115	6.281	2.079	0.5679	1.898
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	2p(6)	3p(6)	4p(6)	3d(10)
0.2	8.11	0.000921	0.0246	0.233	2.11	0.0251	0.358	4.85	0.499
0.4	16.3	0.00186	0.0492	0.467	4.28	0.0504	0.714	9.78	0.997
0.6	24.7	0.00280	0.0738	0.700	6.50	0.0757	1.07	14.8	1.50
0.8	33.2	0.00376	0.0983	0.931	8.76	0.101	1.43	19.9	2.00
1.0	41.5	0.00467	0.123	1.16	11.0	0.126	1.78	24.9	2.49
1.2	49.4	0.00560	0.147	1.39	13.0	0.151	2.13	29.6	2.98
1.4	56.3	0.00654	0.172	1.61	14.6	0.176	2.48	33.8	3.47
1.6	61.6	0.00747	0.196	1.83	15.6	0.201	2.82	37.1	3.94
1.8	65.1	0.00840	0.220	2.04	15.9	0.226	3.16	39.1	4.42
2.0	66.6	0.00933	0.244	2.25	15.6	0.251	3.49	39.9	4.88
2.2	66.6	0.0103	0.268	2.44	15.0	0.276	3.81	39.5	5.34
2.4	65.5	0.0112	0.291	2.63	14.1	0.301	4.12	38.3	5.78
2.6	64.0	0.0121	0.315	2.81	13.6	0.325	4.43	36.4	6.22
2.8	62.3	0.0130	0.338	2.97	12.6	0.350	4.72	34.7	6.64
3.0	60.4	0.0140	0.361	3.12	11.7	0.374	5.00	32.8	7.04
3.2	58.1	0.0149	0.383	3.26	10.9	0.398	5.27	30.4	7.43
3.4	56.3	0.0158	0.406	3.37	10.1	0.422	5.53	28.6	7.81
3.6	54.5	0.0168	0.428	3.47	9.49	0.446	5.77	26.8	8.16
3.8	53.0	0.0177	0.449	3.55	8.85	0.470	5.99	25.2	8.50
4.0	51.6	0.0186	0.470	3.61	8.32	0.494	6.20	23.6	8.81
5	45.8	0.0232	0.571	3.62	6.20	0.608	6.92	17.8	10.0
6	41.0	0.0277	0.659	3.30	4.80	0.717	7.11	13.9	10.6
7	36.7	0.0321	0.733	2.90	3.83	0.819	6.85	11.1	10.4
8	32.6	0.0365	0.791	2.44	3.14	0.913	6.31	9.10	9.83
9	28.2	0.0408	0.830	2.08	2.62	0.998	5.64	7.62	9.00
10	25.4	0.0450	0.851	1.80	2.22	1.07	4.93	6.48	7.99
12	20.0	0.0531	0.841	1.38	1.66	1.19	3.82	4.86	6.22
14	16.3	0.0606	0.777	1.09	1.30	1.25	3.06	3.80	4.99
16	13.6	0.0676	0.682	0.889	1.04	1.27	2.51	3.06	4.10
18	11.5	0.0740	0.588	0.738	0.857	1.24	2.09	2.52	3.43
20	9.89	0.0797	0.506	0.624	0.700	1.18	1.77	2.12	2.91

Rb (Z=37) 1s(2)2s(2)3s(2)4s(2)5s(1)2p(6)3p(6)4p(6)3d(10)

Q	---->	21.44	6.084	2.294	0.7857	0.2084	6.483	2.175	0.6553	2.013
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(1)	2p(6)	3p(6)	3d(6)	3d(10)
0.2	28.8	0.000871	0.0227	0.213	1.75	22.3	0.0232	0.323	3.70	0.437
0.4	67.0	0.00176	0.0455	0.427	3.53	54.0	0.0465	0.646	7.44	0.873
0.6	78.8	0.00265	0.0681	0.640	5.35	59.2	0.0698	0.970	11.2	1.31
0.8	70.2	0.00353	0.0907	0.851	7.19	43.9	0.0930	1.29	15.0	1.75
1.0	66.9	0.00442	0.114	1.06	9.01	34.1	0.116	1.61	18.8	2.18
1.2	66.6	0.00530	0.136	1.27	10.7	27.4	0.139	1.93	22.4	2.61
1.4	67.6	0.00619	0.159	1.47	12.2	22.6	0.163	2.24	25.8	3.04
1.6	69.1	0.00707	0.181	1.67	13.3	19.0	0.186	2.55	28.7	3.46
1.8	70.2	0.00795	0.203	1.87	13.9	16.4	0.209	2.86	31.0	3.87
2.0	70.7	0.00883	0.225	2.06	14.0	14.3	0.232	3.16	32.5	4.28
2.2	70.4	0.00971	0.247	2.24	13.7	12.6	0.255	3.45	33.2	4.68
2.4	69.3	0.0106	0.269	2.42	13.2	11.2	0.278	3.74	33.1	5.08
2.6	67.5	0.0115	0.291	2.58	12.4	10.0	0.300	4.02	32.4	5.46
2.8	65.8	0.0123	0.312	2.74	12.0	9.05	0.323	4.29	31.3	5.84
3.0	63.4	0.0132	0.333	2.88	11.1	8.22	0.345	4.55	29.8	6.20
3.2	61.7	0.0141	0.354	3.01	10.4	7.50	0.368	4.80	28.7	6.55
3.4	59.3	0.0150	0.375	3.12	9.70	6.88	0.390	5.03	26.9	6.89
3.6	57.0	0.0159	0.395	3.22	9.08	6.33	0.412	5.26	25.1	7.21
3.8	55.2	0.0167	0.416	3.30	8.53	5.86	0.434	5.47	23.7	7.52
4.0	53.5	0.0176	0.435	3.37	8.00	5.43	0.456	5.66	22.4	7.81
5	46.6	0.0219	0.529	3.44	6.01	3.63	0.562	6.39	17.0	8.98
6	41.3	0.0262	0.613	3.20	4.67	2.57	0.664	6.66	13.3	9.60
7	36.9	0.0304	0.683	2.84	3.73	1.91	0.759	6.52	10.7	9.67
8	32.8	0.0346	0.740	2.41	3.06	1.49	0.847	6.08	8.82	9.28
9	29.1	0.0386	0.780	2.05	2.56	1.19	0.927	5.51	7.40	8.63
10	25.7	0.0426	0.804	1.78	2.17	0.976	0.998	4.86	6.30	7.79
12	20.3	0.0503	0.804	1.37	1.63	0.687	1.11	3.77	4.74	6.13
14	16.5	0.0575	0.753	1.08	1.27	0.513	1.18	3.02	3.71	4.91
16	13.8	0.0642	0.670	0.882	1.03	0.397	1.21	2.48	2.99	4.05
18	11.7	0.0704	0.580	0.733	0.844	0.316	1.19	2.07	2.47	3.39
20	10.0	0.0759	0.501	0.620	0.707	0.259	1.14	1.76	2.07	2.88

Sr (Z=38) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 3d(10)

Q	---->	22.09	6.267	2.392	0.8639	0.2546	6.681	2.276	0.7329	2.127
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	2p(6)	3p(6)	4p(6)	3d(10)
0.2	22.3	0.000804	0.0211	0.195	1.46	16.9	0.0215	0.292	2.99	0.385
0.4	46.7	0.00163	0.0423	0.390	2.95	37.9	0.0431	0.583	6.01	0.770
0.6	75.4	0.00244	0.0634	0.585	4.45	59.2	0.0646	0.876	9.04	1.16
0.8	85.9	0.00326	0.0843	0.779	5.97	64.2	0.0861	1.17	12.1	1.54
1.0	82.2	0.00408	0.106	0.971	7.47	55.1	0.108	1.46	15.1	1.92
1.2	78.4	0.00490	0.127	1.16	8.90	46.0	0.129	1.74	18.0	2.30
1.4	76.1	0.00571	0.148	1.35	10.2	38.8	0.151	2.03	20.8	2.68
1.6	75.2	0.00653	0.168	1.53	11.3	33.3	0.172	2.31	23.3	3.05
1.8	74.5	0.00734	0.189	1.71	12.0	29.0	0.193	2.58	25.5	3.42
2.0	74.0	0.00815	0.210	1.89	12.4	25.5	0.215	2.86	27.2	3.78
2.2	73.1	0.00896	0.230	2.06	12.4	22.7	0.236	3.12	28.3	4.14
2.4	71.1	0.00977	0.251	2.22	12.1	20.3	0.257	3.38	28.8	4.49
2.6	70.1	0.0106	0.271	2.37	11.7	18.3	0.278	3.64	28.8	4.83
2.8	68.1	0.0114	0.291	2.52	11.1	16.6	0.299	3.88	28.3	5.17
3.0	66.2	0.0122	0.310	2.65	10.7	15.1	0.320	4.12	27.5	5.49
3.2	63.8	0.0130	0.330	2.77	9.94	13.9	0.341	4.35	26.4	5.81
3.4	61.9	0.0138	0.349	2.89	9.28	12.8	0.361	4.57	22.5	6.11
3.6	59.6	0.0146	0.368	2.98	8.71	11.8	0.392	4.78	24.1	6.41
3.8	57.3	0.0154	0.387	3.07	8.20	10.9	0.402	4.98	22.7	6.69
4.0	55.3	0.0162	0.406	3.14	7.71	10.2	0.423	5.17	21.3	6.96
5	47.8	0.0203	0.494	3.26	5.83	7.33	0.522	5.89	16.4	8.07
6	42.3	0.0242	0.573	3.08	4.55	5.57	0.616	6.22	12.9	8.74
7	37.6	0.0281	0.641	2.77	3.65	4.25	0.705	6.17	10.5	8.94
8	33.4	0.0320	0.696	2.38	3.00	3.29	0.788	5.84	8.62	8.73
9	29.6	0.0357	0.736	2.02	2.51	2.64	0.864	5.36	7.24	8.23
10	26.3	0.0394	0.762	1.76	2.14	2.16	0.932	4.77	6.17	7.55
12	20.7	0.0466	0.771	1.35	1.61	1.51	1.04	3.72	4.65	6.03
14	16.8	0.0533	0.730	1.08	1.25	1.13	1.11	2.99	3.64	4.84
16	14.0	0.0596	0.656	0.876	1.01	0.876	1.15	2.45	2.94	3.98
18	11.9	0.0654	0.573	0.728	0.832	0.703	1.14	2.05	2.43	3.34
20	10.2	0.0706	0.497	0.615	0.700	0.568	1.10	1.74	2.04	2.84

