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# PARTIAL AND TOTAL ELECTRONIC STOPPING CROSS SECTIONS OF ATOMS AND SOLIDS FOR PROTONS

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Based on a wave packet theory[Phys.Rev.A40,2188(1989); Phys. Stat.Sol.(B)156,49(1989)], partial and total electronic cross sections of target elements in atomic and solid phases with atomic number Z ranging from 2 (He) to 92 (U) are tabulated shell by shell for protons with velocity v from $0.2v_0$ to $20v_0$ ($v_0$=2.18 $\times 10^8$cm/s).

[keywords ; electronic stopping, partial cross section, total cross section, proton, wave packet theory]

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## INTRODUCTION

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 fundamental problems in the studies of both the atomic collision phenomena in solids and the plasma-wall interaction in a fusion reactor. So far, theoretical estimates have been performed of the stopping of a free electron gas[1-4] and of atomic electrons based either on Born approximation[5,6] or on a momentum-exchange model[7]. In addition, the density-functional calculations[8], the kinetic theory based on the binary-encounter model[9], and the local-electron-density-model (LEDM) calculations[10,11] have been also presented. Recently, tables of electronic stopping power of atoms up to krypton were made on the basis of the kinetic binary-encounter model[12]. Quite recently, the idea of the wave packet treatment was newly presented to estimate the stopping and the straggling of bound electrons by means of the dielectric function method together with the independent shell model[13]. The calculated stopping and straggling cross sections of atoms up to Xe (Z=54) were tabulated[14,15]. The main thrust of this theory is the use of momentum-space representation to describe a bound-electron system. Here, we have an idea that each atomic shell serves only as a wave packet of the interacting electron gas with an appropriate momentum-occupation probability. Then, by studying the dielectric response of this system, the one-shell polarization can be calculated. Hence the dielectric function is straightforwardly obtained to be applied to the stopping cross sections. This paper is devoted to the presentation of calculated

results on partial and total electronic stopping cross sections of elements with atomic number $Z_2$ ranging from 2 (He) to 92 (U) in atomic and solid phases for a proton at velocities from $0.2v_0$ to $20v_0$ ($v_0=2.18\times 10^8$cm/s).

One-shell dielectric function

In general, atomic states are degenerate with respect to magnetic quantum number without an external magnetic field. Then, atomic states of bound electrons are classified by a set of the principal and angular-momentum quantum numbers, i.e., (n,l). We assume that the wave packet involves equivalent N bound electrons in a normalization volume V. The case is considered where the number density of the electrons is additive, and V and N go to infinity with N/V constant. This situation allows us to treat the discrete q values as continuous. The occupation probability W(q) of momentum $\hbar q$ for a shell (n,l) introduced into the wave packet system, is determined by maximizing the entropy

$$S = -\sum_q W(q)\ \ln\{\ W(q)\ \}\ , \qquad (1)$$

under the condition that the total number N and the total energy E of the wave packet composed of plane waves are kept constant:

$$2\sum_q W(q) = N\ , \qquad 2\sum_q W(q)\times\hbar^2q^2/2m = E\ . \qquad (2)$$

Here $\sum_q$ means $V/(2\pi)^3\int d^3q$ and a factor 2 comes from spin multiplicity. Using the Lagrange method of undetermined multipliers, one obtains a result $W(q) = W(0)\exp(-q^2/\bar{q}^2)$, with $(\hbar\bar{q})^2/2m=2E/3$.

The characteristic momentum $\hbar q$ for a shell is determined later and found to depend on the number density of the bound electrons considered. We may assume that the occupation of the lowest momentum ($\hbar q=0$) in the wave packet system is complete regardless of N, since we consider not a dilute but a dense electron gas. Hence we may set $W(0)=1$ so that $W(q)$ is reduced to

$$W(q)=\exp(-q^2/\bar{q}^2). \tag{3}$$

Let us consider the response of the wave-packet system with the ground state occupation probability $W(q)$. Details of derivation is omitted here, but the density-fluctuation component in the k-$\omega$ space can be calculated within the frame of linear response[13]. As a result, the RPA one-shell dielectric function $\varepsilon(\vec{k},\omega)$ can be expressed by $\varepsilon(\vec{k},\omega) = 1 + 4\pi\,\alpha(\vec{k},\omega)$, where the one-shell polarization is given by

$$4\pi\,\alpha(\vec{k},\omega) = V(k)(2/V)\sum_{p}[W(p+k)-W(p)]/[\hbar\omega-(E_{p+k}-E_p)+i\hbar\eta]. \tag{4}$$

In the above, $E_p = (\hbar p)^2/2m$, $V(k)=4\pi e^2/k^2$ and $\eta$ is a positive infinitesimal. One can calculate directly the imaginary part of $\varepsilon(\vec{k},\omega)$. On the other hand, the real part of $\varepsilon(\vec{k},\omega)$ is also calculated from the Kramers-Kronig relation. Thus, one obtains the explicit form

$$\left.\begin{aligned}
\varepsilon(z,u) &= 1 + (\chi^2/z^2)[f_1(z,u) + i\,f_2(z,u)],\\
f_1(z,u) &= (\pi)^{1/2}/(4z)[G(u+z) - G(u-z)],\\
f_2(z,u) &= \pi/(8z)[\exp\{-(u-z)^2\} - \exp\{-(u+z)^2\}],
\end{aligned}\right\} \tag{5}$$

by using the reduced variables z and u instead of k and $\omega$ : $z=k/(2\bar{q})$ and $u=m\omega/(k\hbar\bar{q})$. In the above equations, $\chi^2=mv_0/(\pi\hbar\bar{q})$ and $G(y)=y\times\exp(-y^2)\Phi(1/2,3/2;y^2)$, where $\Phi(1/2,3/2;y^2)$ is a degenerate hypergeometric function[16]. Figure 2 shows the graphs of functions, $f_1(z,u)$ and $f_2(z,u)$, of $\xi(z,u)$. It is proved that this dielectric function satisfies the sum rules[13].

One-shell stopping cross section

According to the dielectric function method, the one-shell stopping power S for a point charge is calculated as follows:

$$S = 4\pi (Z_1e^2)^2/(mv^2)\ \rho\ L$$

$$L = -8/(\pi^{3/2}\chi^2)\int_0^{\infty} dz\ z\int_0^{v/\bar{v}} du\ u\ \mathrm{Im}[\,\xi(z,u)^{-1} - 1\,], \tag{6}$$

where $\rho=N/V$, $\bar{v}=\hbar\bar{q}/m$ and L denotes the one-shell stopping number. At low velocities, i.e., $v \ll \bar{v}$, L is reduced to

$$L = (1/3)(v/v_0)^3(1/2\pi^2\rho a_0^3) \times \int_0^{\infty} dt\ t\ e^{-t}/[t + (\pi^{1/2}\chi^2/2)e^{-t}\Phi(1/2,3/2;t)]^2. \tag{7}$$

On the other hand, at high velocities,

$$L = \ln(2mv^2/\hbar\omega_p) - \langle v^2\rangle/v^2 - (1/2)\langle v^2\rangle^2/v^4 + \ldots\ , \tag{8}$$

where $\omega_p$ is the plasma frequency defined by $\omega_p = (4\pi\rho e^2/m)^{1/2}$ and $\langle v^2\rangle=(3/2)\bar{v}^2$.

Determination of $\bar{q}$

In order to estimate the stopping power S of the shell considered, the parameter $\bar{q}$ should be determined. Substituting (3) into the former of (2), we obtain $\bar{q} = (\pi)^{1/2}(4N/V)^{1/3}$. If $N_1$ and n denote the number of electrons in the system per atom, and the number density of those atoms, respectively, one gets $\bar{q} = (N_1)^{1/3} \times Q$ from $N = N_1 \times n$, where $Q = (\pi)^{1/2}(n/V)^{1/3}$. Moreover, from the discussion about Q[13], Q is determined from the value of the Hartree-Fock momentum distribution[17,18] at the origin:

$$Q = [ \{ f_{HF}(0) \}^{-2/3} / \pi ]^{1/2}. \qquad (9)$$

Here one realizes that two quantities $N_1$ and Q are needed to evaluate the one-shell stopping power by means of the wave-packet theory. Figures 3(a) and 3(b) show the calculated Q values for atom targets from He ( $Z_2=2$) to U ($Z_2=92$).

Contribution of conduction electrons

If a target material involves conduction electrons, their contributions are estimated by means of the Lindhard-Winther theory[4]. The characteristic parameter in this case is the $r_s$ value, defined from the density $n_0$ of the conduction electrons through the relation $4\pi (r_s a_0)^3/3 = 1/n_0$, where $n_0$ is determined by multiplying the number of conduction electrons per atom, $N_f$, by the number density of atoms. If one uses atomic mass density $\rho_a$[g/cm$^3$] and atomic weight $M_a$[g/mol], $r_s$ can be calculated by

$$r_s = 1.389 ( M_a / N_f \rho_a )^{1/3} \qquad (10)$$

Total stopping cross sections

The total stopping cross section of a target material is calculated by summing up partial contributions of individual shells. If a table involves square brackets in the head line, calculation was carried out for the target in an atomic phase and a solid phase. One has to choose a configuration before ( after ) a slash within the brackets in the case of atomic ( solid ) phase considered. Configurations outside the brackets are common to both phases. At this time, the total value before ( after ) slash in a column 'TOTAL' should be chosen. An example will be shown in section of EXPLANATION OF TABLES.

Figures 4(a) and 4(b) show comparison of the calculated energy dependence with the experimental data [19-36] of the stopping cross section of Kr ( atomic phase ) and Al ( solid phase ) for a proton with kinetic energies from 1 keV to $10^4$ keV. Three electrons per atom are assumed to take part in the conduction band. One finds that theoretical curves for the total stopping quantitatively agree well with the trend of the data. Figure 5 shows the target dependence of stopping cross sections for a proton at $v=0.2v_0$, $2v_0$, and $4v_0$. The data are cited from empirical values[37]. Though the calculated values are a bit greater, each case agrees well with the data in magnitude and phase of the oscillatory values. The whole results of calculation are tabulated in TABLES.

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FIGURE CAPTIONS

Fig.1: Present momentum distribution for $r_s$=1, for which q=1.745 (atomic units). For comparison the Fermi-Dirac distribution is illustrated for the same electron density, where $q_F$ = 1.919(atomic units).

Fig.2: The functions $f_1(z,u)$ and $f_2(z,u)$ involved in the real and imaginary part, respectively, of the present dielectric function $\varepsilon(z,u)$.

Fig.3(a)-(b): Values of the parameter Q with respect to $Z_2$, which are determined from a table of Hartree-Fock wavefunctions[Ref.17,18].

Fig.4:(a)Stopping cross sections of Kr for a proton. Lines:this theory(total and partial(4p,4s,3d) values). Other symbols are the kinetic theory( X )[Ref.12] and the experimental data(○-Ref.19, ▲-Ref.20, ● -Ref.21, △-Ref.22, ▼-Ref.23, ▽ -Ref.24,□ -Ref.25).

(b)Stopping cross sections of Al for a proton. Lines:this theory(total and partial(2p,2s,free) values). Other symbols are the experimental data( X -Ref.26, ○ -Ref.27, ▽-Ref.28, △-Ref.21, ▼ -Ref.29, □ -Ref.30, ■ -Ref.31, ● -Ref.32, ▲-Ref.33, + -Ref.34, ◗ -Ref.35, ⬡ -Ref.36).

Fig.5: $Z_2$(target atomic number) dependence of the electronic stopping cross sections for protons at v=0.2$v_0$, 2$v_0$, and 4$v_0$. The data are cited from [Ref.37].

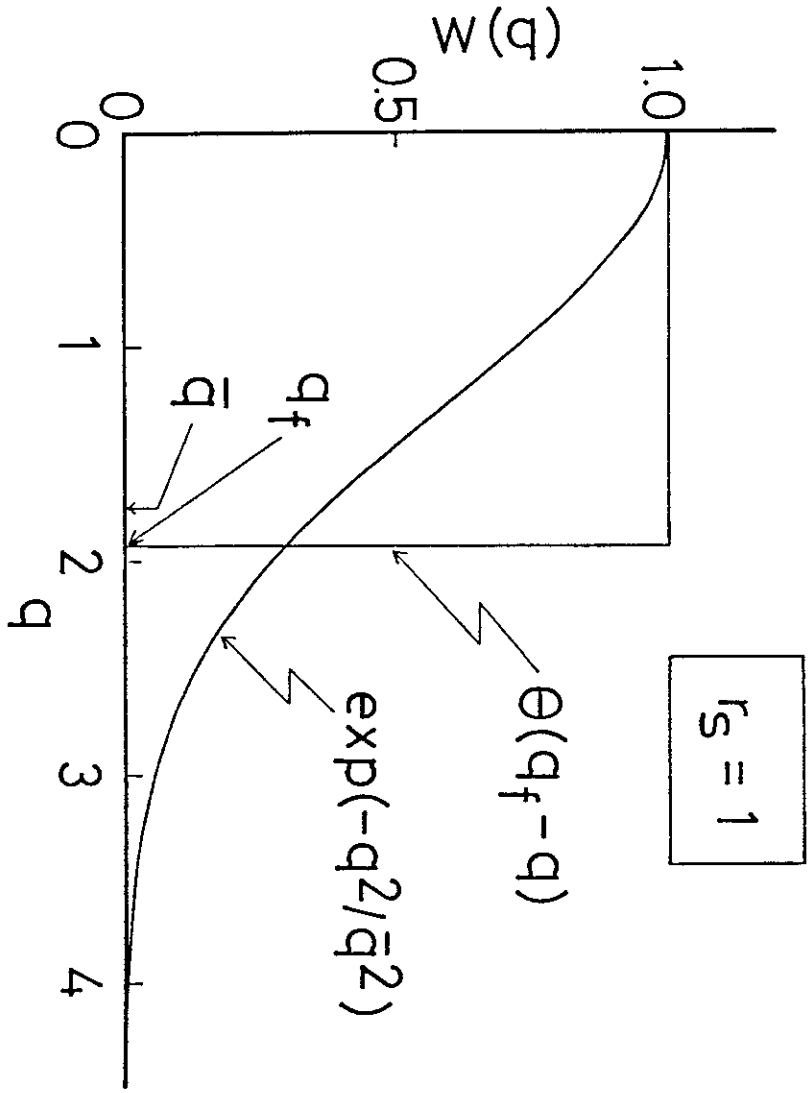



Figure 1

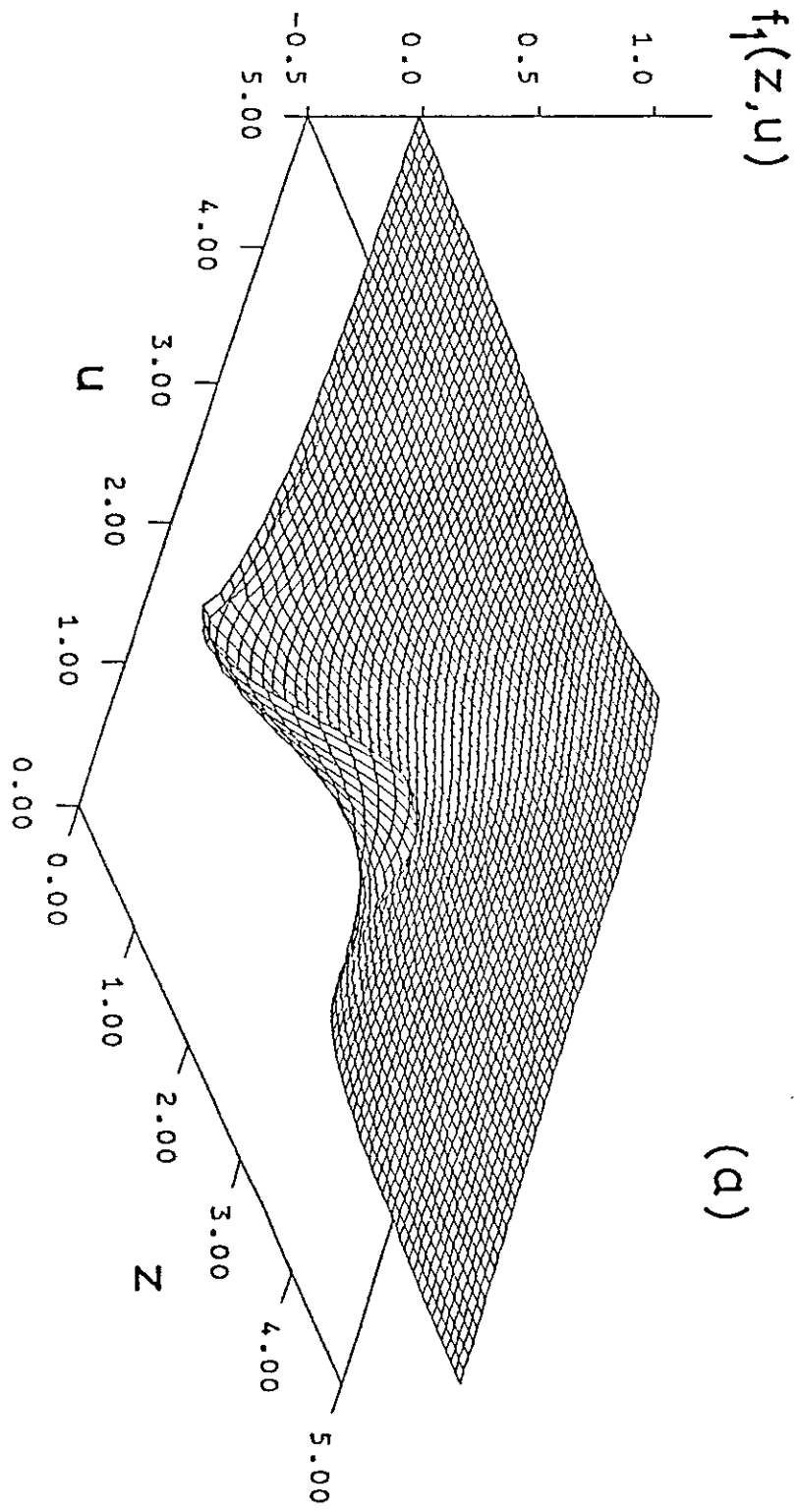

$f_1(z,u)$
-0.5
0.0
0.5
1.0
5.00
4.00
3.00
2.00
1.00
0.00
u
0.00
1.00
2.00
3.00
4.00
5.00
z
(a)

Figure 2(a)

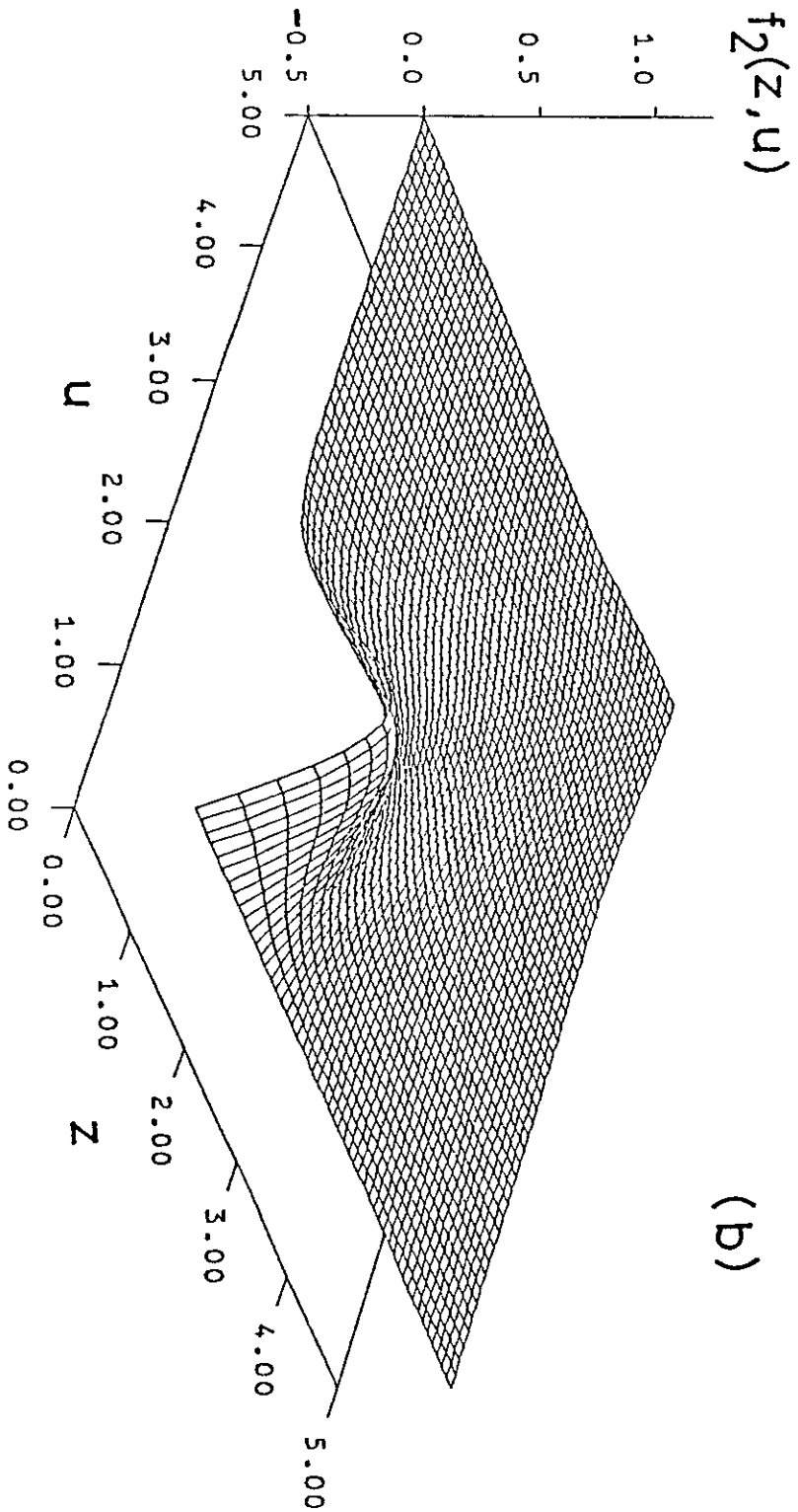

f2(z,u)
-0.5
0.0
0.5
1.0
5.00
4.00
3.00
u
2.00
1.00
0.00
0.00
1.00
2.00
3.00
4.00
5.00
z
(b)