Y (Z=39) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 3d(10) 4d(1)

Q	---->	22.77	6.446	2.478	0.9202	0.2692	6.878	2.375	0.7913	2.198	0.4980
V	TOTAL	1S(2)	2s(2)	3s(2)	4s(2)	5s(2)	2p(6)	3p(6)	4p(6)	3d(10)	4d(1)
0.2	23.1	0.000740	0.0197	0.181	1.30	15.0	0.0199	0.265	2.59	0.357	3.36
0.4	49.8	0.00150	0.0394	0.362	2.61	33.2	0.0340	0.530	5.19	0.714	7.04
0.6	77.8	0.00225	0.0519	0.543	3.94	52.4	0.0600	0.796	7.80	1.07	11.1
0.8	93.6	0.00301	0.0787	0.722	5.27	59.7	0.0800	1.06	10.4	1.43	14.9
1.0	94.2	0.00376	0.0984	0.900	6.60	53.4	0.0999	1.32	13.0	1.78	17.1
1.2	89.6	0.00451	0.118	1.08	7.87	44.2	0.120	1.58	15.0	2.14	17.0
1.4	86.1	0.00527	0.138	1.25	9.04	37.6	0.140	1.84	17.9	2.49	15.7
1.6	82.9	0.00602	0.157	1.42	10.1	32.4	0.160	2.10	20.2	2.83	13.6
1.8	80.8	0.00677	0.177	1.59	10.8	28.3	0.180	2.35	22.2	3.17	12.1
2.0	79.1	0.00752	0.196	1.75	11.3	24.9	0.199	2.30	23.8	3.51	10.8
2.2	77.5	0.00826	0.215	1.91	11.5	22.2	0.219	2.84	25.0	3.84	9.79
2.4	75.7	0.00901	0.234	2.06	11.4	19.9	0.239	3.08	25.8	4.17	8.86
2.6	73.8	0.00976	0.253	2.21	11.1	17.9	0.258	3.31	26.1	4.49	8.06
2.8	71.6	0.0105	0.271	2.34	10.6	16.3	0.278	3.54	26.1	4.80	7.36
3.0	69.4	0.0113	0.290	2.47	10.2	14.9	0.297	3.76	25.6	5.11	6.77
3.2	67.0	0.0120	0.308	2.59	9.70	13.6	0.317	3.97	24.9	5.40	6.23
3.4	64.6	0.0127	0.326	2.70	9.05	12.6	0.336	4.18	24.0	5.69	5.76
3.6	62.5	0.0135	0.344	2.79	8.45	11.6	0.355	4.37	23.2	5.97	5.34
3.8	60.1	0.0142	0.362	2.88	7.97	10.8	0.374	4.56	22.0	6.23	4.97
4.0	57.9	0.0150	0.379	2.95	7.53	10.0	0.393	4.73	20.8	6.49	4.64
5	49.4	0.0187	0.462	3.11	5.72	7.24	0.485	5.44	16.0	7.56	3.38
6	43.4	0.0223	0.537	2.98	4.48	5.50	0.573	5.81	12.7	8.25	2.59
7	38.5	0.0259	0.602	2.69	3.60	4.29	0.657	5.84	10.3	8.51	2.05
8	34.2	0.0295	0.656	2.35	2.96	3.33	0.735	5.59	8.49	8.39	1.67
9	30.4	0.0330	0.697	2.01	2.48	2.66	0.807	5.20	7.13	7.97	1.39
10	27.0	0.0364	0.724	1.73	2.11	2.17	0.872	4.68	6.08	7.39	1.17
12	21.3	0.0430	0.739	1.34	1.59	1.54	0.978	3.68	4.60	5.97	0.828
14	17.2	0.0493	0.707	1.07	1.24	1.14	1.05	2.95	3.61	4.79	0.616
16	14.3	0.0552	0.643	0.870	1.00	0.882	1.09	2.43	2.91	3.95	0.476
18	12.1	0.0606	0.565	0.723	0.825	0.703	1.09	2.04	2.40	3.32	0.381
20	10.4	0.0656	0.492	0.612	0.693	0.579	1.06	1.73	2.02	2.83	0.310

Z r (Z=40) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 3d(10) 4d(2)

Q	---->	23.32	6.633	2.570	0.9719	0.2826	7.079	2.473	0.8435	2.326	0.5400
V	TOTAL	1S(2)	2s(2)	3s(2)	4s(2)	5s(2)	2p(6)	3p(6)	4p(6)	3d(10)	4d(2)
0.2	21.3	0.000694	0.0183	0.167	0.17	13.5	0.0185	0.242	2.29	0.313	3.60
0.4	45.5	0.00141	0.0367	0.334	2.35	29.7	0.0371	0.483	4.59	0.627	7.37
0.6	71.1	0.00211	0.0551	0.502	3.54	47.1	0.0557	0.756	6.89	0.940	11.4
0.8	88.0	0.00282	0.0733	0.668	4.74	55.7	0.0743	0.967	9.19	1.25	15.4
1.0	92.0	0.00353	0.0917	0.832	5.93	51.8	0.0928	1.21	11.5	1.57	19.1
1.2	89.8	0.00423	0.110	0.995	7.08	42.8	0.111	1.45	13.7	1.88	21.7
1.4	88.6	0.00494	0.128	1.16	8.15	36.6	0.130	1.68	15.9	2.18	22.7
1.6	86.8	0.00564	0.146	1.31	9.09	31.6	0.148	1.91	17.9	2.49	22.2
1.8	84.8	0.00635	0.165	1.47	9.85	27.7	0.167	2.14	19.7	2.79	20.8
2.0	82.8	0.00705	0.182	1.62	10.4	24.4	0.185	2.37	21.3	3.08	19.3
2.2	80.5	0.00775	0.200	1.77	10.7	21.8	0.204	2.59	22.5	3.38	17.5
2.4	78.5	0.00845	0.218	1.91	10.7	19.5	0.222	2.81	23.4	3.67	16.0
2.6	76.3	0.00915	0.236	2.05	10.5	17.7	0.240	3.03	23.9	3.95	14.7
2.8	74.0	0.00985	0.253	2.17	10.2	16.1	0.258	3.24	24.1	4.23	13.5
3.0	71.6	0.0106	0.270	2.30	9.74	14.7	0.276	3.44	23.9	4.50	12.5
3.2	69.3	0.0113	0.287	2.41	9.42	13.5	0.294	3.64	23.5	4.76	11.6
3.4	66.8	0.0120	0.304	2.51	8.86	12.4	0.312	3.83	22.8	5.02	10.7
3.6	64.4	0.0127	0.312	2.61	8.30	11.5	0.330	4.01	22.1	5.27	9.99
3.8	62.1	0.0134	0.338	2.69	7.77	10.6	0.348	4.18	21.3	5.51	9.32
4.0	59.8	0.0141	0.354	2.76	7.35	9.89	0.365	4.35	20.3	5.74	8.71
5	50.8	0.0175	0.432	2.95	5.61	7.17	0.451	5.03	15.9	6.75	6.43
6	44.2	0.0210	0.503	2.87	4.41	5.54	0.534	5.43	12.6	7.44	4.95
7	39.1	0.0244	0.565	2.62	3.55	4.30	0.612	5.52	10.2	7.78	3.94
8	34.7	0.0277	0.617	2.32	2.92	3.36	0.686	5.36	8.45	7.79	3.21
9	30.9	0.0310	0.657	1.99	2.45	2.68	0.754	5.02	7.09	7.52	2.68
10	27.6	0.0342	0.686	1.71	2.09	2.19	0.815	4.85	6.10	7.07	2.27
12	21.9	0.0404	0.767	1.33	1.57	1.55	0.919	3.64	4.58	5.85	1.70
14	17.7	0.0464	0.684	1.06	1.23	1.15	0.991	2.91	3.59	4.73	1.31
16	14.7	0.0519	0.628	0.863	0.992	0.893	1.03	2.41	2.90	3.89	1.01
18	12.4	0.0571	0.557	0.718	0.819	0.713	1.04	2.02	2.40	3.28	0.807
20	10.6	0.0618	0.487	0.608	0.689	0.580	1.02	1.72	2.04	2.79	0.658

Nb (Z=41) 1s(2) 2s(2) 3s(2) 4s(2) 5S(2) 2p(6) 3p(6) 4p(6) 3d(10) 4d(3)