Figure 2(b)

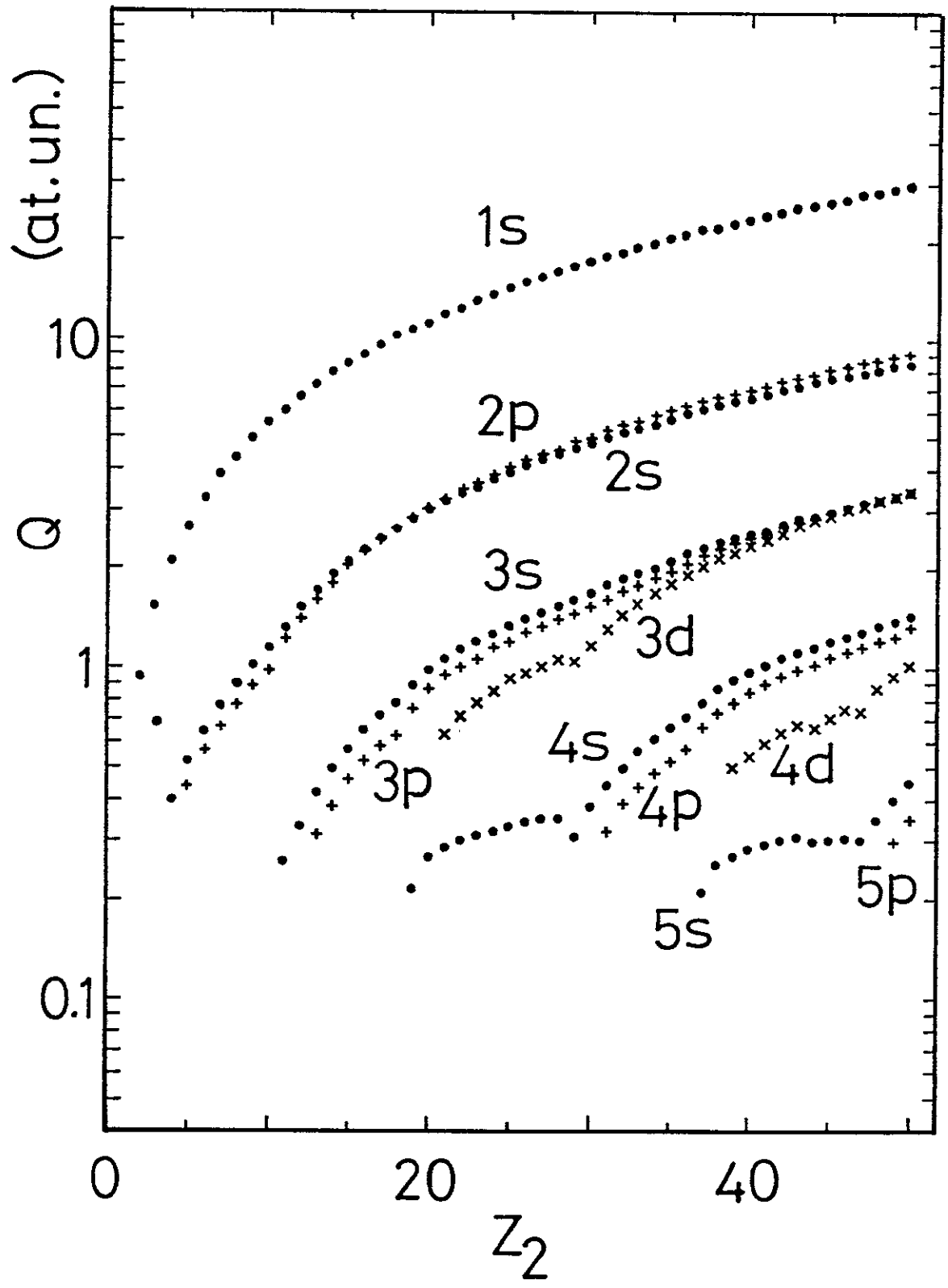



Figure 3(a)

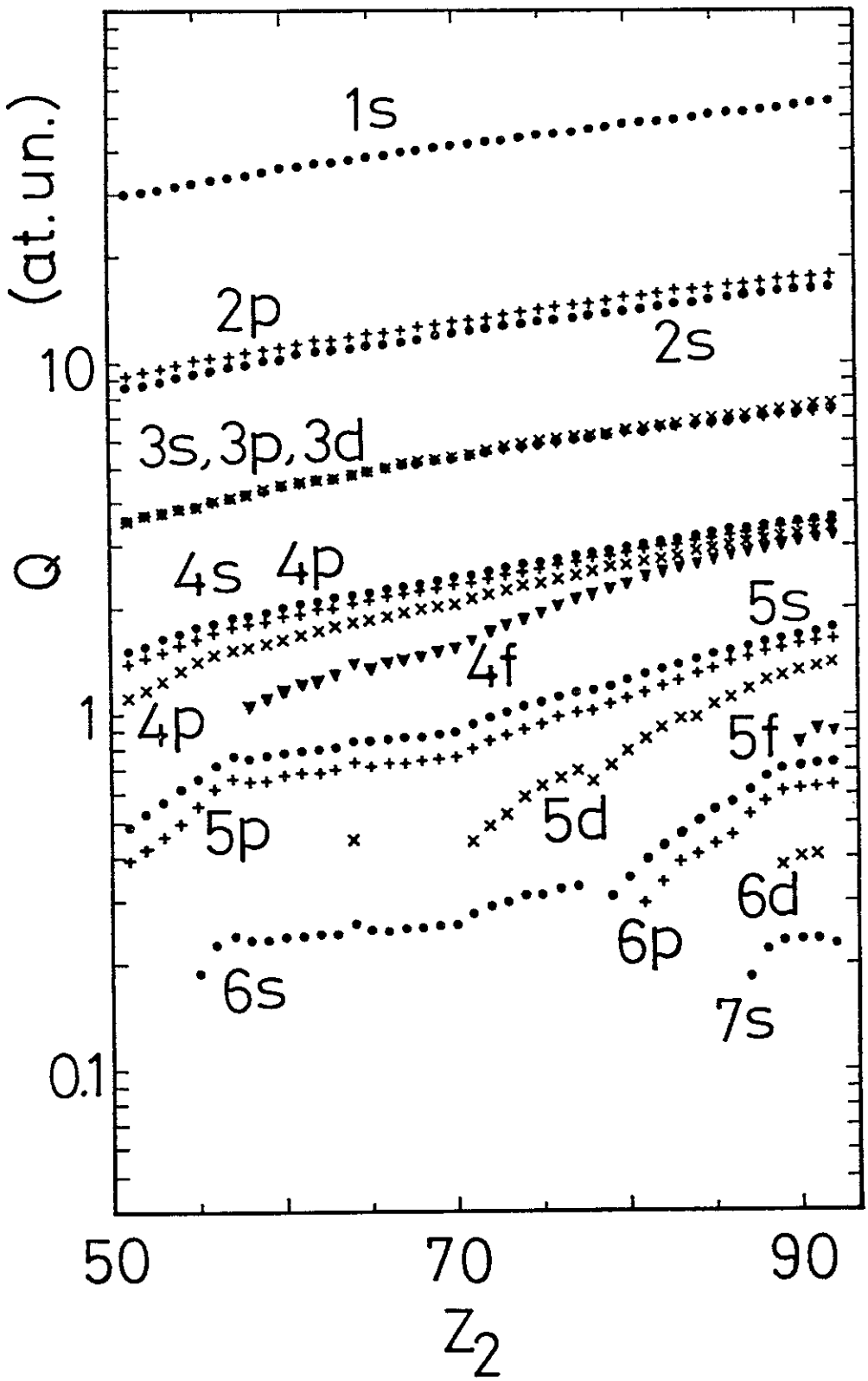

Q (at.un.)
10
1
0.1
1s
2p
2s
3s, 3p, 3d
4s
4p
4f
5s
4p
5f
5p
5d
6d
6p
6s
7s
50
70
90
$Z_2$

Figure 3(b)

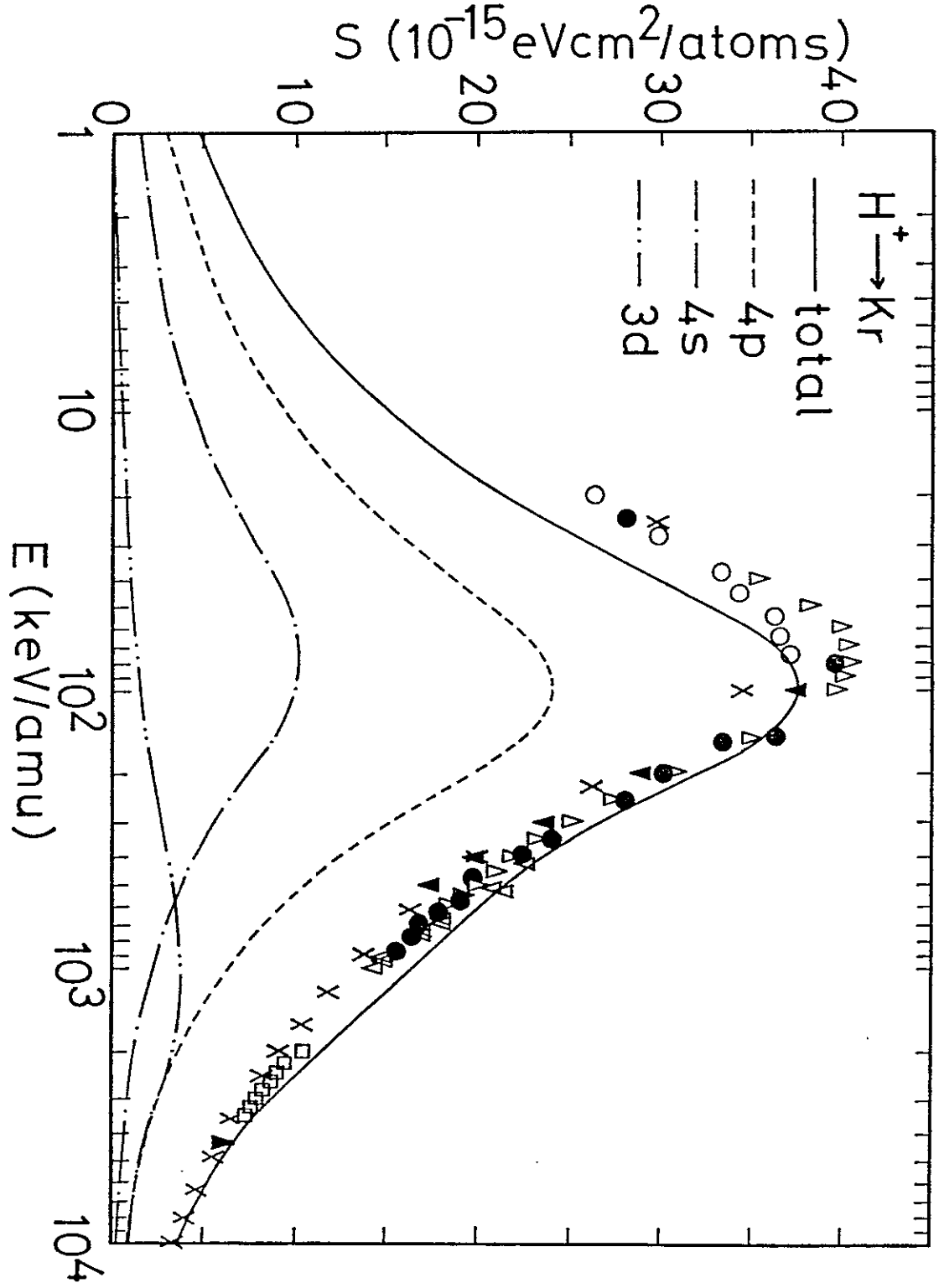

S ($10^{-15}$eVcm$^2$/atoms)
0
10
20
30
40
1
10
$10^2$
$10^3$
$10^4$
E (keV/amu)
$H^+ \rightarrow Kr$
total
4p
4s
3d

Figure 4(a)

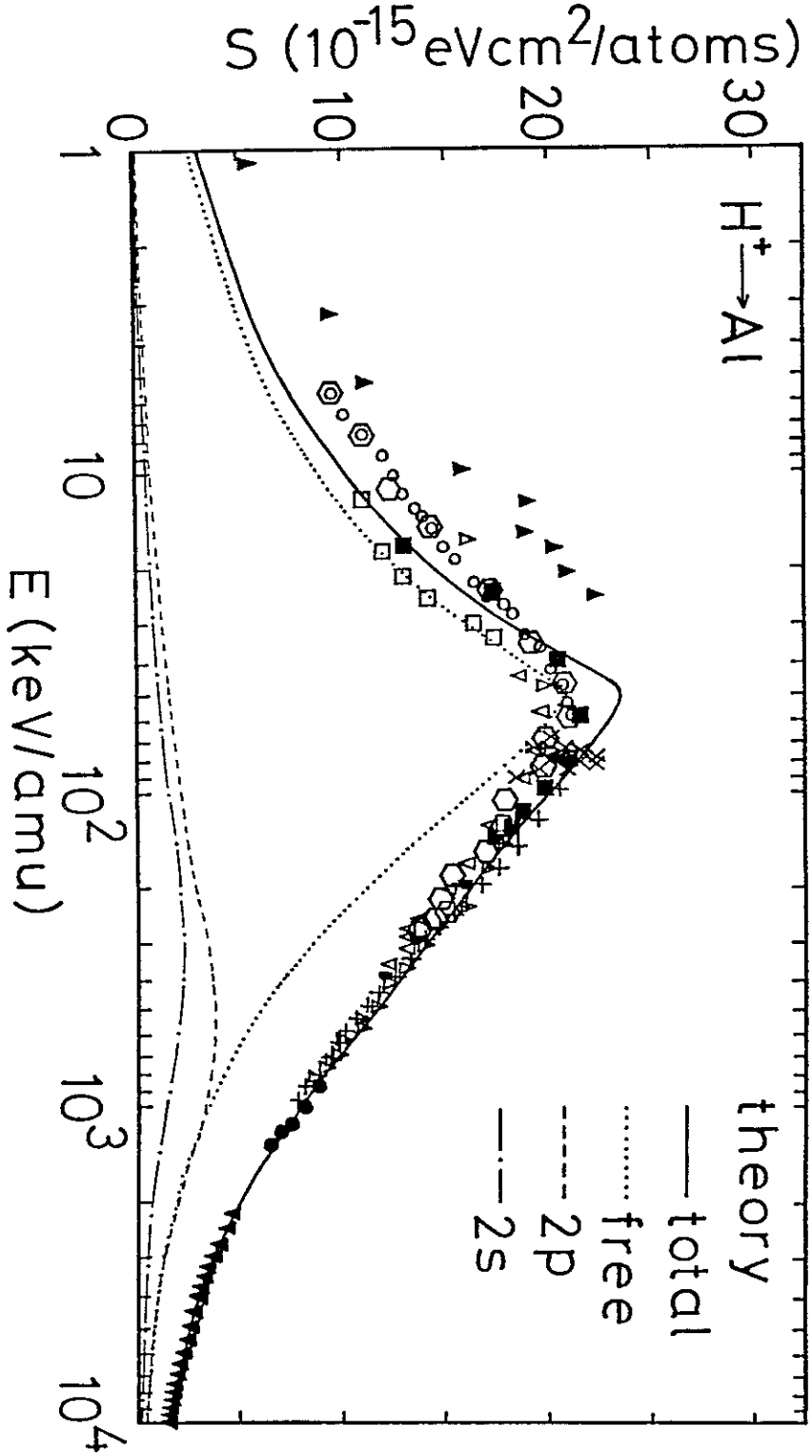

S ($10^{-15}$eVcm$^2$/atoms)
0
10
20
30
1
10
$10^2$
$10^3$
$10^4$
E (keV/amu)
$H^+ \rightarrow Al$
theory
total
free
2p
2s

Figure 4(b)

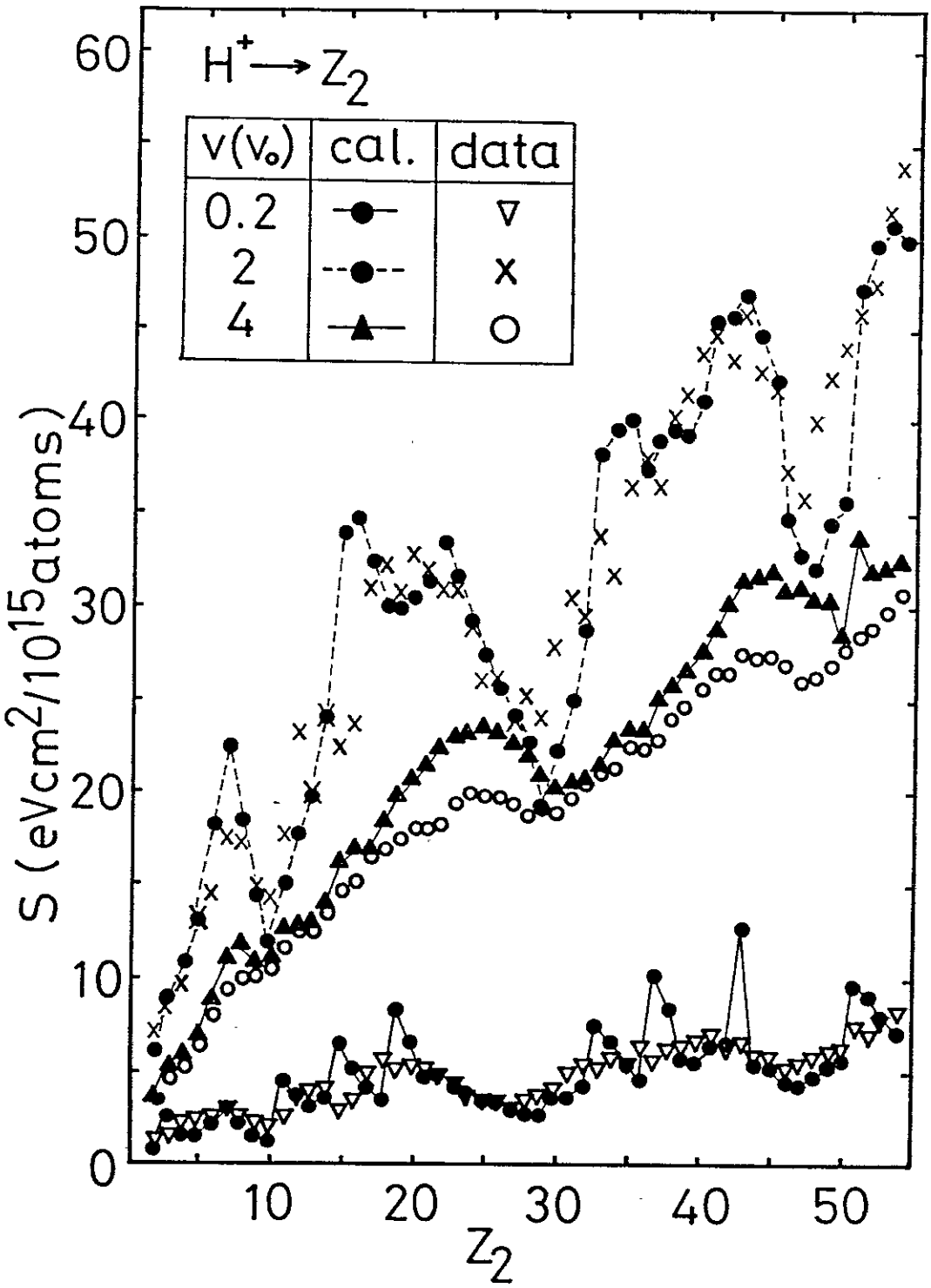



Figure 5

## EXPLANATION OF TABLES

① Symbol of a target element with atomic number.

② Electron state ( the number $N_l$ of electrons ).#

③ Values of Q in atomic units for atomic states or $R_s$ for conduction electrons.

④ Proton velocity in units of $V_0$(= $2.18 \times 10^8$ cm/s).
V=1 corresponds to kinetic energy E=25 keV/amu.

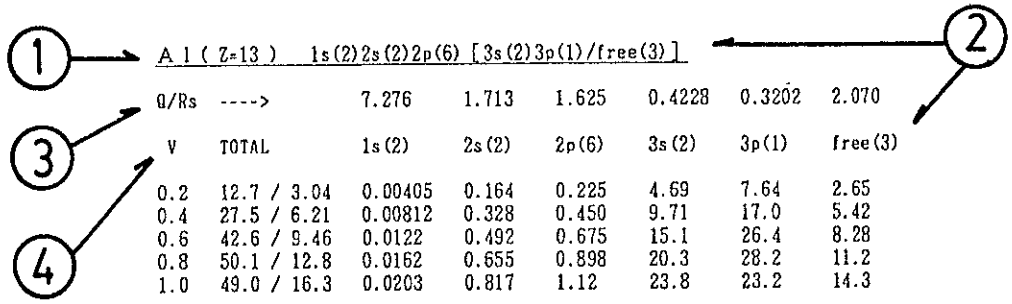
⑤ Stopping cross sections in units of $10^{-15}$ eVcm$^2$/atom.#

# Square brackets denote a selection of the electronic configuration for atomic phase (in front of a slash) or for solid phase (behind a slash). The configulation out of the brackets is common to both phase. The corresponding total stopping cross sections are calculated separately in a colomn 'TOTAL'.