Q	---->	23.96	6.813	2.661	1.022	0.2934	7.318	2.572	0.8935	2.440	0.5890
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	2p(6)	3p(6)	4p(6)	3d(10)	4d(3)
0.2	19.8	0.00645	0.0172	0.155	1.06	12.5	0.0170	0.221	2.05	0.280	3.52
0.4	42.0	0.00131	0.0344	0.310	2.14	27.2	0.0341	0.442	4.11	0.561	7.12
0.6	65.6	0.00197	0.0516	0.465	3.22	43.3	0.0512	0.663	6.16	0.841	10.9
0.8	82.4	0.00262	0.0686	0.619	4.29	52.5	0.0682	0.884	8.22	1.12	14.6
1.0	87.7	0.00328	0.0858	0.772	5.37	50.3	0.0852	1.10	20.3	1.40	18.3
1.2	86.2	0.00394	0.103	0.923	6.42	41.8	0.102	1.32	12.2	1.68	21.6
1.4	86.3	0.00459	0.120	1.07	7.40	35.9	0.119	1.54	14.2	1.95	24.0
1.6	86.2	0.00525	0.137	1.22	8.28	31.1	0.136	1.75	16.0	2.23	25.3
1.8	85.5	0.00590	0.154	1.36	9.02	27.3	0.153	1.96	17.7	2.50	25.5
2.0	84.3	0.00656	0.171	1.51	9.57	24.1	0.170	2.17	19.2	2.76	24.7
2.2	82.7	0.00721	0.188	1.64	9.91	21.5	0.197	2.38	20.4	3.02	23.5
2.4	80.4	0.00786	0.204	1.77	10.0	19.4	0.204	2.58	21.4	3.29	21.6
2.6	78.0	0.00851	0.221	1.90	9.96	17.5	0.221	2.77	22.0	3.54	20.0
2.8	75.8	0.00916	0.237	2.02	9.75	15.9	0.237	2.97	22.3	3.79	18.5
3.0	73.4	0.00981	0.253	2.14	9.40	14.5	0.254	3.15	22.4	4.04	17.2
3.2	71.0	0.0105	0.269	2.25	9.03	13.4	0.270	3.34	22.1	4.28	16.0
3.4	68.6	0.0111	0.285	2.35	8.67	12.3	0.287	3.51	21.7	4.51	15.0
3.6	66.0	0.0118	0.301	2.44	8.15	11.4	0.303	3.68	21.1	4.74	14.0
3.8	63.7	0.0124	0.316	2.52	7.65	10.6	0.319	3.85	20.5	4.96	13.1
4.0	61.4	0.0131	0.332	2.59	7.19	9.82	0.336	4.00	19.7	5.17	12.3
5	52.3	0.0163	0.405	2.80	5.53	7.11	0.415	4.66	16.1	6.11	9.17
6	45.3	0.0195	0.473	2.76	4.35	5.42	0.491	5.07	12.8	6.79	7.11
7	39.9	0.0227	0.532	2.55	3.51	4.28	0.564	5.21	10.4	7.18	5.67
8	35.4	0.0258	0.582	2.28	2.89	3.38	0.632	5.12	8.56	7.28	4.65
9	31.5	0.0288	0.622	1.97	2.43	2.70	0.696	4.85	7.20	7.11	3.88
10	28.1	0.0319	0.652	1.70	2.07	2.21	0.754	4.47	6.14	6.77	3.29
12	22.4	0.0377	0.677	1.32	1.56	1.56	0.853	3.60	4.64	5.72	2.48
14	18.2	0.0432	0.661	1.05	1.22	1.16	0.925	2.89	3.64	4.67	1.93
16	15.1	0.0485	0.613	0.857	0.985	0.897	0.969	2.38	2.94	3.84	1.55
18	12.7	0.0534	0.548	0.713	0.813	0.717	0.984	2.00	2.43	3.24	1.26
20	10.9	0.0579	0.481	0.604	0.684	0.583	0.971	1.70	2.04	2.76	1.03

Mo (Z=42) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 3d(10) 4d(4)

Q	---->	24.50	1.667	2.752	1.070	0.3032	7.477	2.670	0.9416	2.522	0.6356
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	2p(6)	3p(6)	4p(6)	3d(10)	4d(4)
0.2	18.5	0.000607	0.0161	0.144	0.975	11.6	0.0161	0.203	1.85	0.259	3.38
0.4	39.0	0.00123	0.0322	0.298	1.96	25.3	0.0323	0.405	3.71	0.519	6.81
0.6	60.9	0.00195	0.0483	0.432	2.94	40.2	0.0484	0.608	5.57	0.778	10.3
0.8	77.4	0.00247	0.0643	0.575	3.93	49.7	0.0646	0.811	7.41	1.04	13.9
1.0	83.3	0.00309	0.0803	0.718	4.91	48.6	0.0806	1.01	9.24	1.30	17.4
1.2	82.7	0.00371	0.0964	0.858	5.87	41.4	0.0967	1.21	11.0	1.55	20.6
1.4	83.1	0.00433	0.112	0.997	6.77	35.6	0.113	1.41	12.8	1.81	23.5
1.6	83.7	0.00494	0.128	1.13	7.60	30.9	0.129	1.61	14.5	2.06	25.7
1.8	84.0	0.00556	0.144	1.27	8.31	27.1	0.145	1.80	16.0	2.31	27.0
2.0	83.8	0.00618	0.160	1.40	8.87	24.0	0.161	1.99	17.4	2.56	27.3
2.2	83.0	0.00679	0.176	1.53	9.25	21.4	0.177	2.18	18.6	2.80	26.9
2.4	81.7	0.00741	0.191	1.65	9.44	19.2	0.193	2.37	19.6	3.04	26.0
2.6	79.7	0.00802	0.207	1.77	9.45	17.4	0.209	2.55	20.3	3.28	24.6
2.8	78.1	0.00863	0.222	1.89	9.32	15.8	0.224	2.73	20.7	3.52	23.7
3.0	75.6	0.00924	0.237	2.00	9.07	14.5	0.240	2.90	20.9	3.74	22.1
3.2	73.1	0.00986	0.252	2.10	8.71	13.3	0.256	3.07	20.9	3.97	20.6
3.4	70.7	0.0105	0.267	2.19	8.44	12.3	0.271	3.24	20.6	4.19	19.2
3.6	68.1	0.0111	0.282	2.28	8.00	11.3	0.287	3.34	20.2	4.40	18.0
3.8	65.7	0.0117	0.297	2.36	7.53	10.5	0.302	3.55	19.6	4.61	16.9
4.0	63.4	0.0123	0.311	2.44	7.08	9.79	0.318	3.70	19.0	4.81	15.9
5	53.7	0.0154	0.381	2.66	5.45	7.09	0.393	4.32	15.8	5.70	12.0
6	46.2	0.0184	0.444	2.65	4.30	5.41	0.466	4.74	12.5	6.37	9.29
7	40.6	0.0214	0.501	2.48	3.47	4.28	0.535	4.92	10.2	6.78	7.44
8	36.0	0.0243	0.549	2.24	2.86	3.42	0.600	4.88	8.44	6.93	6.10
9	32.1	0.0272	0.589	1.95	2.41	2.72	0.661	4.67	7.10	6.83	5.10
10	28.6	0.0300	0.619	1.68	2.05	2.22	0.717	4.35	6.07	6.55	4.34
12	22.9	0.0356	0.647	1.31	1.55	1.58	0.813	3.55	4.59	5.63	3.25
14	18.6	0.0408	0.638	1.04	1.21	1.18	0.884	2.86	3.60	4.62	2.54
16	15.4	0.0458	0.598	0.851	0.979	0.911	0.929	2.36	2.91	3.81	2.05
18	13.0	0.0505	0.539	0.708	0.808	0.719	0.948	1.98	2.40	3.21	1.69
20	11.2	0.0548	0.476	0.600	0.680	0.590	0.941	1.69	2.02	2.74	1.41

Tc (Z=43) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 3d(10) 4d(5)

Q	---->	25.76	7.178	2.843	1.117	3.114	7.676	2.766	0.9833	2.667	0.6797
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	2p(6)	3p(6)	4p(6)	3d(10)	4d(5)
0.2	17.4	0.000530	0.0151	0.134	0.898	11.0	0.0150	0.187	1.70	0.227	3.23
0.4	36.7	0.00107	0.0302	0.268	1.80	23.8	0.0301	0.374	3.41	0.455	6.50
0.6	57.2	0.00162	0.0453	0.402	2.71	37.8	0.0453	0.560	5.11	0.682	9.80
0.8	73.3	0.00216	0.0603	0.536	3.62	47.5	0.0603	0.747	6.81	0.910	13.1
1.0	79.3	0.00270	0.0754	0.668	4.52	47.0	0.0754	0.933	8.49	1.14	16.4
1.2	81.0	0.00324	0.0905	0.799	5.40	42.4	0.0903	1.120	10.1	1.36	19.6
1.4	80.6	0.00378	0.106	0.929	6.23	36.1	0.105	1.30	11.7	1.59	22.5
1.6	81.2	0.00432	0.120	1.06	7.01	31.3	0.120	1.48	13.3	1.81	25.0
1.8	81.9	0.00486	0.135	1.18	7.69	27.4	0.135	1.66	14.7	2.03	26.9
2.0	82.4	0.00540	0.150	1.31	8.24	24.3	0.150	1.84	16.0	2.25	28.1
2.2	82.3	0.00594	0.165	1.43	8.64	21.6	0.165	2.01	17.2	2.46	28.6
2.4	81.6	0.00647	0.180	1.54	8.88	19.4	0.180	2.18	18.2	2.67	28.3
2.6	80.4	0.00701	0.194	1.65	8.96	17.6	0.195	2.35	18.9	2.88	27.7
2.8	78.6	0.00755	0.208	1.76	8.90	15.9	0.210	2.52	19.4	3.09	26.5
3.0	76.7	0.00808	0.223	1.87	8.72	14.6	0.225	2.68	19.7	3.29	25.3
3.2	74.6	0.00861	0.237	1.96	8.44	13.4	0.239	2.84	19.8	3.49	24.2
3.4	72.0	0.00915	0.251	2.06	8.14	12.4	0.254	2.99	19.6	3.69	22.6
3.6	69.4	0.00969	0.265	2.14	7.84	11.5	0.268	3.14	19.3	3.88	21.1
3.8	66.9	0.0102	0.279	2.22	7.41	10.6	0.283	3.29	18.9	4.06	19.9
4.0	64.6	0.0108	0.292	2.29	6.99	9.85	0.297	3.42	18.4	4.24	18.8
5	54.6	0.0134	0.358	2.52	5.37	7.17	0.368	4.02	15.5	5.06	14.3
6	46.7	0.0161	0.418	2.55	4.25	5.42	0.436	4.44	12.3	5.70	11.2
7	41.0	0.0187	0.472	2.41	3.44	4.30	0.501	4.65	10.1	6.13	9.00
8	36.3	0.0213	0.519	2.19	2.84	3.48	0.563	4.66	8.33	6.34	7.39
9	32.3	0.0238	0.558	1.92	2.39	2.76	0.620	4.50	7.03	6.33	6.20
10	28.9	0.0263	0.588	1.67	2.04	2.25	0.674	4.23	6.01	6.15	5.27
12	23.3	0.0312	0.620	1.29	1.54	1.58	0.766	3.50	4.55	5.44	3.97
14	18.9	0.0358	0.616	1.03	1.20	1.17	0.836	2.84	3.57	4.53	3.10
16	15.7	0.0403	0.582	0.845	0.972	0.911	0.883	2.34	2.88	3.76	2.50
18	13.3	0.0444	0.529	0.704	0.803	0.741	0.905	1.96	2.39	3.15	2.06
20	11.4	0.0483	0.470	0.596	0.676	0.599	0.903	1.67	2.01	2.70	1.73

Ru (Z=44) 1s(2) 2s(2) 3s(2) 4s(2) 5s(1) 2p(6) 3p(6) 4p(6) 3d(10) 4d(7)

q	---->	25.86	7.379	2.906	1.161	0.3027	7.887	2.858	1.020	2.778	0.6662
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(1)	2p(6)	3p(6)	4p(6)	3d(10)	4d(7)
0.2	16.4	0.000524	0.0141	0.128	0.834	9.60	0.0140	0.173	1.58	0.206	3.80
0.4	35.3	0.00106	0.0282	0.255	1.67	21.7	0.0281	0.346	3.18	0.413	7.63
0.6	53.8	0.00160	0.0423	0.383	2.52	33.4	0.0422	0.519	4.76	0.619	11.5
0.8	61.7	0.00214	0.0563	0.511	3.36	34.5	0.0562	0.692	6.33	0.826	15.4
1.0	62.9	0.00267	0.0703	0.637	4.19	29.0	0.0703	0.864	7.89	1.03	19.2
1.2	64.5	0.00321	0.0844	0.762	5.00	23.9	0.0842	1.04	9.43	1.24	22.9
1.4	67.0	0.00374	0.0985	0.885	5.79	20.1	0.0982	1.21	10.9	1.44	26.4
1.6	69.9	0.00428	0.112	1.01	6.51	17.2	0.112	1.37	12.4	1.64	29.6
1.8	72.7	0.00481	0.126	1.13	7.16	14.9	0.126	1.54	13.7	1.84	32.1
2.0	75.1	0.00534	0.140	1.24	7.70	13.1	0.140	1.70	15.0	2.04	34.1
2.2	76.8	0.00587	0.154	1.36	8.12	11.6	0.154	1.87	16.1	2.24	35.2
2.4	77.6	0.00641	0.168	1.47	8.39	10.4	0.168	2.03	17.0	2.43	35.6
2.6	77.7	0.00694	0.181	1.58	8.52	9.35	0.182	2.18	17.8	2.62	35.3
2.8	77.0	0.00747	0.195	1.68	8.51	8.46	0.196	2.34	18.3	2.81	34.5
3.0	75.7	0.00800	0.208	1.78	8.39	7.71	0.209	2.49	18.7	3.00	33.2
3.2	74.1	0.00853	0.221	1.88	8.18	7.06	0.223	2.64	18.9	3.18	31.9
3.4	72.3	0.00906	0.235	1.97	7.89	6.49	0.237	2.78	18.8	3.36	30.5
3.6	69.9	0.00959	0.248	2.05	7.65	5.99	0.250	2.92	18.6	3.53	28.6
3.8	67.3	0.0101	0.261	2.13	7.28	5.54	0.264	3.06	18.3	3.70	26.9
4.0	65.0	0.0107	0.273	2.20	6.89	5.16	0.277	3.19	17.8	3.87	25.3
5	54.9	0.0133	0.335	2.43	5.30	3.72	0.343	3.76	15.0	4.63	19.4
6	47.1	0.0159	0.392	2.48	4.21	2.80	0.407	4.17	12.1	5.24	15.3
7	41.1	0.0185	0.443	2.36	3.41	2.11	0.468	4.40	9.92	5.68	12.3
8	36.4	0.0210	0.488	2.16	2.82	1.63	0.526	4.45	8.25	5.92	10.1
9	32.5	0.0236	0.526	1.91	2.37	1.31	0.581	4.33	6.95	5.97	8.51
10	29.1	0.0260	0.556	1.66	2.02	1.07	0.632	4.11	5.95	5.86	7.26
12	23.6	0.0309	0.590	1.28	1.53	0.750	0.720	3.45	4.51	5.28	5.47
14	19.3	0.0355	0.592	1.03	1.20	0.558	0.789	2.81	3.55	4.46	4.28
16	16.0	0.0399	0.565	0.840	0.968	0.432	0.836	2.31	2.87	3.72	3.45
18	13.6	0.0440	0.518	0.702	0.801	0.344	0.861	1.95	2.34	3.12	2.85
20	11.7	0.0479	0.463	0.595	0.673	0.290	0.864	1.66	2.00	2.67	2.40

Rh (Z=45) 1s(2) 2s(2) 3s(2) 4s(2) 5s(1) 2p(6) 3p(6) 4p(6) 3d(10) 4d(8)

Q	---->	26.37	7.555	3.000	1.202	0.3040	8.089	2.953	1.065	2.884	0.7091
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(1)	2p(6)	3p(6)	4p(6)	3d(10)	4d(8)
0.2	15.8	0.000497	0.0133	0.119	0.780	9.51	0.0131	0.160	1.45	0.189	3.54
0.4	34.1	0.00101	0.0266	0.238	1.57	21.5	0.0263	0.321	2.91	0.378	7.11
0.6	52.0	0.00152	0.0399	0.357	2.35	33.1	0.0395	0.481	4.37	0.566	10.7
0.8	59.5	0.00203	0.0531	0.476	3.14	34.3	0.0527	0.641	5.81	0.755	14.3
1.0	60.3	0.00253	0.0663	0.593	3.91	28.9	0.0658	0.801	7.24	0.943	17.8
1.2	61.4	0.00304	0.0796	0.710	4.68	23.9	0.0789	0.959	8.65	1.13	21.3
1.4	63.5	0.00355	0.0928	0.825	5.41	20.1	0.0920	1.12	10.0	1.32	24.6
1.6	66.1	0.00406	0.106	0.939	6.09	17.1	0.105	1.27	11.4	1.50	27.6
1.8	68.9	0.00456	0.119	1.05	6.71	14.9	0.118	1.43	23.6	1.69	30.3
2.0	71.5	0.00507	0.132	1.16	7.24	13.1	0.131	1.58	13.8	1.87	32.5
2.2	73.5	0.00557	0.145	1.27	7.66	11.6	0.144	1.73	14.8	2.05	34.1
2.4	75.0	0.00608	0.158	1.37	7.96	10.4	0.157	1.88	15.8	2.23	35.1
2.6	75.7	0.00658	0.171	1.47	8.12	9.33	0.170	2.03	16.5	2.40	35.5
2.8	75.7	0.00709	0.184	1.57	8.16	8.45	0.183	2.17	17.1	2.57	35.3
3.0	75.1	0.00759	0.196	1.67	8.09	7.71	0.196	2.31	17.5	2.75	34.6
3.2	73.8	0.00809	0.209	1.76	7.93	7.05	0.209	2.45	17.8	2.91	33.6
3.4	72.3	0.00859	0.221	1.84	7.68	6.48	0.222	2.58	17.8	3.08	32.4
3.6	70.7	0.00910	0.234	1.92	7.44	5.98	0.235	2.72	17.7	3.24	31.2
3.8	68.4	0.00960	0.246	2.00	7.16	5.54	0.247	2.84	17.5	3.40	29.5
4.0	66.0	0.0101	0.258	2.06	6.79	5.15	0.260	2.97	17.1	3.55	27.9
5	55.6	0.0126	0.316	2.30	5.26	3.71	0.322	3.51	14.5	4.26	21.4
6	47.8	0.0151	0.371	2.37	4.19	2.80	0.382	3.92	11.9	4.85	17.0
7	41.6	0.0176	0.420	2.28	3.41	2.11	0.439	4.16	9.80	5.28	13.7
8	36.8	0.0200	0.463	2.10	2.81	1.63	0.494	4.24	8.15	5.54	11.3
9	32.8	0.0224	0.500	1.88	2.37	1.31	0.546	4.16	6.89	5.64	9.53
10	29.5	0.0247	0.530	1.64	2.02	1.07	0.594	4.00	5.90	5.58	8.14
12	24.0	0.0293	0.566	1.27	1.53	0.751	0.679	3.40	4.47	5.12	6.15
14	19.6	0.0337	0.571	1.02	1.20	0.559	0.746	2.78	3.51	4.38	4.81
16	16.3	0.0379	0.550	0.836	0.966	0.432	0.794	2.29	2.85	3.68	3.89
18	13.8	0.0419	0.508	0.697	0.799	0.345	0.821	1.93	2.35	3.10	3.21
20	11.9	0.0456	0.457	0.591	0.673	0.289	0.829	1.65	1.98	2.65	2.70

Pd (Z=46) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 3d(10) 4d(8)