For example : Al stopping for a proton at V = $0.2V_0$

Atomic phase stopping = 1s(2) + 2s(2) + 2p(6) + 3s(2) + 3p(1)
= 0.00405 + 0.164 + 0.225 + 4.69 + 7.64
= 12.7

Solid phase stopping = 1s(2) + 2s(2) + 2p(6) + free(3)
= 0.00405 + 0.164 + 0.225 + 2.65
= 3.04




Al ( Z=13 )  1s(2)2s(2)2p(6) [3s(2)3p(1)/free(3)]

| Q/Rs | ----> | 7.276 | 1.713 | 1.625 | 0.4228 | 0.3202 | 2.070 |
|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 2p(6) | 3s(2) | 3p(1) | free(3) |
| 0.2 | 12.7 / 3.04 | 0.00405 | 0.164 | 0.225 | 4.69 | 7.64 | 2.65 |
| 0.4 | 27.5 / 6.21 | 0.00812 | 0.328 | 0.450 | 9.71 | 17.0 | 5.42 |
| 0.6 | 42.6 / 9.46 | 0.0122 | 0.492 | 0.675 | 15.1 | 26.4 | 8.28 |
| 0.8 | 50.1 / 12.8 | 0.0162 | 0.655 | 0.898 | 20.3 | 28.2 | 11.2 |
| 1.0 | 49.0 / 16.3 | 0.0203 | 0.817 | 1.12 | 23.8 | 23.2 | 14.3 |
| 1.2 | 45.4 / 19.9 | 0.0243 | 0.977 | 1.34 | 24.3 | 18.8 | 17.6 |
| 1.4 | 40.6 / 23.4 | 0.0284 | 1.13 | 1.56 | 22.5 | 15.4 | 20.7 |
| 1.6 | 35.4 / 22.7 | 0.0324 | 1.29 | 1.77 | 19.5 | 12.8 | 19.6 |
| 1.8 | 31.1 / 21.4 | 0.0364 | 1.44 | 1.98 | 16.8 | 10.8 | 17.9 |
| 2.0 | 27.8 / 20.3 | 0.0404 | 1.58 | 2.19 | 14.7 | 9.28 | 16.3 |
| 2.2 | 25.2 / 18.9 | 0.0443 | 1.71 | 2.39 | 13.0 | 8.07 | 14.8 |
| 2.4 | 23.0 / 17.9 | 0.0483 | 1.83 | 2.58 | 11.5 | 7.06 | 13.4 |
| 2.6 | 21.3 / 17.1 | 0.0522 | 1.94 | 2.76 | 10.3 | 6.25 | 12.3 |
| 2.8 | 19.8 / 16.2 | 0.0561 | 2.04 | 2.94 | 9.21 | 5.56 | 11.2 |
| 3.0 | 18.6 / 15.6 | 0.0599 | 2.12 | 3.10 | 8.32 | 5.00 | 10.3 |
| 3.2 | 17.6 / 14.9 | 0.0638 | 2.18 | 3.26 | 7.56 | 4.50 | 9.43 |
| 3.4 | 16.6 / 14.4 | 0.0676 | 2.22 | 3.39 | 6.91 | 4.05 | 8.70 |
| 3.6 | 15.8 / 13.9 | 0.0713 | 2.25 | 3.52 | 6.33 | 3.66 | 8.05 |
| 3.8 | 15.1 / 13.4 | 0.0751 | 2.25 | 3.63 | 5.83 | 3.32 | 7.46 |
| 4.0 | 14.5 / 13.0 | 0.0788 | 2.24 | 3.72 | 5.39 | 3.03 | 6.93 |
| 5 | 11.8 / 11.0 | 0.0966 | 2.02 | 3.92 | 3.79 | 2.02 | 4.98 |
| 6 | 9.74 / 9.29 | 0.113 | 1.66 | 3.74 | 2.77 | 1.46 | 3.76 |
| 7 | 9.07 / 7.72 | 0.128 | 1.32 | 3.34 | 2.09 | 1.10 | 2.93 |
| 8 | 6.52 / 6.39 | 0.142 | 1.10 | 2.78 | 1.64 | 0.858 | 2.37 |
| 9 | 5.41 / 5.34 | 0.153 | 0.927 | 2.31 | 1.32 | 0.701 | 1.95 |
| 10 | 4.56 / 4.53 | 0.162 | 0.793 | 1.94 | 1.09 | 0.575 | 1.63 |
| 12 | 3.52 / 3.53 | 0.173 | 0.602 | 1.55 | 0.784 | 0.412 | 1.20 |
| 14 | 2.77 / 2.80 | 0.174 | 0.472 | 1.23 | 0.593 | 0.308 | 0.927 |
| 16 | 2.25 / 2.27 | 0.166 | 0.381 | 1.00 | 0.461 | 0.240 | 0.720 |
| 18 | 1.84 / 1.91 | 0.152 | 0.315 | 0.838 | 0.371 | 0.196 | 0.606 |
| 20 | 1.57 / 1.60 | 0.135 | 0.266 | 0.706 | 0.305 | 0.162 | 0.495 |

He ( Z=2 ) 1s(2)

| Q/Rs | ----> | 0.9383 |
|---|---|---|
| V | TOTAL | 1s(2) |
| 0.2 | 0.704 | 0.704 |
| 0.4 | 1.43 | 1.43 |
| 0.6 | 2.15 | 2.15 |
| 0.8 | 2.87 | 2.87 |
| 1.0 | 3.59 | 3.59 |
| 1.2 | 4.28 | 4.28 |
| 1.4 | 4.92 | 4.92 |
| 1.6 | 5.48 | 5.48 |
| 1.8 | 5.92 | 5.92 |
| 2.0 | 6.20 | 6.20 |
| 2.2 | 6.31 | 6.31 |
| 2.4 | 6.26 | 6.26 |
| 2.6 | 6.05 | 6.05 |
| 2.8 | 5.70 | 5.70 |
| 3.0 | 5.23 | 5.23 |
| 3.2 | 4.78 | 4.78 |
| 3.4 | 4.38 | 4.38 |
| 3.6 | 4.01 | 4.01 |
| 3.8 | 3.75 | 3.75 |
| 4.0 | 3.53 | 3.53 |
| 5 | 2.62 | 2.62 |
| 6 | 2.02 | 2.02 |
| 7 | 1.61 | 1.61 |
| 8 | 1.31 | 1.31 |
| 9 | 1.09 | 1.09 |
| 10 | 0.928 | 0.928 |
| 12 | 0.689 | 0.689 |
| 14 | 0.523 | 0.523 |
| 16 | 0.410 | 0.410 |
| 18 | 0.332 | 0.332 |
| 20 | 0.274 | 0.274 |

Li ( Z=3 ) 1s(2) [2s(1)/free(1) ]

| Q/Rs | ----> | 1.559 | 0.6754 | 3.260 |
|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(1) | free(1) |
| 0.2 | 1.59 / 2.65 | 0.206 | 1.38 | 2.44 |
| 0.4 | 3.16 / 5.60 | 0.414 | 2.75 | 5.19 |
| 0.6 | 4.83 / 8.87 | 0.621 | 4.21 | 8.25 |
| 0.8 | 6.51 / 12.7 | 0.827 | 5.68 | 11.9 |
| 1.0 | 8.04 / 14.7 | 1.03 | 7.01 | 13.7 |
| 1.2 | 9.16 / 13.3 | 1.23 | 7.93 | 12.1 |
| 1.4 | 9.63 / 11.9 | 1.43 | 8.20 | 10.5 |
| 1.6 | 9.52 / 10.8 | 1.62 | 7.89 | 9.14 |
| 1.8 | 9.06 / 9.83 | 1.81 | 7.25 | 8.02 |
| 2.0 | 8.45 / 9.03 | 1.98 | 6.47 | 7.05 |
| 2.2 | 7.84 / 8.45 | 2.14 | 5.70 | 6.31 |
| 2.4 | 7.41 / 7.93 | 2.28 | 5.13 | 5.65 |
| 2.6 | 6.99 / 7.49 | 2.40 | 4.59 | 5.09 |
| 2.8 | 6.66 / 7.10 | 2.50 | 4.16 | 4.60 |
| 3.0 | 6.30 / 6.76 | 2.58 | 3.72 | 4.18 |
| 3.2 | 6.07 / 6.45 | 2.63 | 3.44 | 3.82 |
| 3.4 | 5.80 / 6.15 | 2.65 | 3.15 | 3.50 |
| 3.6 | 5.54 / 5.87 | 2.65 | 2.89 | 3.22 |
| 3.8 | 5.30 / 5.59 | 2.62 | 2.68 | 2.97 |
| 4.0 | 5.05 / 5.32 | 2.58 | 2.47 | 2.74 |
| 5 | 3.95 / 4.13 | 2.19 | 1.76 | 1.94 |
| 6 | 3.02 / 3.18 | 1.73 | 1.32 | 1.45 |
| 7 | 2.42 / 2.52 | 1.40 | 1.02 | 1.12 |
| 8 | 1.97 / 2.05 | 1.16 | 0.804 | 0.894 |
| 9 | 1.62 / 1.70 | 0.972 | 0.647 | 0.729 |
| 10 | 1.36 / 1.44 | 0.830 | 0.534 | 0.608 |
| 12 | 1.01 / 1.07 | 0.628 | 0.383 | 0.441 |
| 14 | 0.783 / 0.830 | 0.492 | 0.291 | 0.338 |
| 16 | 0.621 / 0.663 | 0.395 | 0.226 | 0.268 |
| 18 | 0.509 / 0.542 | 0.326 | 0.183 | 0.216 |
| 20 | 0.423 / 0.448 | 0.273 | 0.150 | 0.175 |

Be ( Z=4 ) 1s(2) [2s(2)/free(2) ]

| Q/Rs | ----> | 2.116 | 0.3905 | 1.870 |
|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | free(2) |
| 0.2 | 5.74 / 1.50 | 0.0967 | 5.64 | 1.40 |
| 0.4 | 12.0 / 3.04 | 0.194 | 11.8 | 2.85 |
| 0.6 | 18.7 / 4.63 | 0.291 | 18.4 | 4.34 |
| 0.8 | 24.9 / 6.25 | 0.387 | 24.5 | 5.86 |
| 1.0 | 28.3 / 7.90 | 0.482 | 27.8 | 7.42 |
| 1.2 | 27.7 / 9.61 | 0.577 | 27.1 | 9.03 |
| 1.4 | 25.0 / 12.1 | 0.670 | 24.3 | 11.4 |
| 1.6 | 21.4 / 12.4 | 0.762 | 20.6 | 11.6 |
| 1.8 | 18.7 / 11.8 | 0.852 | 17.8 | 10.9 |
| 2.0 | 16.4 / 10.9 | 0.939 | 15.4 | 10.0 |
| 2.2 | 14.6 / 10.2 | 1.02 | 13.6 | 9.19 |
| 2.4 | 13.1 / 9.51 | 1.10 | 12.0 | 8.41 |
| 2.6 | 11.9 / 8.88 | 1.18 | 10.7 | 7.70 |
| 2.8 | 10.9 / 8.31 | 1.25 | 9.61 | 7.06 |
| 3.0 | 9.98 / 7.81 | 1.32 | 8.66 | 6.49 |
| 3.2 | 9.24 / 7.35 | 1.37 | 7.86 | 5.98 |
| 3.4 | 8.61 / 6.96 | 1.43 | 7.18 | 5.53 |
| 3.6 | 8.04 / 6.59 | 1.47 | 6.57 | 5.12 |
| 3.8 | 7.55 / 6.26 | 1.51 | 6.05 | 4.75 |
| 4.0 | 7.11 / 5.96 | 1.53 | 5.57 | 4.43 |
| 5 | 5.43 / 4.74 | 1.54 | 3.89 | 3.20 |
| 6 | 4.21 / 3.82 | 1.40 | 2.80 | 2.42 |
| 7 | 3.32 / 3.09 | 1.19 | 2.13 | 1.90 |
| 8 | 2.64 / 2.50 | 0.966 | 1.68 | 1.53 |
| 9 | 2.15 / 2.06 | 0.797 | 1.35 | 1.26 |
| 10 | 1.83 / 1.77 | 0.710 | 1.12 | 1.06 |
| 12 | 1.34 / 1.33 | 0.544 | 0.791 | 0.785 |
| 14 | 1.03 / 1.03 | 0.429 | 0.605 | 0.602 |
| 16 | 0.813 / 0.827 | 0.350 | 0.463 | 0.477 |
| 18 | 0.662 / 0.680 | 0.290 | 0.372 | 0.390 |
| 20 | 0.565 / 0.563 | 0.245 | 0.320 | 0.318 |

B ( Z=5 )  1s(2) [ 2s(2)2p(1)/free(3) ]

| Q/Rs | ----> | 2.693 | 0.5184 | 0.4505 | 1.560 |
|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 2p(1) | free(3) |
| 0.2 | 6.42 / 1.43 | 0.0528 | 2.92 | 3.46 | 1.39 |
| 0.4 | 16.2 / 2.92 | 0.105 | 5.95 | 7.29 | 2.81 |
| 0.6 | 20.8 / 4.42 | 0.158 | 9.14 | 11.5 | 4.26 |
| 0.8 | 27.6 / 5.92 | 0.211 | 12.3 | 15.0 | 5.71 |
| 1.0 | 31.6 / 7.45 | 0.263 | 15.2 | 16.2 | 7.19 |
| 1.2 | 32.3 / 9.00 | 0.315 | 17.0 | 15.0 | 8.68 |
| 1.4 | 30.3 / 10.6 | 0.366 | 17.3 | 12.6 | 10.2 |
| 1.6 | 27.6 / 12.3 | 0.417 | 16.4 | 10.7 | 11.9 |
| 1.8 | 24.8 / 13.7 | 0.467 | 15.1 | 9.23 | 13.2 |
| 2.0 | 21.6 / 13.2 | 0.515 | 13.1 | 8.00 | 12.7 |
| 2.2 | 19.2 / 12.5 | 0.563 | 11.6 | 7.01 | 11.9 |
| 2.4 | 17.2 / 11.7 | 0.610 | 10.4 | 6.19 | 11.1 |
| 2.6 | 15.5 / 10.9 | 0.655 | 9.34 | 5.50 | 10.2 |
| 2.8 | 14.1 / 10.2 | 0.699 | 8.43 | 4.92 | 9.48 |
| 3.0 | 12.8 / 9.51 | 0.740 | 7.63 | 4.44 | 8.77 |
| 3.2 | 11.8 / 8.91 | 0.780 | 6.98 | 4.03 | 8.13 |
| 3.4 | 10.9 / 8.38 | 0.817 | 6.37 | 3.66 | 7.55 |
| 3.6 | 10.1 / 7.87 | 0.852 | 5.87 | 3.35 | 7.02 |
| 3.8 | 9.37 / 7.42 | 0.884 | 5.41 | 3.08 | 6.54 |
| 4.0 | 8.77 / 7.02 | 0.914 | 5.00 | 2.85 | 6.11 |
| 5 | 6.53 / 5.47 | 1.01 | 3.55 | 1.96 | 4.46 |
| 6 | 5.09 / 4.42 | 1.02 | 2.66 | 1.41 | 3.40 |
| 7 | 4.07 / 3.63 | 0.960 | 2.05 | 1.06 | 2.67 |
| 8 | 3.30 / 3.03 | 0.856 | 1.61 | 0.838 | 2.17 |
| 9 | 2.70 / 2.52 | 0.726 | 1.30 | 0.671 | 1.79 |
| 10 | 2.24 / 2.13 | 0.616 | 1.07 | 0.553 | 1.51 |
| 12 | 1.64 / 1.59 | 0.476 | 0.768 | 0.399 | 1.11 |
| 14 | 1.26 / 1.24 | 0.381 | 0.578 | 0.298 | 0.861 |
| 16 | 1.00 / 1.00 | 0.313 | 0.454 | 0.232 | 0.690 |
| 18 | 0.818 / 0.82 | 0.262 | 0.367 | 0.189 | 0.560 |
| 20 | 0.681 / 0.689 | 0.223 | 0.303 | 0.155 | 0.466 |

C ( Z=6 )  1s(2) [2s(2)2p(2)/free(4)]

| Q/Rs | ----> | 3.268 | 0.6420 | 0.5725 | 1.660 |
|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 2p(2) | free(4) |
| 0.2 | 4.07 / 2.17 | 0.0324 | 1.75 | 2.29 | 2.14 |
| 0.4 | 8.31 / 4.38 | 0.0645 | 3.56 | 4.68 | 4.32 |
| 0.6 | 12.7 / 6.64 | 0.0962 | 5.41 | 7.16 | 6.54 |
| 0.8 | 17.1 / 8.93 | 0.127 | 7.29 | 9.67 | 8.80 |
| 1.0 | 21.2 / 11.3 | 0.160 | 9.08 | 12.0 | 11.1 |
| 1.2 | 24.6 / 13.6 | 0.192 | 10.6 | 13.8 | 13.4 |
| 1.4 | 26.5 / 16.0 | 0.223 | 11.7 | 14.6 | 15.8 |
| 1.6 | 26.8 / 19.5 | 0.254 | 12.1 | 14.5 | 19.2 |
| 1.8 | 25.7 / 19.4 | 0.285 | 11.8 | 13.6 | 19.1 |
| 2.0 | 23.8 / 18.3 | 0.315 | 11.1 | 12.3 | 18.0 |
| 2.2 | 21.1 / 17.1 | 0.344 | 10.1 | 10.7 | 16.8 |
| 2.4 | 18.9 / 15.9 | 0.373 | 8.87 | 9.61 | 15.5 |
| 2.6 | 17.1 / 14.7 | 0.401 | 8.00 | 8.68 | 14.3 |
| 2.8 | 15.6 / 13.5 | 0.428 | 7.27 | 7.92 | 13.1 |
| 3.0 | 14.3 / 12.6 | 0.454 | 6.65 | 7.20 | 12.1 |
| 3.2 | 13.3 / 11.7 | 0.480 | 6.13 | 6.66 | 11.2 |
| 3.4 | 12.2 / 10.9 | 0.504 | 5.65 | 6.03 | 10.4 |
| 3.6 | 11.3 / 10.2 | 0.528 | 5.25 | 5.54 | 9.66 |
| 3.8 | 10.5 / 9.54 | 0.550 | 4.81 | 5.15 | 8.99 |
| 4.0 | 10.2 / 8.95 | 0.571 | 4.47 | 4.77 | 8.38 |
| 5 | 7.30 / 6.75 | 0.653 | 3.25 | 3.39 | 6.10 |
| 6 | 5.69 / 5.33 | 0.689 | 2.45 | 2.55 | 4.64 |
| 7 | 4.60 / 4.33 | 0.675 | 1.92 | 2.00 | 3.65 |
| 8 | 3.73 / 3.56 | 0.621 | 1.53 | 1.58 | 2.94 |
| 9 | 3.10 / 2.98 | 0.551 | 1.27 | 1.29 | 2.43 |
| 10 | 2.59 / 2.52 | 0.483 | 1.05 | 1.06 | 2.04 |
| 12 | 1.86 / 1.88 | 0.370 | 0.740 | 0.754 | 1.51 |
| 14 | 1.45 / 1.47 | 0.302 | 0.571 | 0.576 | 1.17 |
| 16 | 1.14 / 1.19 | 0.252 | 0.437 | 0.446 | 0.934 |
| 18 | 0.936 / 0.971 | 0.214 | 0.361 | 0.361 | 0.757 |
| 20 | 0.773 / 0.814 | 0.184 | 0.291 | 0.298 | 0.630 |

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

| Q/Rs | ----> | 3.873 | 0.7680 | 0.6656 |
|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 2p(3) |
| 0.2 | 2.94 | 0.0209 | 1.15 | 1.76 |
| 0.4 | 5.91 | 0.0417 | 2.32 | 3.55 |
| 0.6 | 8.93 | 0.0626 | 3.51 | 5.36 |
| 0.8 | 12.0 | 0.0835 | 4.70 | 7.20 |
| 1.0 | 15.0 | 0.104 | 5.88 | 8.99 |
| 1.2 | 17.8 | 0.125 | 6.98 | 10.7 |
| 1.4 | 20.1 | 0.145 | 7.91 | 12.1 |
| 1.6 | 21.8 | 0.166 | 8.57 | 13.1 |
| 1.8 | 22.6 | 0.186 | 8.89 | 13.5 |
| 2.0 | 22.5 | 0.206 | 8.87 | 13.5 |
| 2.2 | 21.8 | 0.225 | 8.57 | 13.0 |
| 2.4 | 20.6 | 0.245 | 8.09 | 12.2 |
| 2.6 | 19.1 | 0.264 | 7.52 | 11.4 |
| 2.8 | 17.9 | 0.283 | 7.04 | 10.6 |
| 3.0 | 16.3 | 0.301 | 6.34 | 9.60 |
| 3.2 | 15.0 | 0.319 | 5.85 | 8.85 |
| 3.4 | 13.9 | 0.337 | 5.41 | 8.15 |
| 3.6 | 12.9 | 0.354 | 5.01 | 7.54 |
| 3.8 | 12.0 | 0.370 | 4.63 | 7.00 |
| 4.0 | 11.2 | 0.386 | 4.32 | 6.50 |
| 5 | 8.26 | 0.456 | 3.12 | 4.69 |
| 6 | 6.42 | 0.507 | 2.36 | 3.55 |
| 7 | 5.19 | 0.535 | 1.86 | 2.80 |
| 8 | 4.31 | 0.540 | 1.50 | 2.26 |
| 9 | 2.64 | 0.525 | 1.24 | 1.87 |
| 10 | 3.10 | 0.492 | 1.04 | 1.56 |
| 12 | 2.27 | 0.395 | 0.749 | 1.12 |
| 14 | 1.73 | 0.313 | 0.564 | 0.849 |
| 16 | 1.36 | 0.259 | 0.442 | 0.663 |
| 18 | 1.12 | 0.220 | 0.359 | 0.537 |
| 20 | 0.928 | 0.188 | 0.297 | 0.443 |