Q	---->	26.89	7.731	3.096	1.255	0.3359	8.288	3.051	1.125	2.980	0.7940
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	2p(6)	3p(6)	4p(6)	3d(10)	4d(8)
0.2	14.7	0.000472	0.0125	0.111	0.718	9.39	0.0123	0.149	1.30	0.175	2.85
0.4	30.8	0.000957	0.0251	0.222	1.44	20.1	0.0247	0.297	2.61	0.349	5.72
0.6	47.9	0.00144	0.0376	0.333	2.16	31.9	0.0371	0.445	3.91	0.523	8.58
0.8	62.6	0.00192	0.0501	0.444	2.88	41.3	0.0495	0.594	5.21	0.698	11.4
1.0	69.8	0.00240	0.0626	0.553	3.60	43.2	0.0618	0.742	6.49	0.872	14.3
1.2	72.0	0.00289	0.0751	0.662	4.30	40.1	0.0741	0.889	7.76	1.05	17.0
1.4	71.4	0.00337	0.0876	0.770	4.97	34.5	0.0864	1.03	8.99	1.22	19.7
1.6	71.8	0.00385	0.100	0.876	5.61	30.1	0.0987	1.18	10.2	1.39	22.3
1.8	72.7	0.00433	0.113	0.891	6.19	26.5	0.111	1.32	11.3	1.56	24.6
2.0	73.7	0.00481	0.125	1.08	6.70	23.5	0.123	1.47	12.4	1.73	26.6
2.2	74.7	0.00529	0.137	1.18	7.12	21.0	0.136	1.61	13.4	1.89	28.3
2.4	75.5	0.00577	0.149	1.28	7.43	18.9	0.184	1.74	14.3	2.06	29.5
2.6	75.9	0.00625	0.161	1.38	7.63	17.2	0.160	1.88	15.0	2.22	30.3
2.8	75.8	0.00672	0.173	1.47	7.71	15.1	0.172	2.01	15.6	2.38	30.7
3.0	75.3	0.00720	0.185	1.56	7.70	14.3	0.184	2.15	16.1	2.54	30.6
3.2	74.4	0.00768	0.197	1.64	7.59	13.1	0.196	2.27	16.4	2.70	30.2
3.4	73.0	0.00815	0.209	1.72	7.41	12.1	0.208	2.40	16.6	2.85	29.5
3.6	71.4	0.00863	0.221	1.80	7.18	11.2	0.220	2.52	16.6	3.00	28.6
3.8	69.7	0.00911	0.232	1.87	6.97	10.4	0.232	2.64	16.5	3.15	27.8
4.0	67.6	0.00959	0.244	1.94	6.66	9.68	0.244	2.76	16.2	3.30	26.6
5	58.1	0.0120	0.299	2.18	5.40	7.03	0.303	3.28	14.1	3.96	21.6
6	49.7	0.0143	0.351	2.27	4.29	5.36	0.359	3.67	11.7	4.52	17.4
7	43.1	0.0167	0.398	2.21	3.47	4.24	0.413	3.93	9.61	4.95	13.9
8	38.0	0.0190	0.440	2.05	2.86	3.44	0.465	4.03	8.02	5.23	11.5
9	33.9	0.0212	0.475	1.85	2.41	2.80	0.514	3.99	6.79	5.35	9.65
10	30.3	0.0235	0.505	1.63	2.06	2.29	0.560	3.84	5.82	5.33	8.22
12	24.6	0.0279	0.542	1.26	1.56	1.62	0.642	3.34	4.42	4.96	6.20
14	20.1	0.0321	0.551	1.01	1.22	1.20	0.707	2.76	3.48	4.31	4.87
16	16.7	0.0361	0.534	0.830	0.982	0.926	0.755	2.28	2.82	3.64	3.92
18	14.1	0.0398	0.497	0.692	0.809	0.745	0.784	1.91	2.33	3.07	3.25
20	12.1	0.0434	0.450	0.587	0.682	0.611	0.795	1.64	1.96	2.62	2.73

Ag (Z=47) 1s(2) 2s(2) 3s(2) 4s(2) 5s(1) 2p(6) 3p(6) 4p(6) 3d(10) 4d(10)

Q	---->	28.25	7.886	3.180	1.278	0.3045	8.456	3.126	1.138	3.034	0.7370
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(1)	2p(6)	3p(6)	4p(6)	3d(10)	4d(10)
0.2	15.4	0.000412	0.0119	0.105	0.693	9.48	0.0117	0.140	1.27	0.167	0.356
0.4	33.4	0.000837	0.0239	0.209	1.39	21.4	0.0235	0.281	2.55	0.335	7.15
0.6	51.0	0.00126	0.0358	0.314	2.09	33.0	0.0352	0.420	3.83	0.501	10.7
0.8	58.2	0.00168	0.0477	0.418	2.78	34.3	0.0470	0.561	5.09	0.668	14.3
1.0	58.6	0.00210	0.0595	0.521	3.47	28.8	0.0587	0.700	6.34	0.835	17.8
1.2	59.5	0.00253	0.0715	0.624	4.15	23.8	0.0704	0.839	7.58	1.00	21.3
1.4	61.3	0.00295	0.0834	0.725	4.80	20.0	0.0820	0.977	8.79	1.17	24.7
1.6	63.8	0.00337	0.0952	0.825	5.42	17.1	0.0937	1.11	9.95	1.33	27.8
1.8	66.5	0.00379	0.107	0.924	5.98	14.9	0.105	1.25	11.1	1.49	30.7
2.0	69.2	0.00421	0.119	1.02	6.48	13.1	0.117	1.38	12.1	1.66	33.2
2.2	71.6	0.00463	0.130	1.12	6.90	11.6	0.129	1.52	13.1	1.82	35.3
2.4	73.5	0.00505	0.142	1.21	7.21	10.4	0.140	1.65	14.0	1.97	36.9
2.6	74.9	0.00547	0.154	1.30	7.42	9.32	0.152	1.78	14.7	2.13	37.9
2.8	75.6	0.00589	0.165	1.39	7.53	8.45	0.164	1.90	15.3	2.29	38.4
3.0	75.6	0.00631	0.177	1.47	7.53	7.69	0.175	2.03	15.8	2.44	38.3
3.2	75.1	0.00672	0.188	1.55	7.45	7.05	0.186	2.15	16.1	2.59	37.8
3.4	74.0	0.00714	0.199	1.63	7.29	6.48	0.198	2.27	16.3	2.74	36.9
3.6	72.6	0.00756	0.210	1.70	7.08	5.98	0.209	2.39	16.3	2.88	35.8
3.8	71.1	0.00798	0.221	1.77	6.87	5.54	0.221	2.50	16.2	3.02	34.7
4.0	69.1	0.00839	0.232	1.84	6.60	5.15	0.232	2.61	16.0	3.16	33.2
5	59.6	0.0105	0.285	2.08	5.37	3.71	0.287	3.11	14.0	3.81	27.0
6	50.9	0.0125	0.335	2.18	4.27	2.80	0.341	3.50	11.7	4.35	21.4
7	44.0	0.0146	0.380	2.14	3.46	2.11	0.393	3.76	9.58	4.77	17.4
8	38.6	0.0166	0.420	2.00	2.86	1.63	0.443	3.87	8.00	5.06	14.3
9	34.4	0.0186	0.455	1.82	2.41	1.31	0.490	3.86	6.76	5.20	12.1
10	30.8	0.0206	0.484	1.61	2.05	1.07	0.534	3.74	5.80	5.20	10.3
12	25.0	0.0245	0.522	1.25	1.55	0.752	0.612	3.29	4.41	4.88	7.76
14	20.6	0.0282	0.534	1.01	1.21	0.559	0.676	2.73	3.47	4.27	6.09
16	17.1	0.0317	0.521	0.824	0.978	0.432	0.724	2.26	2.81	3.61	4.91
18	14.5	0.0351	0.488	0.690	0.810	0.345	0.754	1.90	2.33	3.06	4.06
20	12.4	0.0383	0.444	0.585	0.682	0.289	0.767	1.63	1.96	2.61	3.41

C d (Z=48) 1s(2) 2s(2) 3s(2) 4s(2) 5S(2) 2p(6) 3p(6) 4P(6) 3d(10) 4d(10)

Q	---->	28.11	8.103	3.298	1.344	0.3492	8.694	3.241	1.213	3.209	0.8742
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	2p(6)	3p(6)	4p(6)	3d(10)	4d(10)
0.2	13.4	0.000418	0.0111	0.0963	0.629	8.66	0.0109	0.129	1.12	0.146	2.55
0.4	27.8	0.000848	0.0223	0.192	1.26	18.4	0.0218	0.258	2.24	0.292	5.12
0.6	43.3	0.00128	0.0334	0.289	1.89	29.2	0.0328	0.386	3.36	0.438	7.68
0.8	57.0	0.00171	0.0445	0.385	2.52	38.3	0.0437	0.515	4.48	0.584	10.2
1.0	64.5	0.00213	0.0556	0.480	3.15	41.1	0.0546	0.643	5.58	0.730	12.7
1.2	66.1	0.00256	0.0667	0.575	3.76	38.1	0.0655	0.771	6.66	0.875	15.2
1.4	66.0	0.00299	0.0779	0.669	4.35	33.5	0.0763	0.897	7.73	1.02	17.6
1.6	66.1	0.00341	0.0889	0.761	4.91	29.4	0.0871	1.02	8.76	1.16	20.0
1.8	66.8	0.00384	0.100	0.852	5.44	25.9	0.0980	1.15	9.75	1.31	22.2
2.0	67.7	0.00427	0.111	0.942	5.91	23.1	0.109	1.27	10.7	1.45	24.2
2.2	68.8	0.00469	0.122	1.03	6.31	20.6	0.120	1.39	11.6	1.59	26.0
2.4	69.8	0.00512	0.133	1.12	6.63	18.6	0.131	1.51	12.4	1.73	27.6
2.6	70.7	0.00554	0.144	1.20	6.87	16.9	0.141	1.63	13.1	1.86	28.8
2.8	71.3	0.00597	0.154	1.28	7.01	15.4	0.152	1.75	13.7	2.00	29.8
3.0	71.5	0.00639	0.165	1.36	7.07	14.1	0.163	1.87	14.2	2.13	30.4
3.2	71.3	0.00681	0.176	1.44	7.04	13.0	0.174	1.98	14.6	2.27	30.7
3.4	70.8	0.00723	0.186	1.51	6.94	11.9	0.184	2.09	14.8	2.40	30.7
3.6	70.0	0.00766	0.197	1.58	6.78	11.1	0.195	2.20	15.0	2.53	30.5
3.8	68.8	0.00808	0.207	1.64	6.59	10.1	0.205	2.31	15.0	2.65	30.0
4.0	67.5	0.00851	0.217	1.71	6.39	9.58	0.216	2.41	14.9	2.78	29.3
5	59.0	0.0106	0.267	1.95	5.28	6.97	0.268	2.88	13.4	3.36	24.6
6	50.9	0.0127	0.313	2.06	4.19	5.32	0.318	3.25	11.5	3.85	20.1
7	44.0	0.0148	0.356	2.04	3.41	4.20	0.366	3.51	9.36	4.26	16.5
8	38.7	0.0168	0.395	1.94	2.82	3.42	0.413	3.65	7.84	4.55	13.7
9	34.5	0.0189	0.429	1.78	2.38	2.81	0.457	3.67	6.66	4.72	11.6
10	30.9	0.0209	0.457	1.59	2.03	2.30	0.499	3.59	5.71	4.78	9.89
12	25.1	0.0248	0.496	1.24	1.53	1.62	0.574	3.21	4.35	4.59	7.49
14	20.7	0.0285	0.510	0.996	1.20	1.21	0.635	2.69	3.43	4.11	5.89
16	17.3	0.0321	0.502	0.817	0.972	0.937	0.682	2.24	2.78	3.53	4.76
18	14.6	0.0356	0.475	0.684	0.802	0.743	0.714	1.88	2.30	3.01	3.94
20	12.5	0.0388	0.435	0.581	0.676	0.607	0.730	1.61	1.94	2.57	3.32

In (Z = 49) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 5p(1) 3d(10) 4d(10)

Q	---->	28.77	8.289	3.378	1.403	0.4054	8.905	3.344	1.264	0.3020	3.317	0.9545
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	2p(6)	3p(6)	4p(6)	5p(1)	3d(10)	4d(10)
0.2	20.2	0.000392	0.0105	0.0912	0.578	6.38	0.0101	0.119	1.03	9.65	0.135	2.14
0.4	43.5	0.000797	0.0211	0.182	1.16	13.3	0.0205	0.239	2.06	21.7	0.270	4.30
0.6	66.9	0.00120	0.0316	0.274	1.74	20.9	0.0308	0.358	3.09	33.6	0.404	6.45
0.8	79.2	0.00160	0.0421	0.365	2.32	28.2	0.0411	0.478	4.12	34.6	0.539	8.58
1.0	82.3	0.00200	0.0525	0.455	2.89	32.7	0.0513	0.597	5.13	29.0	0.673	10.7
1.2	81.6	0.00241	0.0630	0.545	3.45	33.1	0.0615	0.715	6.13	23.9	0.807	12.8
1.4	79.5	0.00281	0.0735	0.633	4.00	30.7	0.0712	0.833	7.11	20.1	0.941	14.8
1.6	76.2	0.00321	0.0840	0.721	4.52	26.8	0.0819	0.950	8.06	17.2	1.07	16.8
1.8	74.7	0.00361	0.0944	0.808	5.01	23.9	0.0921	1.07	8.98	14.9	1.21	18.7
2.0	73.9	0.00401	0.105	0.893	5.45	21.5	0.102	1.18	9.85	13.1	1.34	20.4
2.2	73.5	0.00441	0.115	0.977	5.84	19.4	0.113	1.30	10.7	11.6	1.47	22.0
2.4	73.3	0.00481	0.125	1.06	6.16	17.6	0.123	1.41	11.4	10.4	1.59	23.5
2.6	73.2	0.00521	0.136	1.14	6.41	16.0	0.133	1.52	12.1	9.35	1.72	24.7
2.8	73.1	0.00560	0.146	1.22	6.58	14.6	0.143	1.63	12.7	8.47	1.85	25.8
3.0	72.9	0.00600	0.156	1.29	6.67	13.4	0.153	1.74	13.2	7.72	1.97	26.5
3.2	72.4	0.00640	0.166	1.36	6.68	12.4	0.163	1.84	13.6	7.06	2.10	27.1
3.4	71.8	0.00680	0.176	1.43	6.63	11.4	0.173	1.95	13.9	6.50	2.22	27.4
3.6	70.9	0.00719	0.186	1.50	6.51	10.6	0.183	2.05	14.1	6.00	2.34	27.4
3.8	69.8	0.00759	0.196	1.56	6.35	9.86	0.193	2.15	14.2	5.55	2.45	27.2
4.0	68.5	0.00799	0.205	1.62	6.18	9.20	0.203	2.24	14.2	5.16	2.57	26.9
5	60.2	0.00998	0.252	1.86	5.18	6.73	0.252	2.69	13.1	3.72	3.11	23.3
6	52.1	0.0119	0.297	1.98	4.12	5.15	0.299	3.05	11.3	2.81	3.58	19.5
7	44.8	0.0139	0.338	1.98	3.36	4.09	0.345	3.31	9.24	2.11	3.97	16.0
8	39.2	0.0158	0.375	1.89	2.79	3.33	0.389	3.46	7.76	1.63	4.26	13.4
9	34.9	0.0177	0.407	1.75	2.35	2.77	0.431	3.50	6.59	1.31	4.45	11.3
10	31.2	0.0196	0.435	1.57	2.01	2.34	0.470	3.45	5.66	1.07	4.53	9.69
12	25.4	0.0233	0.474	1.23	1.52	1.66	0.542	3.13	4.32	0.749	4.41	7.36
14	21.0	0.0269	0.491	0.988	1.19	1.24	0.601	2.66	3.40	0.557	4.01	5.79
16	17.5	0.0303	0.486	0.812	0.963	0.958	0.648	2.22	2.76	0.432	3.48	4.69
18	14.8	0.0335	0.463	0.680	0.769	0.762	0.680	1.87	2.29	0.344	2.98	3.88
20	12.7	0.0366	0.428	0.577	0.670	0.624	0.698	1.60	1.93	0.290	2.55	3.27

Sn (Z=50) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 5p(2) 3d(10) 4d(10)

Q	---->	29.38	8.482	3.480	1.460	0.4511	9.103	3.442	1.326	0.3537	3.415	1.035
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	2p(6)	3p(6)	4p(6)	5p(2)	3d(10)	4d(10)
0.2	17.2	0.000370	0.00989	0.0853	0.535	5.14	0.00962	0.112	0.933	8.44	0.125	1.82
0.4	35.8	0.000752	0.0199	0.170	1.07	10.7	0.0194	0.223	1.87	17.9	0.251	3.65
0.6	55.9	0.00113	0.0298	0.256	1.61	16.6	0.0291	0.334	2.81	28.4	0.377	5.48
0.8	74.3	0.00151	0.0397	0.341	2.14	22.5	0.0388	0.446	3.73	37.3	0.502	7.29
1.0	85.5	0.00189	0.0496	0.425	2.67	27.1	0.0484	0.557	4.65	40.4	0.627	9.08
1.2	88.1	0.00227	0.0595	0.509	3.19	28.9	0.0581	0.668	5.56	37.6	0.752	10.9
1.4	86.2	0.00265	0.0694	0.592	3.70	27.9	0.0677	0.779	6.45	33.2	0.877	12.6
1.6	83.1	0.00303	0.0793	0.674	4.18	25.5	0.0773	0.887	7.31	29.1	1.00	14.3
1.8	81.3	0.00341	0.0891	0.756	4.64	23.8	0.0870	0.995	8.15	25.8	1.12	15.9
2.0	79.1	0.00379	0.0989	0.835	5.06	21.4	0.0966	1.10	8.96	22.9	1.25	17.4
2.2	77.5	0.00417	0.1095	0.914	5.43	19.3	0.106	1.21	9.71	20.6	1.37	18.9
2.4	76.3	0.00454	0.118	0.991	5.75	17.5	0.116	1.31	10.4	18.5	1.49	20.2
2.6	75.5	0.00492	0.128	1.07	6.00	15.9	0.126	1.42	11.1	16.8	1.61	21.3
2.8	74.7	0.00530	0.138	1.14	6.19	14.6	0.135	1.52	11.6	15.3	1.72	22.4
3.0	74.7	0.00567	0.147	1.21	6.30	13.4	0.145	1.62	12.1	14.0	1.84	23.2
3.2	73.3	0.00605	0.157	1.28	6.35	12.4	0.154	1.72	12.6	12.9	1.96	23.8
3.4	72.4	0.00642	0.166	1.35	6.33	11.4	0.164	1.82	12.9	11.9	2.07	24.3
3.6	71.4	0.00678	0.175	1.41	6.25	10.6	0.173	1.92	13.1	11.0	2.18	24.6
3.8	70.3	0.00717	0.185	1.47	6.13	9.85	0.182	2.01	13.3	10.3	2.29	24.6
4.0	69.0	0.00755	0.194	1.53	5.98	9.22	0.192	2.10	13.3	9.54	2.40	24.5
5	61.2	0.00943	0.239	1.76	5.04	6.75	0.238	2.52	12.5	6.94	2.91	22.2
6	53.2	0.0113	0.281	1.89	4.07	5.16	0.283	2.87	11.0	5.30	3.36	19.0
7	45.7	0.0131	0.320	1.91	3.32	4.09	0.326	3.13	9.11	4.20	3.73	15.6
8	40.1	0.0150	0.355	1.83	2.75	3.34	0.368	3.29	7.64	3.41	4.02	13.0
9	35.6	0.0168	0.387	1.71	2.33	2.78	0.408	3.35	6.50	2.82	4.22	11.1
10	31.8	0.0186	0.414	1.55	1.99	2.34	0.446	3.32	5.59	2.31	4.31	9.51
12	25.9	0.0220	0.453	1.22	1.51	1.72	0.514	3.05	4.27	1.63	4.25	7.23
14	21.3	0.0254	0.471	0.980	1.18	1.27	0.572	2.62	3.37	1.21	3.91	5.71
16	17.8	0.0287	0.470	0.808	0.956	1.00	0.617	2.20	2.74	0.941	3.43	4.62
18	15.0	0.0317	0.451	0.675	0.791	0.781	0.650	1.85	2.27	0.744	2.95	3.83
20	12.9	0.0347	0.419	0.573	0.666	0.644	0.670	1.59	1.92	0.607	2.54	3.23