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

| Q/Rs | -----> | 4.421 | 0.8894 | 0.7787 |
|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 2p(4) |
| 0.2 | 2.11 | 0.0149 | 0.811 | 1.28 |
| 0.4 | 4.23 | 0.0297 | 1.63 | 2.57 |
| 0.6 | 6.37 | 0.0445 | 2.46 | 3.87 |
| 0.8 | 8.51 | 0.0594 | 3.28 | 5.17 |
| 1.0 | 10.6 | 0.0742 | 4.10 | 6.45 |
| 1.2 | 12.7 | 0.0890 | 4.89 | 7.70 |
| 1.4 | 14.6 | 0.104 | 5.61 | 8.88 |
| 1.6 | 16.3 | 0.118 | 6.22 | 9.92 |
| 1.8 | 17.6 | 0.133 | 6.66 | 10.8 |
| 2.0 | 18.4 | 0.147 | 6.90 | 11.4 |
| 2.2 | 18.8 | 0.161 | 6.94 | 11.7 |
| 2.4 | 18.7 | 0.175 | 6.80 | 11.7 |
| 2.6 | 18.3 | 0.189 | 6.53 | 11.5 |
| 2.8 | 17.5 | 0.202 | 6.19 | 11.1 |
| 3.0 | 16.7 | 0.216 | 5.84 | 10.6 |
| 3.2 | 15.7 | 0.229 | 5.37 | 10.1 |
| 3.4 | 14.6 | 0.242 | 4.95 | 9.38 |
| 3.6 | 13.8 | 0.254 | 4.57 | 8.98 |
| 3.8 | 12.8 | 0.267 | 4.28 | 8.27 |
| 4.0 | 12.0 | 0.279 | 3.99 | 7.74 |
| 5 | 8.92 | 0.334 | 2.91 | 5.68 |
| 6 | 6.96 | 0.378 | 2.23 | 4.35 |
| 7 | 5.61 | 0.409 | 1.76 | 3.44 |
| 8 | 4.65 | 0.425 | 1.42 | 2.80 |
| 9 | 3.94 | 0.427 | 1.18 | 2.33 |
| 10 | 3.38 | 0.416 | 1.00 | 1.96 |
| 12 | 2.55 | 0.362 | 0.733 | 1.46 |
| 14 | 1.96 | 0.295 | 0.553 | 1.11 |
| 16 | 1.54 | 0.240 | 0.433 | 0.870 |
| 18 | 1.25 | 0.199 | 0.351 | 0.699 |
| 20 | 1.04 | 0.176 | 0.288 | 0.577 |

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

| Q/Rs | ----> | 4.995 | 1.014 | 0.8776 |
|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 2p(5) |
| 0.2 | 1.59 | 0.0109 | 0.585 | 0.995 |
| 0.4 | 3.19 | 0.0217 | 1.18 | 1.99 |
| 0.6 | 4.81 | 0.0325 | 1.78 | 3.00 |
| 0.8 | 6.42 | 0.0432 | 2.38 | 4.00 |
| 1.0 | 8.01 | 0.0538 | 2.97 | 4.99 |
| 1.2 | 9.56 | 0.0642 | 3.54 | 5.96 |
| 1.4 | 11.1 | 0.0749 | 4.08 | 6.90 |
| 1.6 | 12.4 | 0.0856 | 4.57 | 7.78 |
| 1.8 | 13.7 | 0.0962 | 4.98 | 8.58 |
| 2.0 | 14.7 | 0.107 | 5.29 | 9.27 |
| 2.2 | 15.4 | 0.117 | 5.47 | 9.82 |
| 2.4 | 15.9 | 0.127 | 5.52 | 10.2 |
| 2.6 | 16.0 | 0.137 | 5.45 | 10.4 |
| 2.8 | 15.8 | 0.147 | 5.26 | 10.4 |
| 3.0 | 15.4 | 0.157 | 4.95 | 10.3 |
| 3.2 | 14.7 | 0.166 | 4.57 | 9.92 |
| 3.4 | 13.8 | 0.176 | 4.20 | 9.40 |
| 3.6 | 12.9 | 0.185 | 3.87 | 8.80 |
| 3.8 | 12.0 | 0.194 | 3.58 | 8.20 |
| 4.0 | 11.2 | 0.203 | 3.33 | 7.63 |
| 5 | 8.35 | 0.243 | 2.49 | 5.61 |
| 6 | 6.62 | 0.276 | 1.94 | 4.40 |
| 7 | 5.41 | 0.301 | 1.55 | 3.56 |
| 8 | 4.51 | 0.315 | 1.27 | 2.93 |
| 9 | 3.83 | 0.320 | 1.06 | 2.46 |
| 10 | 3.31 | 0.314 | 0.899 | 2.10 |
| 12 | 2.53 | 0.282 | 0.671 | 1.58 |
| 14 | 1.99 | 0.239 | 0.516 | 1.23 |
| 16 | 1.59 | 0.200 | 0.406 | 0.982 |
| 18 | 1.29 | 0.168 | 0.327 | 0.795 |
| 20 | 1.07 | 0.146 | 0.270 | 0.657 |

Ne ( Z=10 ) 1s(2)4s(2)2p(6)

| Q/Rs | ----> | 5.572 | 1.136 | 0.9814 |
|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 2p(6) |
| 0.2 | 1.24 | 0.00819 | 0.446 | 0.785 |
| 0.4 | 2.49 | 0.0164 | 0.894 | 1.56 |
| 0.6 | 3.73 | 0.0245 | 1.35 | 2.36 |
| 0.8 | 4.97 | 0.0326 | 1.80 | 3.14 |
| 1.0 | 6.20 | 0.0406 | 2.24 | 3.91 |
| 1.2 | 7.40 | 0.0485 | 2.68 | 4.68 |
| 1.4 | 8.57 | 0.0563 | 3.10 | 5.42 |
| 1.6 | 9.68 | 0.0644 | 3.49 | 6.13 |
| 1.8 | 10.7 | 0.0724 | 3.83 | 6.81 |
| 2.0 | 11.6 | 0.0803 | 4.13 | 7.43 |
| 2.2 | 12.4 | 0.0882 | 4.35 | 7.98 |
| 2.4 | 13.0 | 0.0959 | 4.48 | 8.45 |
| 2.6 | 13.5 | 0.104 | 4.54 | 8.83 |
| 2.8 | 13.7 | 0.111 | 4.50 | 9.09 |
| 3.0 | 13.7 | 0.119 | 4.38 | 9.23 |
| 3.2 | 13.6 | 0.126 | 4.18 | 9.26 |
| 3.4 | 13.2 | 0.133 | 3.91 | 9.15 |
| 3.6 | 12.7 | 0.140 | 3.63 | 8.92 |
| 3.8 | 12.1 | 0.147 | 3.37 | 8.57 |
| 4.0 | 11.4 | 0.154 | 3.13 | 8.15 |
| 5 | 8.55 | 0.186 | 2.32 | 6.05 |
| 6 | 6.76 | 0.213 | 1.82 | 4.73 |
| 7 | 5.56 | 0.235 | 1.46 | 3.86 |
| 8 | 4.65 | 0.251 | 1.20 | 3.20 |
| 9 | 3.98 | 0.260 | 1.01 | 2.71 |
| 10 | 3.44 | 0.262 | 0.854 | 2.32 |
| 12 | 2.65 | 0.248 | 0.643 | 1.76 |
| 14 | 2.11 | 0.220 | 0.502 | 1.39 |
| 16 | 1.71 | 0.189 | 0.397 | 1.12 |
| 18 | 1.40 | 0.161 | 0.320 | 0.922 |
| 20 | 1.17 | 0.137 | 0.265 | 0.765 |

Na ( Z=11 ) 1s(2)2s(2)2p(6) [3s(1)/free(1) ]

| θ/Rs | ----> | 6.121 | 1.312 | 1.205 | 0.2617 | 3.986 |
|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 2p(6) | 3s(1) | free(1) |
| 0.2 | 13.0 / 4.61 | 0.00638 | 0.316 | 0.473 | 12.2 | 3.81 |
| 0.4 | 30.0 / 9.96 | 0.0128 | 0.634 | 0.950 | 28.4 | 8.36 |
| 0.6 | 42.4 / 16.1 | 0.0191 | 0.950 | 1.42 | 40.0 | 13.7 |
| 0.8 | 37.9 / 22.2 | 0.0255 | 1.27 | 1.90 | 34.7 | 19.0 |
| 1.0 | 30.7 / 20.4 | 0.0319 | 1.58 | 2.35 | 26.7 | 16.4 |
| 1.2 | 25.9 / 18.7 | 0.0382 | 1.89 | 2.83 | 21.1 | 13.9 |
| 1.4 | 22.6 / 17.3 | 0.0446 | 2.19 | 3.28 | 17.1 | 11.8 |
| 1.6 | 20.3 / 16.4 | 0.0509 | 2.47 | 3.73 | 14.1 | 10.2 |
| 1.8 | 18.8 / 15.8 | 0.0571 | 2.74 | 4.15 | 11.9 | 8.85 |
| 2.0 | 17.7 / 15.4 | 0.0634 | 2.98 | 4.57 | 10.1 | 7.77 |
| 2.2 | 16.9 / 15.1 | 0.0696 | 3.19 | 4.95 | 8.73 | 6.89 |
| 2.4 | 16.4 / 14.9 | 0.0757 | 3.36 | 5.31 | 7.62 | 6.14 |
| 2.6 | 15.9 / 14.7 | 0.0818 | 3.48 | 5.63 | 6.69 | 5.52 |
| 2.8 | 15.5 / 14.6 | 0.0878 | 3.55 | 5.92 | 5.90 | 4.97 |
| 3.0 | 15.0 / 14.3 | 0.0938 | 3.57 | 6.16 | 5.21 | 4.50 |
| 3.2 | 14.6 / 14.1 | 0.0997 | 3.55 | 6.34 | 4.65 | 4.10 |
| 3.4 | 14.2 / 13.8 | 0.1056 | 3.49 | 6.48 | 4.16 | 3.75 |
| 3.6 | 13.8 / 13.5 | 0.111 | 3.39 | 6.56 | 3.77 | 3.45 |
| 3.8 | 13.4 / 13.2 | 0.117 | 3.28 | 6.60 | 3.40 | 3.17 |
| 4.0 | 13.0 / 12.8 | 0.123 | 3.15 | 6.58 | 3.10 | 2.93 |
| 5 | 10.7 / 10.7 | 0.150 | 2.49 | 5.95 | 2.08 | 2.05 |
| 6 | 8.55 / 8.59 | 0.174 | 1.94 | 4.94 | 1.49 | 1.53 |
| 7 | 6.81 / 6.87 | 0.195 | 1.55 | 3.94 | 1.12 | 1.18 |
| 8 | 5.63 / 5.68 | 0.212 | 1.27 | 3.26 | 0.887 | 0.932 |
| 9 | 4.75 / 4.81 | 0.226 | 1.06 | 2.75 | 0.711 | 0.768 |
| 10 | 4.08 / 4.12 | 0.234 | 0.900 | 2.35 | 0.589 | 0.629 |
| 12 | 3.12 / 3.17 | 0.238 | 0.676 | 1.79 | 0.416 | 0.470 |
| 14 | 2.47 / 2.51 | 0.226 | 0.527 | 1.40 | 0.314 | 0.354 |
| 16 | 2.01 / 2.04 | 0.201 | 0.421 | 1.14 | 0.245 | 0.271 |
| 18 | 1.66 / 1.69 | 0.173 | 0.344 | 0.942 | 0.197 | 0.223 |
| 20 | 3.10 / 3.12 | 0.149 | 0.283 | 0.852 | 0.162 | 0.179 |

Mg ( Z=12 ) 1s(2)2s(2)2p(6) [3s(2)/free(2) ]

| θ/Rs | ----> | 6.689 | 1.518 | 1.420 | 0.3347 | 2.656 |
|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 2p(6) | 3s(2) | free(2) |
| 0.2 | 11.7 / 6.74 | 0.00505 | 0.221 | 0.315 | 8.06 | 3.10 |
| 0.4 | 18.2 / 7.54 | 0.0101 | 0.443 | 0.631 | 17.1 | 6.44 |
| 0.6 | 28.6 / 11.6 | 0.0152 | 0.664 | 0.946 | 27.0 | 10.0 |
| 0.8 | 36.9 / 16.0 | 0.0202 | 0.885 | 1.259 | 34.7 | 13.8 |
| 1.0 | 38.5 / 21.6 | 0.0253 | 1.10 | 1.570 | 35.8 | 18.9 |
| 1.2 | 35.4 / 23.3 | 0.0303 | 1.32 | 1.878 | 32.1 | 20.0 |
| 1.4 | 30.3 / 21.9 | 0.0354 | 1.53 | 2.182 | 26.5 | 18.1 |
| 1.6 | 26.7 / 20.3 | 0.0404 | 1.73 | 2.480 | 22.5 | 16.1 |
| 1.8 | 23.9 / 19.0 | 0.0453 | 1.93 | 2.771 | 19.2 | 14.3 |
| 2.0 | 21.8 / 17.9 | 0.0503 | 2.11 | 3.053 | 16.6 | 12.7 |
| 2.2 | 20.2 / 17.1 | 0.0552 | 2.28 | 3.324 | 14.5 | 11.4 |
| 2.4 | 18.8 / 16.3 | 0.0601 | 2.43 | 3.583 | 12.8 | 10.3 |
| 2.6 | 17.8 / 16.1 | 0.0650 | 2.55 | 3.826 | 11.3 | 9.55 |
| 2.8 | 16.9 / 15.2 | 0.0698 | 2.65 | 4.052 | 10.1 | 8.43 |
| 3.0 | 16.2 / 14.8 | 0.0746 | 2.72 | 4.257 | 9.13 | 7.68 |
| 3.2 | 15.6 / 14.4 | 0.0793 | 2.77 | 4.439 | 8.28 | 7.03 |
| 3.4 | 15.0 / 13.9 | 0.0840 | 2.78 | 4.596 | 7.54 | 6.46 |
| 3.6 | 14.5 / 13.6 | 0.0887 | 2.77 | 4.727 | 6.89 | 5.95 |
| 3.8 | 14.1 / 13.2 | 0.0933 | 2.73 | 4.829 | 6.41 | 5.50 |
| 4.0 | 13.5 / 12.8 | 0.0978 | 2.67 | 4.902 | 5.83 | 5.09 |
| 5 | 11.2 / 10.9 | 0.120 | 2.23 | 4.859 | 3.95 | 3.63 |
| 6 | 9.09 / 8.96 | 0.140 | 1.76 | 4.342 | 2.84 | 2.71 |
| 7 | 7.36 / 7.32 | 0.157 | 1.43 | 3.622 | 2.16 | 2.12 |
| 8 | 5.97 / 2.58 | 0.173 | 1.18 | 2.932 | 1.69 | 1.70 |
| 9 | 4.94 / 4.98 | 0.185 | 0.986 | 2.416 | 1.35 | 1.39 |
| 10 | 4.32 / 4.36 | 0.195 | 0.840 | 2.169 | 1.12 | 1.16 |
| 12 | 3.30 / 3.34 | 0.203 | 0.632 | 1.657 | 0.803 | 0.845 |
| 14 | 2.62 / 2.66 | 0.199 | 0.497 | 1.307 | 0.615 | 0.655 |
| 16 | 2.13 / 2.16 | 0.184 | 0.400 | 1.063 | 0.478 | 0.509 |
| 18 | 1.75 / 1.79 | 0.163 | 0.330 | 0.882 | 0.378 | 0.417 |
| 20 | 1.48 / 1.51 | 0.142 | 0.275 | 0.747 | 0.317 | 0.343 |

Al ( Z=13 )  1s(2)2s(2)2p(6) [3s(2)3p(1)/free(3)]

| Q/Rs | ----> | 7.276 | 1.713 | 1.625 | 0.4228 | 0.3202 | 2.070 |
|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 2p(6) | 3s(2) | 3p(1) | free(3) |
| 0.2 | 12.7 / 3.04 | 0.00405 | 0.164 | 0.225 | 4.69 | 7.64 | 2.65 |
| 0.4 | 27.5 / 6.21 | 0.00812 | 0.328 | 0.450 | 9.71 | 17.0 | 5.42 |
| 0.6 | 42.6 / 9.46 | 0.0122 | 0.492 | 0.675 | 15.1 | 26.4 | 8.28 |
| 0.8 | 50.1 / 12.8 | 0.0162 | 0.655 | 0.898 | 20.3 | 28.2 | 11.2 |
| 1.0 | 49.0 / 16.3 | 0.0203 | 0.817 | 1.12 | 23.8 | 23.2 | 14.3 |
| 1.2 | 45.4 / 19.9 | 0.0243 | 0.977 | 1.34 | 24.3 | 18.8 | 17.6 |
| 1.4 | 40.6 / 23.4 | 0.0284 | 1.13 | 1.56 | 22.5 | 15.4 | 20.7 |
| 1.6 | 35.4 / 22.7 | 0.0324 | 1.29 | 1.77 | 19.5 | 12.8 | 19.6 |
| 1.8 | 31.1 / 21.4 | 0.0364 | 1.44 | 1.98 | 16.8 | 10.8 | 17.9 |
| 2.0 | 27.8 / 20.3 | 0.0404 | 1.58 | 2.19 | 14.7 | 9.28 | 16.3 |
| 2.2 | 25.2 / 18.9 | 0.0443 | 1.71 | 2.39 | 13.0 | 8.07 | 14.8 |
| 2.4 | 23.0 / 17.9 | 0.0483 | 1.83 | 2.58 | 11.5 | 7.06 | 13.4 |
| 2.6 | 21.3 / 17.1 | 0.0522 | 1.94 | 2.76 | 10.3 | 6.25 | 12.3 |
| 2.8 | 19.8 / 16.2 | 0.0561 | 2.04 | 2.94 | 9.21 | 5.56 | 11.2 |
| 3.0 | 18.6 / 15.6 | 0.0599 | 2.12 | 3.10 | 8.32 | 5.00 | 10.3 |
| 3.2 | 17.6 / 14.9 | 0.0638 | 2.18 | 3.26 | 7.56 | 4.50 | 9.43 |
| 3.4 | 16.6 / 14.4 | 0.0676 | 2.22 | 3.39 | 6.91 | 4.05 | 8.70 |
| 3.6 | 15.8 / 13.9 | 0.0713 | 2.25 | 3.52 | 6.33 | 3.66 | 8.05 |
| 3.8 | 15.1 / 13.4 | 0.0751 | 2.25 | 3.63 | 5.83 | 3.32 | 7.46 |
| 4.0 | 14.5 / 13.0 | 0.0788 | 2.24 | 3.72 | 5.39 | 3.03 | 6.93 |
| 5 | 11.8 / 11.0 | 0.0966 | 2.02 | 3.92 | 3.79 | 2.02 | 4.98 |
| 6 | 9.74 / 9.29 | 0.113 | 1.66 | 3.74 | 2.77 | 1.46 | 3.76 |
| 7 | 9.07 / 7.72 | 0.128 | 1.32 | 3.34 | 2.09 | 1.10 | 2.93 |
| 8 | 6.52 / 6.39 | 0.142 | 1.10 | 2.78 | 1.64 | 0.858 | 2.37 |
| 9 | 5.41 / 5.34 | 0.153 | 0.927 | 2.31 | 1.32 | 0.701 | 1.95 |
| 10 | 4.56 / 4.53 | 0.162 | 0.793 | 1.94 | 1.09 | 0.575 | 1.63 |
| 12 | 3.52 / 3.53 | 0.173 | 0.602 | 1.55 | 0.784 | 0.412 | 1.20 |
| 14 | 2.77 / 2.80 | 0.174 | 0.472 | 1.23 | 0.593 | 0.308 | 0.927 |
| 16 | 2.25 / 2.27 | 0.166 | 0.381 | 1.00 | 0.461 | 0.240 | 0.720 |
| 18 | 1.84 / 1.91 | 0.152 | 0.315 | 0.838 | 0.371 | 0.196 | 0.606 |
| 20 | 1.57 / 1.60 | 0.135 | 0.266 | 0.706 | 0.305 | 0.162 | 0.495 |