Sb (Z=51) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 5p(3) 3p(10) 4d(10)

Q	---->	30.03	8.664	3.572	1.520	0.4933	9.302	3.539	1.391	0.4000	3.520	1.111
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	2p(6)	3p(6)	4p(6)	5p(3)	3d(10)	4d(10)
0.2	15.0	0.000349	0.00938	0.0803	0.494	4.30	0.00909	0.104	0.846	7.48	0.116	1.58
0.4	30.8	0.000709	0.0188	0.161	0.991	8.85	0.0183	0.209	1.70	15.5	0.233	3.16
0.6	47.5	0.00107	0.0282	0.241	1.49	13.7	0.0275	0.313	2.54	24.1	0.350	4.74
0.8	64.3	0.00143	0.0376	0.321	1.98	18.6	0.0366	0.417	3.38	32.7	0.466	6.31
1.0	78.4	0.00178	0.0470	0.401	2.47	22.8	0.0458	0.521	4.21	39.5	0.582	7.86
1.2	86.9	0.00214	0.0563	0.480	2.95	25.2	0.0549	0.625	5.04	42.4	0.699	9.39
1.4	89.1	0.00250	0.0657	0.558	3.41	25.5	0.0640	0.728	5.84	41.3	0.814	10.9
1.6	87.5	0.00286	0.0751	0.636	3.86	24.2	0.0731	0.380	6.63	38.0	0.929	12.4
1.8	86.4	0.00321	0.0844	0.712	4.29	22.7	0.0822	0.932	7.40	35.4	1.04	13.8
2.0	83.1	0.00357	0.0937	0.788	4.68	20.3	0.0913	1.03	8.14	31.8	1.16	15.1
2.2	80.9	0.00393	0.103	0.862	5.04	18.4	0.100	1.13	8.83	28.7	1.27	16.4
2.4	79.0	0.00428	0.112	0.935	5.35	16.7	0.110	1.23	9.49	26.1	1.38	17.6
2.6	77.6	0.00464	0.121	1.01	5.61	15.3	0.119	1.33	10.1	23.8	1.49	18.7
2.8	76.3	0.00500	0.130	1.08	5.80	14.1	0.128	1.43	10.6	21.8	1.60	19.7
3.0	75.2	0.00535	0.140	1.14	5.94	13.0	0.137	1.52	11.1	20.0	1.71	20.5
3.2	74.1	0.00570	0.149	1.21	6.01	12.0	0.146	1.61	11.6	18.4	1.82	21.2
3.4	73.0	0.00605	0.157	1.27	6.02	11.1	0.155	1.71	11.9	17.1	1.12	21.7
3.6	71.9	0.00641	0.166	1.33	5.98	10.3	0.164	1.80	12.2	15.9	2.03	22.1
3.8	70.6	0.00676	0.175	1.39	5.89	9.59	0.172	1.88	12.3	14.7	2.13	22.3
4.0	69.4	0.00712	0.184	1.45	5.77	8.96	0.181	1.97	12.5	13.7	2.23	22.4
5	61.7	0.00889	0.226	1.67	4.85	6.58	0.225	2.37	12.0	10.1	2.71	21.0
6	53.9	0.0106	0.267	1.80	4.00	5.05	0.267	2.70	10.6	7.72	3.14	18.3
7	46.5	0.0124	0.304	1.84	3.28	4.02	0.309	2.96	8.99	6.12	3.50	15.2
8	40.6	0.0141	0.338	1.78	2.73	3.27	0.348	3.13	7.51	4.98	3.78	12.8
9	36.0	0.0158	0.369	1.67	2.30	2.72	0.386	3.20	6.41	4.14	3.98	10.9
10	32.3	0.0175	0.395	1.53	1.97	2.31	0.423	3.19	5.53	3.52	4.10	9.33
12	26.3	0.0208	0.434	1.21	1.49	1.72	0.488	2.97	4.22	2.58	4.08	7.12
14	21.7	0.0240	0.454	0.971	1.18	1.30	0.544	2.58	3.34	1.92	3.80	5.63
16	18.1	0.0271	0.455	0.802	0.950	1.00	0.589	2.18	2.72	1.49	3.37	4.56
18	15.3	0.0300	0.440	0.672	0.786	0.800	0.622	1.84	2.25	1.18	2.91	3.78
20	13.1	0.0328	0.411	0.571	0.661	0.656	0.642	1.57	1.90	0.980	2.51	3.19

Te (Z=52) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 5p(4) 3d(10) 4d(10)

Q	---->	30.54	8.844	3.664	1.579	0.5338	9.498	3.637	1.449	0.4295	3.624	1.185
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	2p(6)	3p(6)	4p(6)	5p(4)	3d(10)	4d(10)
0.2	13.8	0.000333	0.00890	0.0758	0.458	3.68	0.00861	0.0976	0.777	7.17	0.108	1.38
0.4	28.1	0.000677	0.0179	0.152	0.919	7.54	0.0173	0.196	1.56	14.7	0.217	2.77
0.6	43.0	0.00102	0.0268	0.227	1.38	11.6	0.0260	0.293	2.34	22.6	0.326	4.15
0.8	58.1	0.00136	0.0357	0.303	1.83	15.8	0.0347	0.391	3.11	30.7	0.434	5.52
1.0	72.1	0.00170	0.0446	0.378	2.29	19.5	0.0434	0.488	3.87	38.0	0.542	6.88
1.2	82.7	0.00205	0.0535	0.453	2.73	22.1	0.0520	0.585	4.63	43.2	0.651	8.22
1.4	88.5	0.00239	0.0624	0.527	3.16	23.1	0.0606	0.682	5.37	45.3	0.758	9.54
1.6	89.8	0.00273	0.0713	0.600	3.58	22.5	0.0692	0.778	6.10	44.4	0.865	10.8
1.8	88.2	0.00307	0.0802	0.672	3.98	21.1	0.0778	0.873	6.80	41.6	0.972	12.1
2.0	86.1	0.00341	0.0890	0.744	4.35	19.4	0.0865	0.967	7.48	38.6	1.08	13.3
2.2	83.0	0.00375	0.0978	0.814	4.69	17.6	0.0951	1.06	8.13	34.9	1.18	14.4
2.4	80.8	0.00409	0.107	0.883	4.99	16.1	0.104	1.15	8.75	32.0	1.29	15.5
2.6	79.0	0.00443	0.115	0.950	5.25	14.8	0.112	1.25	9.32	29.4	1.39	16.5
2.8	77.4	0.00477	0.124	1.02	5.45	13.6	0.121	1.34	9.85	27.0	1.49	17.4
3.0	76.0	0.00511	0.133	1.08	5.60	12.6	0.129	1.43	10.3	25.0	1.59	18.2
3.2	74.7	0.00545	0.141	1.14	5.69	11.6	0.138	1.51	10.7	23.1	1.70	18.9
3.4	73.4	0.00579	0.150	1.20	5.73	10.8	0.146	1.60	11.1	21.4	1.79	19.5
3.6	72.1	0.00612	0.158	1.26	5.71	10.0	0.155	1.68	11.4	19.9	1.89	19.9
3.8	70.9	0.00646	0.166	1.32	5.66	9.34	0.163	1.77	11.6	18.6	1.99	20.3
4.0	69.5	0.00680	0.175	1.37	5.56	8.73	0.172	1.85	11.7	17.4	2.08	20.5
5	62.1	0.00849	0.215	1.59	4.75	6.45	0.213	2.23	11.5	12.8	2.54	19.8
6	54.3	0.0102	0.254	1.73	3.94	4.96	0.254	2.55	10.3	9.90	2.94	17.5
7	47.3	0.0118	0.289	1.77	3.23	3.95	0.293	2.80	8.87	7.87	3.28	14.9
8	41.2	0.0135	0.322	1.73	2.69	3.22	0.331	2.97	7.42	6.43	3.56	12.5
9	36.5	0.0151	0.352	1.63	2.28	2.68	0.367	3.06	6.34	5.35	3.76	10.7
10	32.7	0.0167	0.377	1.50	1.95	2.28	0.401	3.07	5.46	4.54	3.89	9.18
12	26.7	0.0199	0.416	1.20	1.48	1.70	0.464	2.89	4.19	3.40	3.92	7.03
14	22.2	0.0230	0.437	0.966	1.17	1.31	0.518	2.54	3.32	2.62	3.69	5.56
16	18.5	0.0259	0.441	0.796	0.944	1.01	0.562	2.16	2.70	2.03	3.31	4.51
18	15.6	0.0287	0.428	0.668	0.781	0.806	0.595	1.83	2.24	1.61	2.88	3.75
20	13.4	0.0314	0.403	0.568	0.568	0.658	0.617	1.56	1.89	1.32	2.49	3.16

I (Z=53) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 5p(5) 3d(10) 4d(10)