Si ( Z=14 )  1s(2)2s(2)2p(6) [ 3s(2)3p(2)/free(4) ]

| Q/Rs | ----> | 7.988 | 1.890 | 1.797 | 0.5014 | 0.3833 | 2.006 |
|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 2p(6) | 3s(2) | 3p(2) | free(4) |
| 0.2 | 9.35 / 3.61 | 0.00317 | 0.128 | 0.174 | 3.15 | 5.89 | 3.30 |
| 0.4 | 19.4 / 7.32 | 0.00635 | 0.257 | 0.349 | 6.45 | 12.3 | 6.71 |
| 0.6 | 30.1 / 11.2 | 0.00952 | 0.385 | 0.523 | 9.92 | 19.3 | 10.3 |
| 0.8 | 40.2 / 15.1 | 0.0127 | 0.513 | 0.697 | 13.4 | 25.6 | 13.9 |
| 1.0 | 46.7 / 19.1 | 0.0158 | 0.640 | 0.870 | 16.4 | 28.8 | 17.6 |
| 1.2 | 47.6 / 23.4 | 0.0190 | 0.765 | 1.04 | 18.1 | 27.7 | 21.6 |
| 1.4 | 45.2 / 28.4 | 0.0222 | 0.888 | 1.21 | 18.2 | 24.9 | 26.3 |
| 1.6 | 40.4 / 27.6 | 0.0253 | 1.01 | 1.38 | 17.0 | 20.9 | 25.2 |
| 1.8 | 36.3 / 26.0 | 0.0285 | 1.13 | 1.54 | 15.5 | 18.1 | 23.3 |
| 2.0 | 32.1 / 24.2 | 0.0316 | 1.24 | 1.70 | 13.4 | 15.7 | 21.2 |
| 2.2 | 28.9 / 22.5 | 0.0347 | 1.35 | 1.86 | 11.9 | 13.8 | 19.3 |
| 2.4 | 26.3 / 21.1 | 0.0378 | 1.45 | 2.01 | 10.6 | 12.2 | 17.6 |
| 2.6 | 24.1 / 17.8 | 0.0409 | 1.54 | 2.16 | 9.52 | 10.8 | 16.2 |
| 2.8 | 22.3 / 18.7 | 0.0439 | 1.63 | 2.30 | 8.59 | 9.70 | 14.7 |
| 3.0 | 20.8 / 17.7 | 0.0470 | 1.70 | 2.44 | 7.80 | 8.77 | 13.5 |
| 3.2 | 19.4 / 16.8 | 0.0500 | 1.77 | 2.57 | 7.10 | 7.93 | 12.4 |
| 3.4 | 18.3 / 16.0 | 0.0530 | 1.82 | 2.69 | 6.48 | 7.24 | 11.4 |
| 3.6 | 17.3 / 15.3 | 0.0560 | 1.86 | 2.80 | 5.96 | 6.63 | 10.6 |
| 3.8 | 16.4 / 14.7 | 0.0589 | 1.89 | 2.90 | 5.49 | 6.10 | 9.81 |
| 4.0 | 15.7 / 14.1 | 0.0619 | 1.90 | 2.99 | 5.08 | 5.62 | 9.13 |
| 5 | 12.6 / 11.7 | 0.0760 | 1.80 | 3.27 | 3.60 | 3.90 | 6.57 |
| 6 | 10.4 / 9.85 | 0.0894 | 1.57 | 3.25 | 2.69 | 2.82 | 4.95 |
| 7 | 8.55 / 8.23 | 0.102 | 1.25 | 3.01 | 2.06 | 2.12 | 3.87 |
| 8 | 7.07 / 6.89 | 0.113 | 1.03 | 2.63 | 1.62 | 1.67 | 3.12 |
| 9 | 5.88 / 5.78 | 0.123 | 0.876 | 2.21 | 1.31 | 1.35 | 2.57 |
| 10 | 4.96 / 4.93 | 0.131 | 0.756 | 1.88 | 1.08 | 1.11 | 2.16 |
| 12 | 3.75 / 3.77 | 0.143 | 0.573 | 1.46 | 0.775 | 0.801 | 1.59 |
| 14 | 2.96 / 3.00 | 0.147 | 0.453 | 1.17 | 0.587 | 0.599 | 1.23 |
| 16 | 2.57 / 2.53 | 0.145 | 0.366 | 1.06 | 0.497 | 0.504 | 0.955 |
| 18 | 1.98 / 2.03 | 0.137 | 0.303 | 0.800 | 0.367 | 0.372 | 0.792 |
| 20 | 1.68 / 1.70 | 0.125 | 0.257 | 0.680 | 0.301 | 0.316 | 0.640 |

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

| Q/Rs | ----> | 8.467 | 2.083 | 0.5729 | 2.050 | 0.4647 |
|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 2p(6) | 3p(3) |
| 0.2 | 6.65 | 0.00271 | 0.101 | 2.31 | 0.125 | 4.12 |
| 0.4 | 13.5 | 0.00545 | 0.202 | 4.68 | 0.249 | 8.39 |
| 0.6 | 20.7 | 0.00817 | 0.302 | 7.16 | 0.375 | 12.9 |
| 0.8 | 28.0 | 0.0109 | 0.402 | 9.66 | 0.499 | 17.4 |
| 1.0 | 34.5 | 0.0136 | 0.502 | 12.0 | 0.623 | 21.4 |
| 1.2 | 39.3 | 0.0163 | 0.600 | 13.8 | 0.746 | 24.2 |
| 1.4 | 41.2 | 0.0190 | 0.697 | 14.6 | 0.868 | 24.9 |
| 1.6 | 40.2 | 0.0217 | 0.792 | 14.5 | 0.988 | 23.9 |
| 1.8 | 37.6 | 0.0244 | 0.886 | 13.6 | 1.11 | 21.9 |
| 2.0 | 34.1 | 0.0271 | 0.976 | 12.4 | 1.22 | 19.5 |
| 2.2 | 30.8 | 0.0298 | 1.06 | 11.2 | 1.34 | 17.1 |
| 2.4 | 28.0 | 0.0325 | 1.15 | 10.1 | 1.45 | 15.4 |
| 2.6 | 25.7 | 0.0351 | 1.23 | 9.04 | 1.56 | 13.8 |
| 2.8 | 23.7 | 0.0377 | 1.30 | 8.18 | 1.67 | 12.5 |
| 3.0 | 21.9 | 0.0403 | 1.36 | 7.43 | 1.77 | 11.3 |
| 3.2 | 20.5 | 0.0430 | 1.42 | 6.81 | 1.87 | 10.3 |
| 3.4 | 19.2 | 0.0455 | 1.48 | 6.24 | 1.96 | 9.47 |
| 3.6 | 18.1 | 0.0481 | 1.52 | 5.73 | 2.05 | 8.71 |
| 3.8 | 17.1 | 0.0506 | 1.56 | 5.28 | 2.13 | 8.05 |
| 4.0 | 16.2 | 0.0532 | 1.58 | 4.91 | 2.21 | 7.45 |
| 5 | 12.9 | 0.0655 | 1.58 | 3.49 | 2.50 | 5.27 |
| 6 | 10.7 | 0.0771 | 1.42 | 2.62 | 2.61 | 3.96 |
| 7 | 8.95 | 0.0879 | 1.20 | 2.04 | 2.55 | 3.07 |
| 8 | 7.46 | 0.0978 | 0.975 | 1.61 | 2.36 | 2.42 |
| 9 | 6.26 | 0.107 | 0.831 | 1.31 | 2.07 | 1.94 |
| 10 | 5.29 | 0.114 | 0.714 | 1.08 | 1.78 | 1.61 |
| 12 | 3.94 | 0.126 | 0.546 | 0.768 | 1.35 | 1.15 |
| 14 | 3.11 | 0.132 | 0.433 | 0.579 | 1.09 | 0.875 |
| 16 | 2.52 | 0.132 | 0.353 | 0.455 | 0.899 | 0.679 |
| 18 | 2.90 | 0.127 | 0.292 | 0.373 | 0.751 | 0.550 |
| 20 | 1.76 | 0.118 | 0.246 | 0.301 | 0.639 | 0.453 |

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

| Q/Rs | ----> | 9.065 | 2.263 | 0.6495 | 2.246 | 0.5167 |
|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 2p(6) | 3p(4) |
| 0.2 | 5.31 | 0.00227 | 0.0818 | 1.72 | 0.0990 | 3.41 |
| 0.4 | 10.7 | 0.00455 | 0.164 | 3.47 | 0.198 | 6.90 |
| 0.6 | 16.3 | 0.00682 | 0.246 | 5.27 | 0.297 | 10.5 |
| 0.8 | 21.9 | 0.00909 | 0.327 | 7.09 | 0.396 | 14.1 |
| 1.0 | 27.4 | 0.0114 | 0.408 | 8.85 | 0.494 | 17.6 |
| 1.2 | 32.1 | 0.0136 | 0.488 | 10.4 | 0.592 | 20.6 |
| 1.4 | 35.4 | 0.0159 | 0.567 | 11.4 | 0.688 | 22.7 |
| 1.6 | 36.9 | 0.0181 | 0.645 | 11.9 | 0.784 | 23.6 |
| 1.8 | 36.5 | 0.0204 | 0.721 | 11.7 | 0.878 | 23.2 |
| 2.0 | 34.8 | 0.0227 | 0.795 | 11.0 | 0.972 | 22.0 |
| 2.2 | 32.5 | 0.0249 | 0.867 | 10.2 | 1.06 | 20.3 |
| 2.4 | 29.8 | 0.0271 | 0.937 | 9.25 | 1.15 | 18.5 |
| 2.6 | 27.1 | 0.0293 | 1.00 | 8.27 | 1.24 | 16.5 |
| 2.8 | 25.0 | 0.0315 | 1.07 | 7.54 | 1.33 | 15.0 |
| 3.0 | 23.1 | 0.0337 | 1.12 | 6.88 | 1.41 | 13.7 |
| 3.2 | 21.6 | 0.0359 | 1.18 | 6.29 | 1.49 | 12.6 |
| 3.4 | 20.2 | 0.0381 | 1.23 | 5.78 | 1.57 | 11.6 |
| 3.6 | 19.0 | 0.0402 | 1.27 | 5.34 | 1.65 | 10.7 |
| 3.8 | 17.9 | 0.0424 | 1.31 | 4.93 | 1.72 | 9.86 |
| 4.0 | 16.9 | 0.0445 | 1.34 | 4.59 | 1.78 | 9.17 |
| 5 | 13.3 | 0.0549 | 1.39 | 3.28 | 2.06 | 6.56 |
| 6 | 11.0 | 0.0647 | 1.30 | 2.48 | 2.20 | 4.95 |
| 7 | 9.26 | 0.0740 | 1.14 | 1.94 | 2.22 | 3.88 |
| 8 | 7.83 | 0.0826 | 0.940 | 1.56 | 2.12 | 3.12 |
| 9 | 6.63 | 0.0904 | 0.788 | 1.27 | 1.94 | 2.54 |
| 10 | 5.62 | 0.0973 | 0.679 | 1.05 | 1.70 | 2.10 |
| 12 | 4.18 | 0.108 | 0.525 | 0.755 | 1.29 | 1.51 |
| 14 | 3.23 | 0.115 | 0.375 | 0.569 | 1.04 | 1.14 |
| 16 | 2.65 | 0.117 | 0.339 | 0.446 | 0.853 | 0.891 |
| 18 | 2.20 | 0.115 | 0.283 | 0.359 | 0.720 | 0.718 |
| 20 | 1.85 | 0.109 | 0.239 | 0.297 | 0.614 | 0.592 |

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

| Q/Rs | ----> | 9.665 | 2.443 | 0.7195 | 2.440 | 0.5761 |
|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 2p(6) | 3p(5) |
| 0.2 | 4.18 | 0.00193 | 0.0676 | 1.33 | 0.0804 | 2.71 |
| 0.4 | 8.55 | 0.00386 | 0.134 | 2.71 | 0.160 | 5.54 |
| 0.6 | 12.9 | 0.00578 | 0.199 | 4.10 | 0.239 | 8.38 |
| 0.8 | 17.3 | 0.00770 | 0.267 | 5.51 | 0.317 | 11.2 |
| 1.0 | 21.7 | 0.00961 | 0.334 | 6.88 | 0.396 | 14.0 |
| 1.2 | 25.7 | 0.0115 | 0.400 | 8.13 | 0.476 | 16.7 |
| 1.4 | 29.1 | 0.0134 | 0.465 | 9.14 | 0.554 | 18.9 |
| 1.6 | 31.5 | 0.0153 | 0.529 | 9.78 | 0.631 | 20.6 |
| 1.8 | 32.7 | 0.0172 | 0.591 | 9.95 | 0.708 | 21.5 |
| 2.0 | 32.7 | 0.0190 | 0.652 | 9.71 | 0.782 | 21.5 |
| 2.2 | 31.6 | 0.0209 | 0.711 | 9.19 | 0.856 | 20.8 |
| 2.4 | 29.7 | 0.0227 | 0.768 | 8.35 | 0.928 | 19.6 |
| 2.6 | 27.1 | 0.0246 | 0.823 | 7.44 | 0.999 | 17.8 |
| 2.8 | 24.6 | 0.0265 | 0.875 | 6.67 | 1.07 | 16.0 |
| 3.0 | 22.6 | 0.0283 | 0.923 | 6.13 | 1.14 | 14.4 |
| 3.2 | 21.2 | 0.0302 | 0.969 | 5.66 | 1.20 | 13.3 |
| 3.4 | 19.8 | 0.0320 | 1.01 | 5.22 | 1.26 | 12.3 |
| 3.6 | 18.7 | 0.0338 | 1.05 | 4.84 | 1.32 | 11.5 |
| 3.8 | 17.7 | 0.0356 | 1.08 | 4.50 | 1.38 | 10.7 |
| 4.0 | 16.7 | 0.0374 | 1.11 | 4.18 | 1.44 | 9.97 |
| 5 | 13.2 | 0.0461 | 1.17 | 3.03 | 1.66 | 7.26 |
| 6 | 10.8 | 0.0543 | 1.08 | 2.30 | 1.79 | 5.54 |
| 7 | 8.98 | 0.0619 | 0.923 | 1.81 | 1.80 | 4.38 |
| 8 | 7.58 | 0.0689 | 0.772 | 1.47 | 1.71 | 3.55 |
| 9 | 6.44 | 0.0752 | 0.649 | 1.21 | 1.55 | 2.95 |
| 10 | 5.51 | 0.0808 | 0.565 | 1.01 | 1.38 | 2.48 |
| 12 | 4.12 | 0.0895 | 0.442 | 0.726 | 1.08 | 1.79 |
| 14 | 3.22 | 0.0947 | 0.357 | 0.548 | 0.864 | 1.35 |
| 16 | 2.60 | 0.0964 | 0.294 | 0.430 | 0.723 | 1.06 |
| 18 | 2.16 | 0.0949 | 0.246 | 0.346 | 0.617 | 0.854 |
| 20 | 1.82 | 0.0909 | 0.210 | 0.286 | 0.530 | 0.704 |

A r ( Z=18 )  1s(2)2s(2)3s(2)2p(6)3p(6)

| Q/Rs | ----> | 10.37 | 2.610 | 0.7869 | 2.635 | 0.6231 |
|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 2p(6) | 3p(6) |
| 0.2 | 3.59 | 0.00158 | 0.0571 | 1.09 | 0.0658 | 2.37 |
| 0.4 | 7.21 | 0.00318 | 0.114 | 2.19 | 0.132 | 4.77 |
| 0.6 | 10.9 | 0.00477 | 0.171 | 3.31 | 0.197 | 7.18 |
| 0.8 | 14.5 | 0.00636 | 0.228 | 4.43 | 0.263 | 9.61 |
| 1.0 | 18.2 | 0.00794 | 0.285 | 5.54 | 0.329 | 12.0 |
| 1.2 | 21.6 | 0.00952 | 0.341 | 6.58 | 0.394 | 14.3 |
| 1.4 | 24.8 | 0.0111 | 0.396 | 7.48 | 0.458 | 16.4 |
| 1.6 | 27.3 | 0.0127 | 0.451 | 8.14 | 0.522 | 18.2 |
| 1.8 | 29.2 | 0.0143 | 0.505 | 8.50 | 0.586 | 19.5 |
| 2.0 | 30.1 | 0.0159 | 0.557 | 8.54 | 0.648 | 20.3 |
| 2.2 | 30.1 | 0.0174 | 0.609 | 8.31 | 0.710 | 20.5 |
| 2.4 | 29.4 | 0.0190 | 0.659 | 7.89 | 0.771 | 20.1 |
| 2.6 | 28.3 | 0.0206 | 0.708 | 7.39 | 0.831 | 19.4 |
| 2.8 | 27.0 | 0.0221 | 0.754 | 6.93 | 0.890 | 18.4 |
| 3.0 | 25.4 | 0.0237 | 0.799 | 6.26 | 0.948 | 17.4 |
| 3.2 | 23.7 | 0.0252 | 0.841 | 5.76 | 1.00 | 16.0 |
| 3.4 | 22.2 | 0.0267 | 0.880 | 5.31 | 1.06 | 14.9 |
| 3.6 | 20.8 | 0.0282 | 0.917 | 4.92 | 1.11 | 13.8 |
| 3.8 | 19.5 | 0.0298 | 0.950 | 4.57 | 1.16 | 12.8 |
| 4.0 | 18.5 | 0.0313 | 0.980 | 4.25 | 1.21 | 12.0 |
| 5 | 14.4 | 0.0386 | 1.07 | 3.08 | 1.43 | 8.79 |
| 6 | 11.8 | 0.0457 | 1.07 | 2.34 | 1.59 | 6.72 |
| 7 | 9.84 | 0.0525 | 0.996 | 1.84 | 1.67 | 5.29 |
| 8 | 8.37 | 0.0589 | 0.874 | 1.49 | 1.67 | 4.27 |
| 9 | 7.20 | 0.0648 | 0.736 | 1.23 | 1.62 | 3.56 |
| 10 | 6.26 | 0.0702 | 0.626 | 1.03 | 1.50 | 3.03 |
| 12 | 4.74 | 0.0794 | 0.485 | 0.746 | 1.20 | 2.24 |
| 14 | 3.66 | 0.0862 | 0.388 | 0.565 | 0.945 | 1.68 |
| 16 | 2.94 | 0.0902 | 0.318 | 0.441 | 0.781 | 1.31 |
| 18 | 2.42 | 0.0916 | 0.266 | 0.354 | 0.663 | 1.05 |
| 20 | 2.06 | 0.0903 | 0.226 | 0.292 | 0.568 | 0.886 |

K ( Z=19 )  1s(2)2s(2)3s(2)2p(6)3p(6)  [ 4s(1)/free(1) ]

| Q/Rs | ----> | 10.75 | 2.813 | 0.8905 | 2.868 | 0.7610 | 0.2185 | 4.964 |
|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 2p(6) | 3p(6) | 4s(1) | free(1) |
| 0.2 | 21.2 / 8.59 | 0.00144 | 0.0472 | 0.809 | 0.0529 | 1.47 | 18.8 | 6.21 |
| 0.4 | 49.8 / 19.1 | 0.00289 | 0.0944 | 1.63 | 0.106 | 2.94 | 45.1 | 14.3 |
| 0.6 | 59.4 / 33.6 | 0.00434 | 0.142 | 2.45 | 0.159 | 4.41 | 52.2 | 26.4 |
| 0.8 | 48.5 / 33.0 | 0.00589 | 0.189 | 3.27 | 0.212 | 5.89 | 38.9 | 23.4 |
| 1.0 | 41.5 / 31.0 | 0.00723 | 0.234 | 4.09 | 0.264 | 7.35 | 29.6 | 19.0 |
| 1.2 | 37.3 / 30.0 | 0.00867 | 0.282 | 4.89 | 0.317 | 8.78 | 23.0 | 15.7 |
| 1.4 | 35.0 / 29.7 | 0.0101 | 0.328 | 5.60 | 0.369 | 10.2 | 18.5 | 13.2 |
| 1.6 | 33.6 / 29.7 | 0.0116 | 0.373 | 6.20 | 0.420 | 11.4 | 15.1 | 11.3 |
| 1.8 | 32.7 / 29.7 | 0.0130 | 0.418 | 6.64 | 0.472 | 12.5 | 12.7 | 9.74 |
| 2.0 | 32.1 / 29.7 | 0.0144 | 0.462 | 6.89 | 0.522 | 13.4 | 10.8 | 8.51 |
| 2.2 | 31.4 / 29.6 | 0.0159 | 0.505 | 6.92 | 0.572 | 14.1 | 9.25 | 7.51 |
| 2.4 | 30.4 / 29.2 | 0.0173 | 0.547 | 6.79 | 0.622 | 14.5 | 7.95 | 6.68 |
| 2.6 | 29.3 / 28.3 | 0.0187 | 0.588 | 6.52 | 0.671 | 14.6 | 6.92 | 5.97 |
| 2.8 | 27.9 / 27.3 | 0.0201 | 0.628 | 6.18 | 0.719 | 14.4 | 6.01 | 5.37 |
| 3.0 | 26.6 / 26.1 | 0.0215 | 0.666 | 5.84 | 0.766 | 14.0 | 5.32 | 4.86 |
| 3.2 | 25.1 / 24.8 | 0.0229 | 0.702 | 5.37 | 0.812 | 13.5 | 4.71 | 4.41 |
| 3.4 | 23.7 / 23.5 | 0.0243 | 0.736 | 4.94 | 0.857 | 12.9 | 4.26 | 4.04 |
| 3.6 | 22.3 / 22.1 | 0.0257 | 0.769 | 4.57 | 0.901 | 12.2 | 3.86 | 3.69 |
| 3.8 | 21.2 / 21.1 | 0.0271 | 0.799 | 4.14 | 0.944 | 11.8 | 3.48 | 3.39 |
| 4.0 | 19.8 / 19.8 | 0.0285 | 0.827 | 3.99 | 0.986 | 10.9 | 3.15 | 3.14 |
| 5 | 14.8 / 14.8 | 0.0352 | 0.925 | 2.91 | 1.17 | 7.61 | 2.13 | 2.18 |
| 6 | 11.6 / 11.7 | 0.0417 | 0.950 | 2.23 | 1.32 | 5.58 | 1.50 | 1.61 |
| 7 | 10.1 / 10.2 | 0.0479 | 0.909 | 1.76 | 1.41 | 4.88 | 1.13 | 1.24 |
| 8 | 8.62 / 8.70 | 0.0538 | 0.826 | 1.42 | 1.44 | 3.98 | 0.892 | 0.984 |
| 9 | 7.41 / 8.31 | 0.0593 | 0.710 | 1.18 | 1.43 | 3.32 | 0.715 | 0.805 |
| 10 | 6.46 / 6.39 | 0.0644 | 0.605 | 0.999 | 1.37 | 2.81 | 0.612 | 0.681 |
| 12 | 4.93 / 5.00 | 0.0731 | 0.465 | 0.733 | 1.14 | 2.10 | 0.420 | 0.488 |
| 14 | 3.86 / 3.91 | 0.0796 | 0.373 | 0.552 | 0.913 | 1.63 | 0.318 | 0.353 |
| 16 | 3.09 / 3.12 | 0.0839 | 0.306 | 0.433 | 0.739 | 1.28 | 0.251 | 0.277 |
| 18 | 2.56 / 2.58 | 0.0857 | 0.258 | 0.350 | 0.633 | 1.03 | 0.200 | 0.218 |
| 20 | 2.15 / 2.17 | 0.0852 | 0.219 | 0.288 | 0.543 | 0.852 | 0.164 | 0.183 |

Ca ( Z=20 )  1s(2)2s(2)3s(2)2p(6)3p(6)  [4s(2)/free(2) ]

| θ/Rs | ----> | 11.35 | 2.997 | 0.9972 | 0.2707 | 3.071 | 0.8695 | 3.273 |
|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 2p(6) | 3p(6) | free(2) |
| 0.2 | 15.0 / 6.69 | 0.00125 | 0.0402 | 0.616 | 13.2 | 0.0444 | 1.06 | 4.93 |
| 0.4 | 32.5 / 14.0 | 0.00250 | 0.0803 | 1.24 | 29.0 | 0.0887 | 2.12 | 10.5 |
| 0.6 | 50.7 / 22.0 | 0.00376 | 0.121 | 1.86 | 45.4 | 0.133 | 3.19 | 16.7 |
| 0.8 | 58.6 / 31.2 | 0.00501 | 0.161 | 2.48 | 51.5 | 0.177 | 4.25 | 24.1 |
| 1.0 | 54.8 / 36.4 | 0.00625 | 0.201 | 3.10 | 46.0 | 0.222 | 5.30 | 27.6 |
| 1.2 | 47.3 / 34.7 | 0.00750 | 0.240 | 3.70 | 36.8 | 0.266 | 6.33 | 24.2 |
| 1.4 | 42.4 / 33.2 | 0.00874 | 0.280 | 4.27 | 30.2 | 0.309 | 7.33 | 21.0 |
| 1.6 | 39.0 / 32.0 | 0.00999 | 0.318 | 4.77 | 25.3 | 0.353 | 8.28 | 18.3 |
| 1.8 | 36.5 / 31.2 | 0.0112 | 0.357 | 5.19 | 21.4 | 0.396 | 9.16 | 16.1 |
| 2.0 | 34.6 / 30.5 | 0.0125 | 0.394 | 5.50 | 18.3 | 0.438 | 9.94 | 14.2 |
| 2.2 | 33.1 / 29.8 | 0.0137 | 0.431 | 5.67 | 15.9 | 0.481 | 10.6 | 12.6 |
| 2.4 | 31.8 / 29.1 | 0.0150 | 0.467 | 5.71 | 14.0 | 0.522 | 11.1 | 11.3 |
| 2.6 | 30.5 / 28.3 | 0.0162 | 0.503 | 5.63 | 12.4 | 0.563 | 11.4 | 10.2 |
| 2.8 | 29.2 / 27.4 | 0.0174 | 0.537 | 5.46 | 11.0 | 0.604 | 11.6 | 9.21 |
| 3.0 | 27.9 / 26.4 | 0.0186 | 0.570 | 5.22 | 9.92 | 0.644 | 11.6 | 8.38 |
| 3.2 | 26.6 / 25.3 | 0.0199 | 0.602 | 4.96 | 8.94 | 0.683 | 11.4 | 7.64 |
| 3.4 | 25.2 / 24.1 | 0.0211 | 0.632 | 4.64 | 8.09 | 0.722 | 11.1 | 7.00 |
| 3.6 | 24.0 / 23.1 | 0.0223 | 0.661 | 4.45 | 7.35 | 0.760 | 10.7 | 6.44 |
| 3.8 | 22.6 / 21.9 | 0.0235 | 0.689 | 4.09 | 6.67 | 0.796 | 10.3 | 5.95 |
| 4.0 | 21.3 / 20.7 | 0.0247 | 0.714 | 3.82 | 6.07 | 0.832 | 9.84 | 5.49 |
| 5 | 16.4 / 16.2 | 0.0305 | 0.811 | 2.81 | 4.05 | 0.996 | 7.68 | 3.87 |
| 6 | 13.1 / 13.1 | 0.0362 | 0.850 | 2.15 | 2.93 | 1.13 | 5.96 | 2.89 |
| 7 | 10.8 / 10.9 | 0.0416 | 0.833 | 1.71 | 2.19 | 1.22 | 4.77 | 2.25 |
| 8 | 9.11 / 9.17 | 0.0468 | 0.775 | 1.39 | 1.73 | 1.27 | 3.91 | 1.79 |
| 9 | 7.82 / 7.87 | 0.0517 | 0.685 | 1.15 | 1.41 | 1.28 | 3.25 | 1.46 |
| 10 | 6.77 / 6.85 | 0.0562 | 0.588 | 0.974 | 1.15 | 1.25 | 2.76 | 1.23 |
| 12 | 5.19 / 5.27 | 0.0641 | 0.447 | 0.725 | 0.808 | 1.09 | 2.06 | 0.883 |
| 14 | 4.09 / 4.15 | 0.0704 | 0.360 | 0.554 | 0.620 | 0.885 | 1.60 | 0.676 |
| 16 | 3.29 / 3.35 | 0.0747 | 0.298 | 0.434 | 0.477 | 0.721 | 1.29 | 0.537 |
| 18 | 2.72 / 2.75 | 0.0771 | 0.250 | 0.352 | 0.401 | 0.606 | 1.04 | 0.432 |
| 20 | 2.29 / 2.33 | 0.0776 | 0.213 | 0.290 | 0.324 | 0.527 | 0.856 | 0.360 |

Sc ( Z=21 ) 1s(2)2s(2)3s(2)2p(6)3p(6) [3d(1)4s(2)/free(3)]

| Q/Rs | ----> | 11.96 | 3.181 | 1.071 | 0.2859 | 3.273 | 0.9463 | 0.6286 | 2.370 |
|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 2p(6) | 3p(6) | 3d(1) | free(3) |
| 0.2 | 14.7 / 5.11 | 0.00108 | 0.0346 | 0.518 | 11.6 | 0.0376 | 0.866 | 1.59 | 3.60 |
| 0.4 | 31.4 / 10.3 | 0.00218 | 0.0690 | 1.04 | 25.3 | 0.0753 | 1.73 | 3.26 | 7.41 |
| 0.6 | 49.2 / 15.8 | 0.00327 | 0.104 | 1.56 | 39.8 | 0.113 | 2.59 | 5.02 | 11.4 |
| 0.8 | 59.7 / 21.5 | 0.00436 | 0.138 | 2.08 | 47.1 | 0.150 | 3.45 | 6.78 | 15.7 |
| 1.0 | 58.6 / 27.4 | 0.00544 | 0.173 | 2.60 | 43.0 | 0.188 | 4.30 | 8.29 | 20.1 |
| 1.2 | 53.0 / 36.6 | 0.00652 | 0.207 | 3.11 | 35.1 | 0.225 | 5.14 | 9.15 | 27.8 |
| 1.4 | 48.2 / 37.1 | 0.00760 | 0.240 | 3.59 | 29.0 | 0.262 | 5.96 | 9.17 | 27.1 |
| 1.6 | 44.2 / 35.8 | 0.00869 | 0.274 | 4.03 | 24.3 | 0.299 | 6.74 | 8.56 | 24.5 |
| 1.8 | 41.0 / 34.3 | 0.00977 | 0.307 | 4.42 | 20.7 | 0.336 | 7.48 | 7.77 | 21.8 |
| 2.0 | 38.1 / 33.0 | 0.0109 | 0.339 | 4.72 | 17.8 | 0.372 | 8.16 | 6.72 | 19.4 |
| 2.2 | 35.9 / 31.8 | 0.0119 | 0.371 | 4.94 | 15.4 | 0.408 | 8.75 | 5.97 | 17.2 |
| 2.4 | 34.0 / 30.5 | 0.0130 | 0.402 | 5.04 | 13.6 | 0.444 | 9.24 | 5.31 | 15.4 |
| 2.6 | 32.4 / 29.5 | 0.0141 | 0.433 | 5.05 | 12.0 | 0.479 | 9.62 | 4.77 | 13.9 |
| 2.8 | 30.9 / 28.4 | 0.0152 | 0.463 | 4.97 | 10.7 | 0.514 | 9.87 | 4.30 | 12.5 |
| 3.0 | 29.4 / 27.2 | 0.0162 | 0.492 | 4.81 | 9.65 | 0.548 | 10.0 | 3.91 | 11.4 |
| 3.2 | 28.0 / 26.0 | 0.0173 | 0.520 | 4.61 | 8.71 | 0.581 | 10.0 | 3.56 | 10.3 |
| 3.4 | 26.6 / 24.9 | 0.0183 | 0.547 | 4.40 | 7.91 | 0.615 | 9.88 | 3.26 | 9.47 |
| 3.6 | 25.2 / 23.7 | 0.0194 | 0.573 | 4.14 | 7.20 | 0.647 | 9.68 | 2.99 | 8.71 |
| 3.8 | 24.0 / 22.7 | 0.0204 | 0.598 | 3.95 | 6.57 | 0.679 | 9.40 | 2.75 | 8.02 |
| 4.0 | 22.6 / 21.5 | 0.0215 | 0.621 | 3.66 | 6.00 | 0.710 | 9.08 | 2.55 | 7.43 |
| 5 | 17.4 / 16.8 | 0.0266 | 0.713 | 2.69 | 4.01 | 0.854 | 7.35 | 1.81 | 5.26 |
| 6 | 13.7 / 13.4 | 0.0136 | 0.760 | 2.07 | 2.89 | 0.973 | 5.66 | 1.35 | 3.95 |
| 7 | 11.3 / 11.2 | 0.0364 | 0.761 | 1.65 | 2.18 | 1.06 | 4.54 | 1.03 | 3.06 |
| 8 | 9.48 / 9.42 | 0.0409 | 0.723 | 1.34 | 1.70 | 1.12 | 3.74 | 0.811 | 2.45 |
| 9 | 8.11 / 8.11 | 0.0453 | 0.656 | 1.12 | 1.37 | 1.14 | 3.12 | 0.655 | 2.02 |
| 10 | 7.03 / 7.06 | 0.0493 | 0.571 | 0.948 | 1.13 | 1.13 | 2.66 | 0.541 | 1.70 |
| 12 | 5.42 / 5.46 | 0.0565 | 0.431 | 0.705 | 0.825 | 1.02 | 1.99 | 0.389 | 1.25 |
| 14 | 4.27 / 4.31 | 0.0624 | 0.350 | 0.545 | 0.608 | 0.854 | 1.56 | 0.294 | 0.943 |
| 16 | 3.44 / 3.49 | 0.0667 | 0.288 | 0.429 | 0.479 | 0.702 | 1.25 | 0.229 | 0.758 |
| 18 | 2.83 / 2.86 | 0.0694 | 0.243 | 0.345 | 0.381 | 0.586 | 1.02 | 0.184 | 0.599 |
| 20 | 2.38 / 2.42 | 0.0705 | 0.207 | 0.285 | 0.316 | 0.505 | 0.844 | 0.151 | 0.505 |

Ti ( Z=22 ) 1s(2)2s(2)3s(2)2p(6)3p(6)3d(2) [ 4s(2)/free(2) ]

| θ/Rs | ----> | 12.54 | 3.364 | 1.140 | 0.2973 | 3.473 | 1.010 | 0.7176 | 2.405 |
|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 2p(6) | 3p(6) | 3d(2) | free(2) |
| 0.2 | 13.2 / 5.08 | 9.54(-4) | 0.0300 | 0.445 | 10.6 | 0.0323 | 0.732 | 1.36 | 2.48 |
| 0.4 | 28.1 / 10.3 | 0.00192 | 0.0598 | 0.893 | 22.9 | 0.0645 | 1.47 | 2.73 | 5.11 |
| 0.6 | 44.1 / 15.8 | 0.00288 | 0.0899 | 1.34 | 36.2 | 0.0966 | 2.20 | 4.14 | 7.89 |
| 0.8 | 54.5 / 21.3 | 0.00384 | 0.120 | 1.79 | 44.0 | 0.129 | 2.94 | 5.56 | 10.8 |
| 1.0 | 54.6 / 27.0 | 0.00480 | 0.150 | 2.23 | 41.5 | 0.161 | 3.66 | 6.94 | 13.9 |
| 1.2 | 49.7 / 33.3 | 0.00575 | 0.179 | 2.67 | 34.0 | 0.193 | 4.38 | 8.20 | 17.6 |
| 1.4 | 46.0 / 34.3 | 0.00671 | 0.208 | 3.08 | 28.2 | 0.225 | 5.08 | 9.21 | 16.5 |
| 1.6 | 43.3 / 34.4 | 0.00766 | 0.237 | 3.47 | 23.8 | 0.257 | 5.75 | 9.84 | 14.9 |
| 1.8 | 41.0 / 34.2 | 0.00862 | 0.266 | 3.82 | 20.2 | 0.288 | 6.39 | 10.0 | 13.4 |
| 2.0 | 38.9 / 33.5 | 0.00957 | 0.294 | 4.12 | 17.4 | 0.319 | 6.99 | 9.77 | 12.0 |
| 2.2 | 37.0 / 32.6 | 0.0105 | 0.322 | 4.34 | 15.2 | 0.350 | 7.53 | 9.27 | 10.8 |
| 2.4 | 35.2 / 31.6 | 0.0115 | 0.350 | 4.48 | 13.4 | 0.381 | 7.99 | 8.67 | 9.75 |
| 2.6 | 33.6 / 30.6 | 0.0124 | 0.377 | 4.54 | 11.8 | 0.411 | 8.38 | 8.04 | 8.84 |
| 2.8 | 31.9 / 29.4 | 0.0134 | 0.403 | 4.52 | 10.6 | 0.441 | 8.66 | 7.30 | 8.05 |
| 3.0 | 30.4 / 28.3 | 0.0143 | 0.428 | 4.44 | 9.48 | 0.471 | 8.85 | 6.68 | 7.35 |
| 3.2 | 29.0 / 27.1 | 0.0152 | 0.453 | 4.30 | 8.60 | 0.500 | 8.94 | 6.14 | 6.74 |
| 3.4 | 27.5 / 25.9 | 0.0162 | 0.477 | 4.13 | 7.80 | 0.529 | 8.93 | 5.64 | 6.20 |
| 3.6 | 26.2 / 24.8 | 0.0171 | 0.500 | 3.94 | 7.12 | 0.557 | 8.84 | 5.21 | 5.72 |
| 3.8 | 24.9 / 23.7 | 0.0180 | 0.522 | 3.75 | 6.51 | 0.585 | 8.67 | 4.84 | 5.29 |
| 4.0 | 23.6 / 22.6 | 0.0190 | 0.543 | 3.55 | 5.96 | 0.612 | 8.44 | 4.49 | 4.91 |
| 5 | 18.2 / 17.7 | 0.0235 | 0.630 | 2.60 | 3.99 | 0.739 | 7.00 | 3.23 | 3.51 |
| 6 | 14.3 / 14.1 | 0.0279 | 0.681 | 2.00 | 2.86 | 0.847 | 5.45 | 2.44 | 2.64 |
| 7 | 11.7 / 11.6 | 0.0322 | 0.694 | 1.60 | 2.16 | 0.932 | 4.39 | 1.91 | 2.05 |
| 8 | 9.86 / 9.80 | 0.0363 | 0.672 | 1.31 | 1.70 | 0.991 | 3.60 | 1.55 | 1.64 |
| 9 | 8.45 / 8.45 | 0.0401 | 0.623 | 1.09 | 1.38 | 1.02 | 3.03 | 1.27 | 1.35 |
| 10 | 7.31 / 7.32 | 0.0438 | 0.553 | 0.922 | 1.13 | 1.03 | 2.58 | 1.06 | 1.14 |
| 12 | 5.62 / 5.65 | 0.0504 | 0.422 | 0.690 | 0.804 | 0.959 | 1.94 | 0.759 | 0.834 |
| 14 | 4.45 / 4.47 | 0.0558 | 0.337 | 0.536 | 0.612 | 0.822 | 1.51 | 0.576 | 0.630 |
| 16 | 3.59 / 3.62 | 0.0600 | 0.278 | 0.424 | 0.481 | 0.683 | 1.22 | 0.445 | 0.508 |
| 18 | 2.96 / 2.99 | 0.0629 | 0.236 | 0.341 | 0.383 | 0.570 | 1.00 | 0.363 | 0.412 |
| 20 | 2.49 / 2.51 | 0.0644 | 0.201 | 0.282 | 0.315 | 0.490 | 0.831 | 0.302 | 0.337 |

V ( Z=23 )  1s(2)2s(2)3s(2)2p(6)3p(6)3d(3) [ 4s(2)/free(2) ]

| Q/Rs | ----> | 13.15 | 3.546 | 1.207 | 0.3078 | 3.673 | 1.075 | 0.7885 | 2.238 |
|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 2p(6) | 3p(6) | 3d(3) | free(2) |
| 0.2 | 12.0 / 4.32 | 0.000840 | 0.0262 | 0.387 | 9.79 | 0.0279 | 0.627 | 1.18 | 2.11 |
| 0.4 | 25.5 / 8.83 | 0.00169 | 0.0523 | 0.777 | 21.0 | 0.0558 | 1.26 | 2.36 | 4.33 |
| 0.6 | 40.0 / 13.5 | 0.00254 | 0.0786 | 1.17 | 33.2 | 0.0836 | 1.89 | 3.55 | 6.65 |
| 0.8 | 50.2 / 18.1 | 0.00338 | 0.105 | 1.55 | 41.2 | 0.112 | 2.52 | 4.75 | 9.06 |
| 1.0 | 51.1 / 22.9 | 0.00423 | 0.131 | 1.94 | 39.8 | 0.139 | 3.14 | 5.94 | 11.6 |
| 1.2 | 47.1 / 28.8 | 0.00507 | 0.157 | 2.32 | 33.6 | 0.167 | 3.75 | 7.08 | 15.3 |
| 1.4 | 43.6 / 30.9 | 0.00591 | 0.182 | 2.68 | 28.0 | 0.195 | 4.35 | 8.13 | 15.3 |
| 1.6 | 40.9 / 31.4 | 0.00675 | 0.208 | 3.03 | 23.5 | 0.222 | 4.93 | 9.02 | 14.0 |
| 1.8 | 39.2 / 31.7 | 0.00759 | 0.233 | 3.34 | 20.2 | 0.249 | 5.49 | 9.68 | 12.7 |
| 2.0 | 37.6 / 31.8 | 0.00843 | 0.258 | 3.62 | 17.3 | 0.277 | 6.02 | 10.1 | 11.5 |
| 2.2 | 36.1 / 31.5 | 0.00927 | 0.282 | 3.84 | 15.0 | 0.303 | 6.50 | 10.2 | 10.4 |
| 2.4 | 34.9 / 30.9 | 0.0101 | 0.306 | 4.00 | 13.3 | 0.330 | 6.93 | 9.99 | 9.38 |
| 2.6 | 33.4 / 30.2 | 0.0110 | 0.330 | 4.09 | 11.7 | 0.356 | 7.30 | 9.63 | 8.52 |
| 2.8 | 32.1 / 29.4 | 0.0118 | 0.353 | 4.12 | 10.5 | 0.382 | 7.60 | 9.15 | 7.77 |
| 3.0 | 30.8 / 28.4 | 0.0126 | 0.376 | 4.09 | 9.49 | 0.408 | 7.83 | 8.64 | 7.11 |
| 3.2 | 29.3 / 27.3 | 0.0134 | 0.398 | 4.00 | 8.54 | 0.434 | 7.97 | 7.99 | 6.53 |
| 3.4 | 28.1 / 26.3 | 0.0143 | 0.419 | 3.88 | 7.81 | 0.459 | 8.03 | 7.52 | 6.01 |
| 3.6 | 26.7 / 25.2 | 0.0151 | 0.440 | 3.73 | 7.08 | 0.483 | 8.02 | 6.90 | 5.55 |
| 3.8 | 25.4 / 24.0 | 0.0159 | 0.460 | 3.55 | 6.54 | 0.508 | 7.94 | 6.41 | 5.14 |
| 4.0 | 22.9 / 23.0 | 0.0167 | 0.479 | 3.41 | 4.71 | 0.531 | 7.80 | 5.97 | 4.77 |
| 5 | 18.7 / 18.1 | 0.0207 | 0.560 | 2.53 | 3.98 | 0.644 | 6.58 | 4.37 | 3.42 |
| 6 | 14.8 / 14.5 | 0.0247 | 0.612 | 1.96 | 2.90 | 0.741 | 5.21 | 3.34 | 2.57 |
| 7 | 12.0 / 11.9 | 0.0284 | 0.632 | 1.56 | 2.15 | 0.820 | 4.22 | 2.62 | 2.01 |
| 8 | 10.1 / 10.0 | 0.0321 | 0.622 | 1.28 | 1.69 | 0.879 | 3.49 | 2.13 | 1.61 |
| 9 | 8.67 / 8.63 | 0.0356 | 0.588 | 1.07 | 1.37 | 0.916 | 2.92 | 1.77 | 1.33 |
| 10 | 7.52 / 7.51 | 0.0389 | 0.533 | 0.906 | 1.12 | 0.929 | 2.49 | 1.51 | 1.11 |
| 12 | 5.86 / 5.84 | 0.0448 | 0.413 | 0.678 | 0.833 | 0.893 | 1.89 | 1.11 | 0.816 |
| 14 | 4.62 / 4.63 | 0.0499 | 0.325 | 0.530 | 0.610 | 0.787 | 1.48 | 0.837 | 0.623 |
| 16 | 3.73 / 3.75 | 0.0539 | 0.271 | 0.422 | 0.475 | 0.664 | 1.19 | 0.654 | 0.498 |
| 18 | 3.07 / 3.10 | 0.0569 | 0.230 | 0.342 | 0.380 | 0.557 | 0.981 | 0.524 | 0.409 |
| 20 | 2.59 / 2.61 | 0.0587 | 0.197 | 0.281 | 0.314 | 0.472 | 0.823 | 0.441 | 0.334 |