Q	---->	31.27	9.026	3.761	1.638	0.5723	9.709	3.732	1.506	0.4633	3.730	1.259
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	2p(6)	3p(6)	4p(6)	5p(5)	3d(10)	4d(10)
0.2	12.6	0.000312	0.00845	0.0714	0.425	3.21	0.00812	0.0917	0.717	6.70	0.101	1.22
0.4	25.5	0.000635	0.0170	0.143	0.854	6.56	0.0164	0.184	1.44	13.6	0.202	2.44
0.6	38.8	0.000957	0.0255	0.214	1.28	10.1	0.0246	0.275	2.15	20.8	0.303	3.66
0.8	52.3	0.00128	0.0339	0.285	1.70	13.7	0.0328	0.367	2.87	28.1	0.404	4.87
1.0	65.3	0.00160	0.0423	0.356	2.12	17.0	0.0409	0.459	3.57	35.1	0.505	6.06
1.2	76.4	0.00192	0.0508	0.427	2.54	19.6	0.0491	0.550	4.27	41.1	0.606	7.25
1.4	84.3	0.00224	0.0593	0.496	2.94	20.9	0.0572	0.641	4.96	45.1	0.706	8.41
1.6	88.2	0.00256	0.0677	0.565	3.33	20.9	0.0654	0.731	5.63	46.6	0.806	9.55
1.8	88.9	0.00288	0.0761	0.634	3.70	19.9	0.0735	0.820	6.28	45.8	0.906	10.7
2.0	87.9	0.00320	0.0845	0.701	4.06	18.8	0.0817	0.909	6.91	43.6	1.00	11.7
2.2	85.3	0.00352	0.0928	0.767	4.38	16.9	0.0898	0.997	7.52	40.7	1.10	12.8
2.4	82.4	0.00384	0.101	0.832	4.67	15.5	0.0979	1.09	8.10	37.0	1.20	13.7
2.6	80.2	0.00416	0.109	0.896	4.92	14.3	0.106	1.17	8.64	34.2	1.30	14.7
2.8	78.5	0.00448	0.118	0.959	5.12	13.2	0.114	1.26	9.14	31.7	1.39	15.5
3.0	76.8	0.00479	0.126	1.02	5.28	12.2	0.122	1.34	9.59	29.4	1.49	16.3
3.2	75.3	0.00511	0.134	1.08	5.39	11.3	0.130	1.42	9.99	27.3	1.58	16.9
3.4	73.8	0.00543	0.142	1.14	5.45	10.5	0.138	1.51	10.3	25.4	1.67	17.5
3.6	72.5	0.00575	0.150	1.19	5.46	9.79	0.146	1.59	10.6	23.7	1.77	18.0
3.8	71.1	0.00606	0.158	1.25	5.43	9.15	0.154	1.67	10.9	22.2	1.86	18.4
4.0	69.7	0.00638	0.166	1.30	5.36	8.56	0.162	1.74	11.0	20.8	1.95	18.7
5	62.5	0.00797	0.205	1.51	4.66	6.34	0.201	2.10	11.0	15.5	2.37	18.6
6	54.8	0.00954	0.241	1.65	3.90	4.89	0.240	2.41	10.0	12.0	2.75	16.8
7	48.0	0.0111	0.276	1.70	3.20	3.89	0.277	2.66	8.74	9.54	3.08	14.6
8	41.7	0.0127	0.307	1.68	2.67	3.18	0.313	2.83	7.34	7.81	3.35	12.3
9	36.9	0.0142	0.335	1.59	2.26	2.65	0.347	2.93	6.25	6.52	3.56	10.5
10	33.0	0.0157	0.360	1.48	1.93	2.25	0.380	2.95	5.41	5.54	3.69	9.03
12	27.0	0.0187	0.399	1.19	1.47	1.68	0.440	2.81	4.15	4.14	3.75	6.93
14	22.5	0.0216	0.421	0.959	1.16	1.31	0.492	2.50	3.29	3.23	3.58	5.49
16	18.8	0.0243	0.427	0.789	0.938	1.02	0.535	2.14	2.67	2.59	3.24	4.47
18	15.9	0.0270	0.417	0.663	0.775	0.815	0.568	1.82	2.22	2.07	2.84	3.71
20	13.6	0.0296	0.395	0.566	0.654	0.665	0.590	1.55	1.87	1.69	2.47	3.13

Xe (Z=54) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2P(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10)

Q	---->	31.82	9.215	3.844	1.691	0.6078	9.9161	3.824	1.577	0.4974	3.836	1.328
V	TOTAL	1s(2)	2s(2)	3s(2)	4s(2)	5s(2)	2p(6)	3p(6)	4p(6)	5p(6)	3d(10)	4d(10)
0.2	11.5	0.000298	0.00801	0.0679	0.399	2.86	0.00768	0.0865	0.651	6.24	0.0942	1.09
0.4	23.3	0.000606	0.0161	0.136	0.801	5.82	0.0155	0.173	1.30	12.6	0.189	2.18
0.6	35.3	0.000912	0.0241	0.204	1.20	8.91	0.0232	0.260	1.95	19.2	0.283	3.27
0.8	47.5	0.00122	0.0322	0.271	1.60	12.1	0.0310	0.346	2.60	25.9	0.377	4.35
1.0	59.4	0.00153	0.0402	0.339	1.99	15.1	0.0387	0.432	3.24	32.4	0.471	5.42
1.2	70.2	0.00183	0.0482	0.406	2.38	17.5	0.0465	0.519	3.88	38.3	0.566	6.48
1.4	78.8	0.00214	0.0562	0.472	2.76	19.1	0.0542	0.604	4.50	43.1	0.659	7.52
1.6	84.5	0.00244	0.0642	0.538	3.13	19.5	0.0619	0.689	5.11	46.1	0.753	8.54
1.8	87.2	0.00275	0.0722	0.603	3.48	19.0	0.0695	0.774	5.71	47.2	0.845	9.54
2.0	87.8	0.00305	0.0802	0.667	3.81	18.1	0.0773	0.858	6.29	46.5	0.938	10.5
2.2	86.6	0.00336	0.0881	0.730	4.12	16.5	0.0850	0.941	6.84	44.8	1.03	11.4
2.4	84.3	0.00366	0.0960	0.792	4.40	15.0	0.0927	1.02	7.38	42.0	1.12	12.3
2.6	83.1	0.00397	0.104	0.853	4.64	18.9	0.100	1.11	7.88	40.2	1.21	13.2
2.8	81.2	0.00427	0.112	0.913	4.85	12.9	0.108	1.19	8.35	37.6	1.30	14.0
3.0	79.2	0.00457	0.119	0.971	5.01	11.9	0.116	1.27	8.78	34.9	1.39	14.7
3.2	77.3	0.00488	0.127	1.03	5.13	11.1	0.123	1.34	9.17	32.5	1.48	15.3
3.4	75.6	0.00518	0.135	1.08	5.20	10.3	0.131	1.42	9.51	30.3	1.56	15.9
3.6	73.9	0.00548	0.143	1.14	5.23	9.60	0.138	1.50	9.81	28.4	1.65	16.4
3.8	72.4	0.00578	0.150	1.19	5.22	8.97	0.146	1.57	10.1	26.5	1.73	16.8
4.0	70.8	0.00608	0.158	1.24	5.17	8.40	0.154	1.65	10.2	24.9	1.82	17.1
5	63.3	0.00760	0.194	1.45	4.58	6.24	0.191	1.99	10.4	18.5	2.22	17.4
6	55.7	0.00910	0.229	1.58	3.86	4.82	0.227	2.29	9.66	14.4	2.58	16.1
7	48.9	0.0106	0.262	1.64	3.16	3.84	0.262	2.53	8.56	11.5	2.90	14.3
8	42.6	0.0121	0.292	1.63	2.65	3.14	0.296	2.70	7.24	9.39	3.16	12.1
9	37.5	0.0135	0.320	1.56	2.24	2.62	0.329	2.81	6.17	7.83	3.36	10.3
10	33.5	0.0150	0.344	1.45	1.92	2.23	0.360	2.84	5.34	6.65	3.50	8.89
12	27.4	0.0178	0.382	1.19	1.46	1.67	0.418	2.74	4.11	4.99	3.60	6.85
14	22.8	0.0206	0.405	0.954	1.15	1.30	0.468	2.46	3.26	3.88	3.47	5.43
16	19.2	0.0233	0.412	0.786	0.933	1.03	0.510	2.12	2.65	3.12	3.17	4.42
18	16.3	0.0258	0.405	0.661	0.772	0.822	0.543	1.80	2.20	2.57	2.80	3.67
20	13.9	0.0283	0.386	0.562	0.651	0.670	0.566	1.54	1.86	2.11	2.44	3.10

Recent Issues of NIFS-DATA Series

NIFS DATA-1 Y. Yamamura, T. Takiguchi and H. Tawara, *Data Compilation of Angular Distributions of Sputtered Atoms* ; Jan. 1990

NIFS DATA-2 T. Kato, J. Lang and K. E. Berrington, *Intensity Ratios of Emission Lines from OV Ions for Temperature and Density Diagnostics* ; Mar. 1990

NIFS DATA-3 T. Kaneko, *Partial Electronic Straggling Cross Sections of Atoms for Protons* ; Mar. 1990

NIFS DATA-4 T. Fujimoto, K. Sawada and K. Takahata, *Cross Section for Production of Excited Hydrogen Atoms Following Dissociative Excitation of Molecular Hydrogen by Electron Impact* ; Mar. 1990

NIFS DATA-5 H. Tawara, *Some Electron Detachment Data for H- Ions in Collisions with Electrons, Ions, Atoms and Molecules – an Alternative Approach to High Energy Neutral Beam Production for Plasma Heating–* ; Apr. 1990

NIFS DATA-6 H. Tawara, Y. Itikawa, H. Nishimura, H. Tanaka and Y. Nakamura, *Collision Data Involving Hydro-Carbon Molecules* ; July 1990

NIFS DATA-7 H.Tawara, *Bibliography on Electron Transfer Processes in Ion-Ion/Atom/Molecule Collisions –Updated 1990–*; Oct. 1990

NIFS DATA-8 U.I.Safronova, T.Kato, K.Masai, L.A.Vainshtain and A.S.Shlyapzeva, *Excitation Collision Sterengths, Cross Scetions and Rate Coefficients for OV, SiXI, FeXXIII, MoXXXIX by Electron Impact($1s^2 2s^2$ - $1s^2 2s2p$-$1s^2 2p^2$ Transitions)* ;Dec.1990

NIFS DATA-9 T.Kaneko, *Partial and Total Electronic Stopping Cross Sections of Atoms and Solids for Protons;* Dec 1990

NIFS DATA-10 K.Shima, N.Kuno, M.Yamanouchi and H.Tawara, *Equilibrium Charge Fraction of Ions of Z=4-92 (0.02-6 MeV/u) and Z=4-20 (Up to 40 MeV/u) Emerging from a Carbon Foil;* Jan.1991