Cr ( Z=24 )  1s(2)2s(2)3s(2)2p(6)3p(6)3d(4) [4s(2)/free(2) ]

| Q/Rs | ----> | 13.77 | 3.728 | 1.273 | 0.3175 | 3.872 | 1.139 | 0.8529 | 2.127 |
|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 2p(6) | 3p(6) | 3d(4) | free(2) |
| 0.2 | 11.1 / 3.87 | 7.42(-4) | 0.0230 | 0.340 | 9.11 | 0.0243 | 0.544 | 1.03 | 1.88 |
| 0.4 | 23.4 / 7.75 | 0.00149 | 0.0460 | 0.682 | 19.5 | 0.0487 | 1.09 | 2.06 | 3.85 |
| 0.6 | 36.7 / 11.8 | 0.00224 | 0.0691 | 1.02 | 30.8 | 0.0729 | 1.64 | 3.10 | 5.89 |
| 0.8 | 46.6 / 15.9 | 0.00299 | 0.0921 | 1.36 | 38.7 | 0.0972 | 2.18 | 4.13 | 8.01 |
| 1.0 | 48.2 / 20.0 | 0.00374 | 0.115 | 1.70 | 38.4 | 0.122 | 2.72 | 5.16 | 10.2 |
| 1.2 | 45.3 / 24.6 | 0.00448 | 0.138 | 2.03 | 33.5 | 0.146 | 3.25 | 6.17 | 12.8 |
| 1.4 | 41.3 / 28.4 | 0.00522 | 0.160 | 2.36 | 27.7 | 0.170 | 3.77 | 7.12 | 14.8 |
| 1.6 | 38.6 / 28.7 | 0.00596 | 0.183 | 2.66 | 23.3 | 0.194 | 4.28 | 8.00 | 13.4 |
| 1.8 | 36.8 / 29.1 | 0.00670 | 0.205 | 2.95 | 19.9 | 0.218 | 4.77 | 8.77 | 12.2 |
| 2.0 | 35.4 / 29.4 | 0.00745 | 0.227 | 3.20 | 17.1 | 0.241 | 5.23 | 9.38 | 11.1 |
| 2.2 | 34.3 / 29.4 | 0.00819 | 0.249 | 3.41 | 14.9 | 0.265 | 5.67 | 9.81 | 10.0 |
| 2.4 | 33.4 / 29.3 | 0.00894 | 0.270 | 3.58 | 13.2 | 0.288 | 6.06 | 10.0 | 9.11 |
| 2.6 | 32.4 / 29.0 | 0.00968 | 0.291 | 3.69 | 11.7 | 0.311 | 6.41 | 10.0 | 8.29 |
| 2.8 | 31.4 / 28.6 | 0.0104 | 0.311 | 3.75 | 10.4 | 0.334 | 6.71 | 9.88 | 7.57 |
| 3.0 | 30.4 / 28.0 | 0.0112 | 0.331 | 3.76 | 9.38 | 0.356 | 6.94 | 9.59 | 6.94 |
| 3.2 | 29.2 / 27.1 | 0.0119 | 0.351 | 3.71 | 8.47 | 0.379 | 7.12 | 9.19 | 6.37 |
| 3.4 | 28.2 / 26.3 | 0.0126 | 0.370 | 3.63 | 7.74 | 0.401 | 7.23 | 8.77 | 5.87 |
| 3.6 | 26.9 / 25.3 | 0.0133 | 0.389 | 3.52 | 7.05 | 0.423 | 7.27 | 8.25 | 5.43 |
| 3.8 | 25.9 / 24.5 | 0.0141 | 0.407 | 3.39 | 6.48 | 0.444 | 7.25 | 7.88 | 5.03 |
| 4.0 | 24.6 / 23.3 | 0.0148 | 0.424 | 3.23 | 5.94 | 0.465 | 7.18 | 7.30 | 4.68 |
| 5 | 19.3 / 18.7 | 0.0184 | 0.499 | 2.55 | 4.00 | 0.565 | 6.30 | 5.38 | 3.36 |
| 6 | 15.3 / 15.0 | 0.0218 | 0.551 | 1.98 | 2.87 | 0.652 | 5.07 | 4.14 | 2.53 |
| 7 | 12.5 / 12.3 | 0.0252 | 0.576 | 1.58 | 2.18 | 0.726 | 4.08 | 3.29 | 1.98 |
| 8 | 10.5 / 10.4 | 0.0285 | 0.576 | 1.29 | 1.72 | 0.783 | 3.38 | 2.68 | 1.59 |
| 9 | 8.93 / 8.86 | 0.0316 | 0.553 | 1.08 | 1.38 | 0.822 | 2.84 | 2.23 | 1.31 |
| 10 | 7.75 / 7.72 | 0.0345 | 0.511 | 0.914 | 1.13 | 0.842 | 2.42 | 1.89 | 1.10 |
| 12 | 6.01 / 6.00 | 0.0400 | 0.403 | 0.681 | 0.811 | 0.828 | 1.84 | 1.41 | 0.805 |
| 14 | 4.77 / 4.79 | 0.0447 | 0.317 | 0.531 | 0.600 | 0.750 | 1.44 | 1.09 | 0.619 |
| 16 | 3.87 / 3.90 | 0.0485 | 0.265 | 0.425 | 0.469 | 0.644 | 1.17 | 0.857 | 0.494 |
| 18 | 3.21 / 3.22 | 0.0514 | 0.224 | 0.346 | 0.391 | 0.544 | 0.960 | 0.689 | 0.398 |
| 20 | 2.68 / 2.70 | 0.0534 | 0.192 | 0.286 | 0.312 | 0.463 | 0.808 | 0.568 | 0.331 |

Mn ( Z=25 )  1s(2)2s(2)3s(2)2p(6)3p(6)3d(5) [ 4s(2)/free(2) ]

| θ/Rs | ----> | 14.38 | 3.908 | 1.339 | 0.3263 | 4.070 | 1.201 | 0.9177 | 2.139 |
|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 2p(6) | 3p(6) | 3d(5) | free(2) |
| 0.2 | 10.3 / 3.65 | 6.59(-4) | 0.0204 | 0.301 | 8.55 | 0.0213 | 0.477 | 0.897 | 1.91 |
| 0.4 | 21.7 / 7.40 | 0.00133 | 0.0408 | 0.603 | 18.2 | 0.0427 | 0.958 | 1.80 | 3.90 |
| 0.6 | 23.9 / 11.2 | 0.00199 | 0.0612 | 0.905 | 28.8 | 0.0640 | 1.44 | 2.70 | 5.97 |
| 0.8 | 43.5 / 15.0 | 0.00266 | 0.0816 | 1.21 | 36.6 | 0.0853 | 1.91 | 3.60 | 8.11 |
| 1.0 | 45.7 / 19.0 | 0.00332 | 0.102 | 1.50 | 37.0 | 0.107 | 2.38 | 4.49 | 10.3 |
| 1.2 | 43.2 / 23.4 | 0.00399 | 0.122 | 1.80 | 32.9 | 0.128 | 2.85 | 5.36 | 13.1 |
| 1.4 | 38.9 / 26.4 | 0.00465 | 0.142 | 2.08 | 27.0 | 0.149 | 3.31 | 6.21 | 14.5 |
| 1.6 | 36.3 / 26.9 | 0.00531 | 0.162 | 2.36 | 22.9 | 0.170 | 3.76 | 7.02 | 13.5 |
| 1.8 | 34.5 / 25.0 | 0.00596 | 0.182 | 2.61 | 19.5 | 0.191 | 4.19 | 7.76 | 10.0 |
| 2.0 | 33.2 / 27.4 | 0.00663 | 0.201 | 2.85 | 16.9 | 0.212 | 4.60 | 8.41 | 11.1 |
| 2.2 | 32.1 / 27.5 | 0.00729 | 0.220 | 3.05 | 14.7 | 0.233 | 4.99 | 8.96 | 10.1 |
| 2.4 | 31.4 / 27.5 | 0.00795 | 0.239 | 3.21 | 13.0 | 0.253 | 5.35 | 9.37 | 9.13 |
| 2.6 | 30.7 / 27.5 | 0.00861 | 0.258 | 3.34 | 11.5 | 0.273 | 5.68 | 9.64 | 8.31 |
| 2.8 | 30.0 / 27.3 | 0.00926 | 0.276 | 3.42 | 10.3 | 0.294 | 5.96 | 9.76 | 7.59 |
| 3.0 | 29.2 / 27.0 | 0.00992 | 0.294 | 3.45 | 9.25 | 0.313 | 6.20 | 9.73 | 6.96 |
| 3.2 | 28.4 / 26.4 | 0.0106 | 0.312 | 3.44 | 8.38 | 0.333 | 6.39 | 9.58 | 6.39 |
| 3.4 | 27.6 / 25.9 | 0.0112 | 0.329 | 3.39 | 7.64 | 0.353 | 6.52 | 9.33 | 5.89 |
| 3.6 | 26.7 / 25.1 | 0.0119 | 0.346 | 3.31 | 6.98 | 0.372 | 6.61 | 9.01 | 5.44 |
| 3.8 | 25.7 / 24.3 | 0.0125 | 0.362 | 3.21 | 6.39 | 0.391 | 6.64 | 8.65 | 5.04 |
| 4.0 | 24.6 / 23.4 | 0.0132 | 0.378 | 3.09 | 5.88 | 0.410 | 6.62 | 8.26 | 4.69 |
| 5 | 19.8 / 19.2 | 0.0163 | 0.447 | 2.47 | 3.98 | 0.498 | 5.98 | 6.39 | 3.36 |
| 6 | 15.8 / 15.4 | 0.0195 | 0.497 | 1.91 | 2.86 | 0.578 | 4.95 | 4.96 | 2.53 |
| 7 | 12.8 / 12.7 | 0.0225 | 0.526 | 1.53 | 2.15 | 0.646 | 3.95 | 3.97 | 1.98 |
| 8 | 10.7 / 10.6 | 0.0254 | 0.532 | 1.25 | 1.69 | 0.700 | 3.28 | 3.25 | 1.60 |
| 9 | 9.19 / 9.13 | 0.0282 | 0.518 | 1.05 | 1.37 | 0.740 | 2.76 | 2.71 | 1.31 |
| 10 | 7.97 / 7.95 | 0.0309 | 0.487 | 0.895 | 1.12 | 0.764 | 2.37 | 2.30 | 1.10 |
| 12 | 6.19 / 6.19 | 0.0358 | 0.394 | 0.671 | 0.798 | 0.766 | 1.79 | 1.73 | 0.805 |
| 14 | 4.95 / 4.96 | 0.0402 | 0.312 | 0.523 | 0.607 | 0.711 | 1.41 | 1.35 | 0.620 |
| 16 | 4.04 / 4.06 | 0.0438 | 0.255 | 0.420 | 0.473 | 0.622 | 1.14 | 1.08 | 0.494 |
| 18 | 3.32 / 3.33 | 0.0466 | 0.217 | 0.341 | 0.389 | 0.531 | 0.943 | 0.859 | 0.397 |
| 20 | 2.79 / 2.80 | 0.0487 | 0.188 | 0.280 | 0.316 | 0.454 | 0.792 | 0.705 | 0.332 |

Fe ( Z=26 ) 1s(2)2s(2)3s(2)2p(6)3p(6)3d(6) [4s(2)/free(2) ]

| Q/Rs | ----> | 14.97 | 4.089 | 1.406 | 0.3365 | 4.269 | 1.266 | 0.9630 | 2.118 |
|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 2p(6) | 3p(6) | 3d(6) | free(2) |
| 0.2 | 9.51 / 3.41 | 5.92(-4) | 0.0182 | 0.266 | 7.96 | 0.0188 | 0.419 | 0.823 | 1.86 |
| 0.4 | 20.0 / 6.91 | 0.00119 | 0.0363 | 0.535 | 16.9 | 0.0377 | 0.841 | 1.65 | 3.81 |
| 0.6 | 31.3 / 10.5 | 0.00179 | 0.0545 | 0.802 | 26.6 | 0.0565 | 1.26 | 2.48 | 5.83 |
| 0.8 | 40.5 / 14.1 | 0.00239 | 0.0727 | 1.07 | 34.3 | 0.0753 | 1.68 | 3.30 | 7.92 |
| 1.0 | 43.2 / 17.8 | 0.00298 | 0.0907 | 1.33 | 35.5 | 0.0942 | 2.09 | 4.12 | 10.1 |
| 1.2 | 41.1 / 21.8 | 0.00358 | 0.0109 | 1.59 | 31.9 | 0.113 | 2.50 | 4.92 | 12.6 |
| 1.4 | 37.1 / 25.1 | 0.00417 | 0.127 | 1.85 | 26.3 | 0.132 | 2.91 | 5.71 | 14.3 |
| 1.6 | 34.5 / 25.5 | 0.00477 | 0.144 | 2.09 | 22.3 | 0.150 | 3.30 | 6.46 | 13.3 |
| 1.8 | 32.6 / 25.7 | 0.00536 | 0.162 | 2.32 | 19.1 | 0.169 | 3.68 | 7.17 | 12.2 |
| 2.0 | 31.4 / 25.8 | 0.00595 | 0.179 | 2.54 | 16.6 | 0.187 | 4.05 | 7.83 | 11.0 |
| 2.2 | 30.4 / 26.0 | 0.00654 | 0.196 | 2.73 | 14.4 | 0.206 | 4.40 | 8.40 | 10.0 |
| 2.4 | 29.7 / 26.0 | 0.00714 | 0.213 | 2.89 | 12.8 | 0.224 | 4.73 | 8.89 | 9.08 |
| 2.6 | 29.1 / 26.1 | 0.00773 | 0.230 | 3.01 | 11.3 | 0.242 | 5.03 | 9.27 | 8.27 |
| 2.8 | 28.6 / 26.1 | 0.00832 | 0.247 | 3.10 | 10.1 | 0.260 | 5.29 | 9.54 | 7.55 |
| 3.0 | 28.0 / 26.0 | 0.00891 | 0.263 | 3.16 | 9.12 | 0.277 | 5.53 | 9.68 | 6.92 |
| 3.2 | 27.5 / 25.8 | 0.00949 | 0.279 | 3.17 | 8.27 | 0.295 | 5.72 | 9.71 | 6.36 |
| 3.4 | 26.8 / 25.1 | 0.0101 | 0.294 | 3.15 | 7.52 | 0.312 | 5.87 | 9.63 | 5.86 |
| 3.6 | 26.1 / 24.6 | 0.0107 | 0.309 | 3.10 | 6.88 | 0.329 | 5.98 | 9.46 | 5.42 |
| 3.8 | 25.3 / 24.0 | 0.0112 | 0.324 | 3.03 | 6.32 | 0.346 | 6.04 | 9.21 | 5.02 |
| 4.0 | 24.4 / 23.2 | 0.0118 | 0.338 | 2.93 | 5.81 | 0.363 | 6.06 | 8.92 | 4.67 |
| 5 | 21.2 / 19.6 | 0.0147 | 0.402 | 2.41 | 4.97 | 0.442 | 5.64 | 7.28 | 3.35 |
| 6 | 16.1 / 15.8 | 0.0175 | 0.450 | 1.85 | 2.84 | 0.514 | 4.81 | 5.62 | 2.53 |
| 7 | 13.1 / 12.9 | 0.0202 | 0.481 | 1.49 | 2.15 | 0.577 | 3.81 | 4.52 | 1.97 |
| 8 | 10.9 / 10.8 | 0.0229 | 0.492 | 1.23 | 1.69 | 0.628 | 3.18 | 3.70 | 1.59 |
| 9 | 9.34 / 9.30 | 0.0254 | 0.485 | 1.03 | 1.35 | 0.668 | 2.69 | 3.09 | 1.31 |
| 10 | 8.12 / 8.09 | 0.0279 | 0.462 | 0.873 | 1.12 | 0.694 | 2.31 | 2.63 | 1.09 |
| 12 | 6.30 / 6.30 | 0.0324 | 0.383 | 0.655 | 0.807 | 0.708 | 1.75 | 1.97 | 0.804 |
| 14 | 5.06 / 5.07 | 0.0364 | 0.306 | 0.511 | 0.612 | 0.671 | 1.38 | 1.54 | 0.619 |
| 16 | 4.14 / 4.14 | 0.0398 | 0.248 | 0.412 | 0.480 | 0.599 | 1.11 | 1.24 | 0.482 |
| 18 | 3.42 / 3.44 | 0.0426 | 0.212 | 0.338 | 0.377 | 0.517 | 0.922 | 1.02 | 0.398 |
| 20 | 2.89 / 2.90 | 0.0446 | 0.184 | 0.279 | 0.318 | 0.444 | 0.779 | 0.842 | 0.331 |

Co ( Z=27 )  1s(2)2s(2)3s(2)2p(6)3p(6)3d(7) [ 4s(2)/free(2) ]

| Q/Rs | ----> | 15.58 | 4.269 | 1.472 | 0.3457 | 4.467 | 1.329 | 1.014 | 2.075 |
|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 2p(6) | 3p(6) | 3d(7) | free(2) |
| 0.2 | 8.87 / 3.17 | 5.31(-4) | 0.0163 | 0.238 | 7.48 | 0.0167 | 0.371 | 0.745 | 1.78 |
| 0.4 | 18.6 / 6.43 | 0.00107 | 0.0325 | 0.478 | 15.8 | 0.0335 | 0.745 | 1.47 | 3.63 |
| 0.6 | 29.1 / 9.75 | 0.00161 | 0.0487 | 0.716 | 24.9 | 0.0502 | 1.12 | 2.25 | 5.55 |
| 0.8 | 37.9 / 13.0 | 0.00214 | 0.0650 | 0.954 | 32.4 | 0.0668 | 1.49 | 2.99 | 7.54 |
| 1.0 | 41.1 / 16.6 | 0.00268 | 0.0812 | 1.19 | 34.1 | 0.0836 | 1.85 | 3.73 | 9.59 |
| 1.2 | 39.2 / 20.1 | 0.00322 | 0.0973 | 1.42 | 30.9 | 0.100 | 2.22 | 4.46 | 11.8 |
| 1.4 | 35.4 / 23.5 | 0.00375 | 0.113 | 1.65 | 25.8 | 0.117 | 2.57 | 5.17 | 13.9 |
| 1.6 | 32.8 / 24.0 | 0.00428 | 0.129 | 1.87 | 21.9 | 0.134 | 2.92 | 5.86 | 13.1 |
| 1.8 | 31.0 / 24.2 | 0.00481 | 0.145 | 2.08 | 18.8 | 0.150 | 3.27 | 6.52 | 12.0 |
| 2.0 | 29.6 / 24.2 | 0.00534 | 0.161 | 2.27 | 16.3 | 0.166 | 3.59 | 7.15 | 10.9 |
| 2.2 | 28.7 / 24.4 | 0.00588 | 0.176 | 2.45 | 14.2 | 0.183 | 3.91 | 7.72 | 9.87 |
| 2.4 | 28.0 / 24.4 | 0.00641 | 0.191 | 2.60 | 12.6 | 0.200 | 4.21 | 8.23 | 8.97 |
| 2.6 | 27.5 / 24.5 | 0.00694 | 0.206 | 2.73 | 11.2 | 0.215 | 4.48 | 8.66 | 8.18 |
| 2.8 | 27.1 / 24.6 | 0.00748 | 0.221 | 2.83 | 9.98 | 0.231 | 4.73 | 9.01 | 7.47 |
| 3.0 | 26.6 / 24.5 | 0.00800 | 0.236 | 2.89 | 9.00 | 0.247 | 4.95 | 9.27 | 6.85 |
| 3.2 | 26.2 / 24.3 | 0.00853 | 0.250 | 2.93 | 8.16 | 0.262 | 5.15 | 9.43 | 6.30 |
| 3.4 | 25.7 / 24.1 | 0.00906 | 0.264 | 2.93 | 7.43 | 0.278 | 5.30 | 9.49 | 5.81 |
| 3.6 | 25.2 / 23.8 | 0.00958 | 0.278 | 2.90 | 6.80 | 0.293 | 5.42 | 9.47 | 5.37 |
| 3.8 | 24.6 / 23.3 | 0.0101 | 0.291 | 2.85 | 6.25 | 0.308 | 5.51 | 9.36 | 4.98 |
| 4.0 | 23.9 / 22.8 | 0.0106 | 0.304 | 2.78 | 5.76 | 0.323 | 5.56 | 9.19 | 4.63 |
| 5 | 20.0 / 19.4 | 0.0132 | 0.363 | 2.30 | 3.93 | 0.395 | 5.32 | 7.72 | 3.32 |
| 6 | 16.2 / 15.9 | 0.0157 | 0.409 | 1.80 | 2.82 | 0.460 | 4.64 | 6.10 | 2.51 |
| 7 | 13.2 / 13.0 | 0.0182 | 0.440 | 1.45 | 2.13 | 0.517 | 3.73 | 4.93 | 1.96 |
| 8 | 12.1 / 12.0 | 0.0206 | 0.454 | 1.20 | 1.67 | 0.566 | 3.08 | 4.08 | 1.58 |
| 9 | 9.49 / 9.43 | 0.0229 | 0.453 | 1.00 | 1.36 | 0.605 | 2.62 | 3.43 | 1.30 |
| 10 | 7.00 / 6.98 | 0.0251 | 0.437 | 0.853 | 1.11 | 0.632 | 2.24 | 2.93 | 1.09 |
| 12 | 6.42 / 6.42 | 0.0393 | 0.372 | 0.641 | 0.800 | 0.654 | 1.71 | 2.20 | 0.799 |
| 14 | 5.14 / 5.16 | 0.0330 | 0.300 | 0.504 | 0.599 | 0.632 | 1.35 | 1.73 | 0.618 |
| 16 | 5.02 / 5.03 | 0.0362 | 0.244 | 0.405 | 0.472 | 0.574 | 1.09 | 1.39 | 0.480 |
| 18 | 3.51 / 3.53 | 0.0388 | 0.207 | 0.333 | 0.376 | 0.503 | 0.907 | 1.15 | 0.398 |
| 20 | 2.97 / 2.99 | 0.0409 | 0.178 | 0.278 | 0.314 | 0.435 | 0.766 | 0.960 | 0.330 |

Ni ( Z=28 )  1s(2)2s(2)3s(2)2p(6)3p(6)3d(8) [ 4s(2)/free(2) ]

| Q/Rs | ----> | 16.18 | 4.449 | 1.538 | 0.3546 | 4.664 | 1.392 | 1.065 | 2.066 |
|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 2p(6) | 3p(6) | 3d(8) | free(2) |
| 0.2 | 8.30 / 3.01 | 4.80(-4) | 0.0146 | 0.213 | 7.05 | 0.0149 | 0.331 | 0.676 | 1.76 |
| 0.4 | 17.4 / 6.10 | 9.67(-4) | 0.0292 | 0.429 | 14.9 | 0.0299 | 0.663 | 1.38 | 3.60 |
| 0.6 | 27.1 / 9.20 | 0.00145 | 0.0438 | 0.643 | 23.4 | 0.0449 | 0.995 | 2.03 | 5.50 |
| 0.8 | 35.6 / 12.5 | 0.00194 | 0.0585 | 0.856 | 30.6 | 0.0597 | 1.32 | 2.71 | 7.46 |
| 1.0 | 39.1 / 15.8 | 0.00242 | 0.0730 | 1.07 | 32.8 | 0.0747 | 1.65 | 3.38 | 9.49 |
| 1.2 | 37.6 / 19.1 | 0.00291 | 0.0875 | 1.28 | 30.2 | 0.0896 | 1.98 | 4.04 | 11.7 |
| 1.4 | 34.0 / 22.5 | 0.00339 | 0.102 | 1.48 | 25.3 | 0.105 | 2.29 | 4.69 | 13.8 |
| 1.6 | 31.4 / 22.8 | 0.00387 | 0.116 | 1.68 | 21.6 | 0.119 | 2.61 | 5.32 | 13.0 |
| 1.8 | 29.5 / 22.8 | 0.00435 | 0.130 | 1.87 | 18.6 | 0.134 | 2.91 | 5.93 | 11.9 |
| 2.0 | 28.1 / 22.8 | 0.00483 | 0.145 | 2.05 | 16.1 | 0.149 | 3.21 | 6.51 | 10.8 |
| 2.2 | 27.1 / 23.0 | 0.00531 | 0.158 | 2.21 | 14.0 | 0.163 | 3.49 | 7.06 | 9.85 |
| 2.4 | 26.4 / 23.0 | 0.00580 | 0.172 | 2.36 | 12.4 | 0.178 | 3.76 | 7.56 | 8.95 |
| 2.6 | 25.9 / 23.1 | 0.00628 | 0.186 | 2.48 | 11.0 | 0.192 | 4.02 | 8.01 | 8.16 |
| 2.8 | 25.5 / 23.1 | 0.00676 | 0.199 | 2.58 | 9.89 | 0.206 | 4.25 | 8.39 | 7.46 |
| 3.0 | 25.2 / 23.1 | 0.00724 | 0.212 | 2.65 | 8.92 | 0.221 | 4.46 | 8.71 | 6.84 |
| 3.2 | 24.8 / 23.0 | 0.00771 | 0.225 | 2.70 | 8.08 | 0.235 | 4.64 | 8.96 | 6.28 |
| 3.4 | 24.5 / 22.9 | 0.00819 | 0.238 | 2.72 | 7.37 | 0.248 | 4.80 | 9.12 | 5.80 |
| 3.6 | 24.1 / 22.7 | 0.00866 | 0.250 | 2.71 | 6.75 | 0.262 | 4.93 | 9.21 | 5.36 |
| 3.8 | 23.7 / 22.5 | 0.00914 | 0.263 | 2.68 | 6.19 | 0.276 | 5.03 | 9.22 | 4.97 |
| 4.0 | 23.2 / 22.1 | 0.00961 | 0.275 | 2.63 | 5.70 | 0.289 | 5.10 | 9.17 | 4.62 |
| 5 | 20.0 / 19.4 | 0.0120 | 0.329 | 2.21 | 3.91 | 0.354 | 5.00 | 8.17 | 3.32 |
| 6 | 16.5 / 16.2 | 0.0142 | 0.372 | 1.74 | 2.82 | 0.413 | 4.43 | 6.68 | 2.51 |
| 7 | 13.4 / 13.2 | 0.0165 | 0.403 | 1.41 | 2.13 | 0.466 | 3.66 | 5.35 | 1.95 |
| 8 | 11.2 / 11.1 | 0.0187 | 0.420 | 1.17 | 1.67 | 0.511 | 2.99 | 4.44 | 1.58 |
| 9 | 9.59 / 9.54 | 0.0208 | 0.423 | 0.981 | 1.35 | 0.549 | 2.54 | 3.73 | 1.30 |
| 10 | 8.32 / 8.30 | 0.0228 | 0.413 | 0.837 | 1.11 | 0.577 | 2.18 | 3.18 | 1.09 |
| 12 | 6.50 / 6.51 | 0.0266 | 0.361 | 0.630 | 0.789 | 0.604 | 1.67 | 2.42 | 0.799 |
| 14 | 5.22 / 5.24 | 0.0301 | 0.294 | 0.493 | 0.594 | 0.593 | 1.32 | 1.90 | 0.618 |
| 16 | 4.30 / 4.31 | 0.0330 | 0.240 | 0.397 | 0.466 | 0.549 | 1.08 | 1.54 | 0.480 |
| 18 | 3.59 / 3.61 | 0.0356 | 0.202 | 0.328 | 0.376 | 0.487 | 0.891 | 1.27 | 0.399 |
| 20 | 3.04 / 3.06 | 0.0376 | 0.173 | 0.275 | 0.310 | 0.425 | 0.750 | 1.07 | 0.330 |

Cu ( Z=29 ) 1s(2)2s(2)3s(2)2p(6)3p(6)3d(10) [4s(1)/free(1) ]

| Q/Rs | ----> | | 16.77 | 4.625 | 1.584 | 0.3125 | 4.856 | 1.436 | 1.035 | 2.673 |
|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | | 1s(2) | 2s(2) | 3s(2) | 4s(1) | 2p(6) | 3p(6) | 3d(10) | free(1) |
| 0.2 | 9.37 | 2.86 | 4.35(-4) | 0.0132 | 0.198 | 8.08 | 0.0134 | 0.306 | 0.754 | 1.57 |
| 0.4 | 20.6 | 5.87 | 8.77(-4) | 0.0264 | 0.398 | 18.0 | 0.0269 | 0.613 | 1.51 | 3.27 |
| 0.6 | 31.7 | 8.88 | 0.00132 | 0.0396 | 0.597 | 27.9 | 0.0404 | 0.920 | 2.27 | 5.08 |
| 0.8 | 34.3 | 12.2 | 0.00176 | 0.0529 | 0.795 | 29.1 | 0.0537 | 1.23 | 3.02 | 7.02 |
| 1.0 | 30.1 | 16.1 | 0.00220 | 0.0660 | 0.991 | 23.7 | 0.0672 | 1.53 | 3.77 | 9.67 |
| 1.2 | 26.8 | 17.8 | 0.00264 | 0.0792 | 1.19 | 19.1 | 0.0806 | 1.83 | 4.50 | 10.1 |
| 1.4 | 24.5 | 18.0 | 0.00308 | 0.0922 | 1.38 | 15.6 | 0.0940 | 2.12 | 5.23 | 9.07 |
| 1.6 | 23.0 | 18.1 | 0.00351 | 0.0105 | 1.56 | 13.0 | 0.107 | 2.41 | 5.94 | 8.06 |
| 1.8 | 22.3 | 18.5 | 0.00395 | 0.118 | 1.74 | 11.0 | 0.121 | 2.70 | 6.62 | 7.16 |
| 2.0 | 21.8 | 18.8 | 0.00439 | 0.131 | 1.90 | 9.39 | 0.134 | 2.97 | 7.28 | 6.39 |
| 2.2 | 21.6 | 19.2 | 0.00482 | 0.143 | 2.06 | 8.15 | 0.147 | 3.23 | 7.90 | 5.72 |
| 2.4 | 21.6 | 19.6 | 0.00526 | 0.156 | 2.20 | 7.14 | 0.160 | 3.49 | 8.48 | 5.15 |
| 2.6 | 21.7 | 20.0 | 0.00570 | 0.168 | 2.32 | 6.31 | 0.173 | 3.73 | 9.00 | 4.65 |
| 2.8 | 21.8 | 20.4 | 0.00614 | 0.180 | 2.42 | 5.63 | 0.186 | 3.95 | 9.47 | 4.23 |
| 3.0 | 22.0 | 20.8 | 0.00657 | 0.192 | 2.50 | 5.04 | 0.199 | 4.15 | 9.86 | 3.85 |
| 3.2 | 22.0 | 21.0 | 0.00700 | 0.204 | 2.55 | 4.53 | 0.211 | 4.33 | 10.2 | 3.52 |
| 3.4 | 22.0 | 21.2 | 0.00744 | 0.216 | 2.58 | 4.08 | 0.224 | 4.49 | 10.4 | 3.24 |
| 3.6 | 21.9 | 21.2 | 0.00787 | 0.227 | 2.58 | 3.68 | 0.236 | 4.62 | 10.6 | 2.99 |
| 3.8 | 21.8 | 21.2 | 0.00830 | 0.238 | 2.56 | 3.33 | 0.249 | 4.72 | 10.7 | 2.76 |
| 4.0 | 21.5 | 21.0 | 0.00873 | 0.249 | 2.52 | 3.04 | 0.261 | 4.80 | 10.6 | 2.56 |
| 5 | 19.3 | 19.1 | 0.0109 | 0.299 | 2.16 | 2.03 | 0.319 | 4.78 | 9.73 | 1.82 |
| 6 | 16.4 | 16.3 | 0.0129 | 0.340 | 1.72 | 1.46 | 0.373 | 4.30 | 8.17 | 1.36 |
| 7 | 14.1 | 13.3 | 0.0150 | 0.371 | 1.39 | 1.82 | 0.422 | 3.60 | 6.48 | 1.06 |
| 8 | 11.2 | 11.2 | 0.0170 | 0.389 | 1.15 | 0.873 | 0.465 | 2.93 | 5.39 | 0.852 |
| 9 | 9.63 | 9.63 | 0.0189 | 0.395 | 0.968 | 0.691 | 0.500 | 2.50 | 4.56 | 0.695 |
| 10 | 8.38 | 8.39 | 0.0208 | 0.389 | 0.825 | 0.571 | 0.528 | 2.15 | 3.90 | 0.580 |
| 12 | 6.55 | 6.56 | 0.0243 | 0.348 | 0.621 | 0.410 | 0.559 | 1.64 | 2.95 | 0.422 |
| 14 | 5.30 | 5.31 | 0.0275 | 0.288 | 0.487 | 0.309 | 0.557 | 1.30 | 2.33 | 0.322 |
| 16 | 4.39 | 4.38 | 0.0303 | 0.236 | 0.394 | 0.266 | 0.524 | 1.06 | 1.88 | 0.255 |
| 18 | 3.66 | 3.67 | 0.0327 | 0.197 | 0.325 | 0.194 | 0.472 | 0.880 | 1.56 | 0.208 |
| 20 | 3.11 | 3.12 | 0.0346 | 0.171 | 0.272 | 0.160 | 0.415 | 0.743 | 1.31 | 0.172 |

Zn ( Z=30 ) 1s(2)2s(2)3s(2)2p(6)3p(6)3d(10) [4s(2)/free(2) ]

| θ/Rs | ----> | 17.37 | 4.803 | 1.668 | 0.3837 | 5.055 | 1.520 | 1.170 | 2.534 |
|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 2p(6) | 3p(6) | 3d(10) | free(2) |
| 0.2 | 6.90 / 3.82 | 3.96(-4) | 0.0120 | 0.175 | 5.87 | 0.0121 | 0.266 | 0.557 | 2.79 |
| 0.4 | 14.3 / 7.77 | 7.98(-4) | 0.0240 | 0.350 | 12.3 | 0.0242 | 0.532 | 1.12 | 5.77 |
| 0.6 | 22.3 / 12.0 | 0.00120 | 0.0359 | 0.526 | 19.2 | 0.0363 | 0.799 | 1.67 | 8.94 |
| 0.8 | 29.6 / 16.4 | 0.00160 | 0.0479 | 0.700 | 25.5 | 0.0484 | 1.06 | 2.23 | 12.3 |
| 1.0 | 33.8 / 21.1 | 0.00200 | 0.0599 | 0.872 | 28.7 | 0.0604 | 1.33 | 2.78 | 16.0 |
| 1.2 | 33.8 / 25.0 | 0.00240 | 0.0718 | 1.04 | 27.7 | 0.0725 | 1.59 | 3.32 | 18.9 |
| 1.4 | 31.9 / 24.3 | 0.00280 | 0.0840 | 1.21 | 24.9 | 0.0846 | 1.84 | 3.86 | 17.3 |
| 1.6 | 29.6 / 23.6 | 0.00320 | 0.0954 | 1.37 | 20.9 | 0.0966 | 2.10 | 4.38 | 15.5 |
| 1.8 | 27.0 / 22.8 | 0.00359 | 0.107 | 1.53 | 18.0 | 0.109 | 2.34 | 4.90 | 13.8 |
| 2.0 | 25.6 / 22.3 | 0.00399 | 0.119 | 1.68 | 15.7 | 0.120 | 2.58 | 5.39 | 12.4 |
| 2.2 | 24.5 / 21.8 | 0.00439 | 0.130 | 1.82 | 13.8 | 0.132 | 2.82 | 5.87 | 11.1 |
| 2.4 | 23.8 / 21.6 | 0.00478 | 0.141 | 1.95 | 12.2 | 0.144 | 3.04 | 6.32 | 10.0 |
| 2.6 | 23.2 / 21.5 | 0.00518 | 0.153 | 2.06 | 10.8 | 0.156 | 3.25 | 6.75 | 9.07 |
| 2.8 | 22.8 / 21.4 | 0.00558 | 0.164 | 2.16 | 9.69 | 0.167 | 3.45 | 7.14 | 8.25 |
| 3.0 | 22.5 / 21.3 | 0.00598 | 0.175 | 2.24 | 8.74 | 0.179 | 3.64 | 7.49 | 7.53 |
| 3.2 | 22.2 / 21.2 | 0.00637 | 0.185 | 2.30 | 7.93 | 0.190 | 3.80 | 7.80 | 6.89 |
| 3.4 | 22.0 / 21.1 | 0.00677 | 0.196 | 2.34 | 7.24 | 0.202 | 3.95 | 8.07 | 6.34 |
| 3.6 | 21.8 / 21.0 | 0.00716 | 0.206 | 2.36 | 6.64 | 0.213 | 4.09 | 8.28 | 5.85 |
| 3.8 | 21.5 / 20.8 | 0.00755 | 0.217 | 2.36 | 6.10 | 0.224 | 4.19 | 8.44 | 5.40 |
| 4.0 | 21.2 / 20.7 | 0.00794 | 0.227 | 2.34 | 5.56 | 0.235 | 4.28 | 8.55 | 5.02 |
| 5 | 19.3 / 19.0 | 0.00988 | 0.273 | 2.07 | 3.90 | 0.288 | 4.39 | 8.37 | 3.57 |
| 6 | 16.6 / 16.5 | 0.0118 | 0.311 | 1.68 | 2.82 | 0.338 | 4.05 | 7.40 | 2.67 |
| 7 | 13.8 / 13.8 | 0.0137 | 0.341 | 1.34 | 2.13 | 0.382 | 3.50 | 6.10 | 2.08 |
| 8 | 11.4 / 11.4 | 0.0155 | 0.360 | 1.12 | 1.67 | 0.422 | 2.86 | 4.99 | 1.67 |
| 9 | 9.79 / 9.81 | 0.0172 | 0.369 | 0.941 | 1.35 | 0.456 | 2.41 | 4.24 | 1.37 |
| 10 | 8.54 / 8.58 | 0.0190 | 0.367 | 0.804 | 1.11 | 0.483 | 2.09 | 3.67 | 1.15 |
| 12 | 6.68 / 6.73 | 0.0222 | 0.335 | 0.606 | 0.800 | 0.517 | 1.60 | 2.80 | 0.850 |
| 14 | 5.38 / 5.42 | 0.0251 | 0.282 | 0.478 | 0.599 | 0.521 | 1.27 | 2.20 | 0.636 |
| 16 | 4.44 / 4.49 | 0.0278 | 0.232 | 0.385 | 0.467 | 0.498 | 1.03 | 1.79 | 0.512 |
| 18 | 3.71 / 3.75 | 0.0301 | 0.193 | 0.319 | 0.372 | 0.455 | 0.858 | 1.49 | 0.414 |
| 20 | 3.17 / 3.20 | 0.0320 | 0.167 | 0.267 | 0.315 | 0.404 | 0.726 | 1.26 | 0.340 |

Ga ( Z=31 )  1s(2)2s(2)3s(2)2p(6)3p(6)3d(10)  [4s(2)4p(1)/free(3)]

| Q/Rs | ----> | 17.97 | 4.982 | 1.755 | 0.4430 | 5.292 | 1.594 | 0.3215 | 1.302 | 2.192 |
|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 2p(6) | 3p(6) | 4p(1) | 3d(10) | free(3) |
| 0.2 | 12.6 / 3.85 | 3.61(-4) | 0.0109 | 0.154 | 4.21 | 0.0107 | 0.236 | 7.56 | 0.426 | 3.02 |
| 0.4 | 27.2 / 7.91 | 7.28(-4) | 0.0218 | 0.309 | 8.68 | 0.0215 | 0.472 | 16.8 | 0.853 | 6.19 |
| 0.6 | 42.1 / 12.0 | 0.00109 | 0.0327 | 0.464 | 13.5 | 0.0322 | 0.708 | 26.1 | 1.28 | 9.49 |
| 0.8 | 49.5 / 16.3 | 0.00146 | 0.0436 | 0.617 | 18.1 | 0.0429 | 0.942 | 28.0 | 1.71 | 12.9 |
| 1.0 | 49.0 / 20.7 | 0.00183 | 0.0545 | 0.770 | 21.6 | 0.0536 | 1.18 | 23.2 | 2.13 | 16.5 |
| 1.2 | 46.3 / 26.5 | 0.00219 | 0.0653 | 0.920 | 22.6 | 0.0643 | 1.41 | 18.7 | 2.54 | 21.5 |
| 1.4 | 42.5 / 28.2 | 0.00255 | 0.0761 | 1.07 | 21.4 | 0.0750 | 1.63 | 15.3 | 2.95 | 22.4 |
| 1.6 | 38.4 / 27.3 | 0.00292 | 0.0868 | 1.21 | 19.0 | 0.0856 | 1.86 | 12.8 | 3.36 | 20.7 |
| 1.8 | 34.9 / 26.2 | 0.00328 | 0.0974 | 1.35 | 16.7 | 0.0963 | 2.08 | 10.8 | 3.76 | 18.8 |
| 2.0 | 31.8 / 25.0 | 0.00364 | 0.108 | 1.49 | 14.5 | 0.107 | 2.29 | 9.29 | 4.14 | 17.0 |
| 2.2 | 29.6 / 24.2 | 0.00400 | 0.118 | 1.61 | 12.7 | 0.117 | 2.50 | 8.04 | 4.52 | 15.3 |
| 2.4 | 28.0 / 23.4 | 0.00437 | 0.129 | 1.73 | 11.4 | 0.128 | 2.70 | 7.07 | 4.88 | 13.9 |
| 2.6 | 26.7 / 22.9 | 0.00473 | 0.139 | 1.84 | 10.2 | 0.138 | 2.89 | 6.25 | 5.22 | 12.6 |
| 2.8 | 25.6 / 22.3 | 0.00509 | 0.149 | 1.93 | 9.20 | 0.149 | 3.08 | 5.56 | 5.54 | 11.5 |
| 3.0 | 24.7 / 22.0 | 0.00546 | 0.159 | 2.01 | 8.29 | 0.159 | 3.25 | 4.99 | 5.84 | 10.6 |
| 3.2 | 23.9 / 21.6 | 0.00582 | 0.169 | 2.07 | 7.51 | 0.169 | 3.40 | 4.49 | 6.12 | 9.70 |
| 3.4 | 23.3 / 21.3 | 0.00618 | 0.179 | 2.12 | 6.87 | 0.179 | 3.55 | 4.04 | 6.37 | 8.93 |
| 3.6 | 22.8 / 21.1 | 0.00654 | 0.188 | 2.15 | 6.34 | 0.189 | 3.67 | 3.66 | 6.58 | 8.25 |
| 3.8 | 22.3 / 20.8 | 0.00690 | 0.198 | 2.16 | 5.81 | 0.199 | 3.78 | 3.33 | 6.77 | 7.65 |
| 4.0 | 21.7 / 20.5 | 0.00725 | 0.207 | 2.16 | 5.31 | 0.209 | 3.87 | 3.03 | 6.91 | 7.10 |
| 5 | 19.5 / 18.8 | 0.00903 | 0.249 | 1.96 | 3.76 | 0.256 | 4.05 | 2.03 | 7.13 | 5.10 |
| 6 | 16.9 / 16.5 | 0.0108 | 0.286 | 1.64 | 2.76 | 0.301 | 3.83 | 1.45 | 6.64 | 3.82 |
| 7 | 14.3 / 14.1 | 0.0125 | 0.314 | 1.30 | 2.10 | 0.342 | 3.39 | 1.10 | 5.77 | 3.00 |
| 8 | 11.8 / 11.7 | 0.0142 | 0.334 | 1.08 | 1.63 | 0.378 | 2.80 | 0.855 | 4.73 | 2.41 |
| 9 | 10.1 / 10.1 | 0.0158 | 0.344 | 0.915 | 1.33 | 0.410 | 2.42 | 0.700 | 3.96 | 1.99 |
| 10 | 8.72 / 8.71 | 0.0174 | 0.345 | 0.783 | 1.09 | 0.436 | 2.03 | 0.581 | 3.44 | 1.66 |
| 12 | 6.81 / 6.83 | 0.0203 | 0.322 | 0.595 | 0.789 | 0.471 | 1.56 | 0.412 | 2.64 | 1.22 |
| 14 | 5.49 / 5.53 | 0.0231 | 0.275 | 0.467 | 0.589 | 0.481 | 1.24 | 0.308 | 2.10 | 0.934 |
| 16 | 4.53 / 4.57 | 0.0256 | 0.228 | 0.379 | 0.462 | 0.467 | 1.01 | 0.240 | 1.71 | 0.744 |
| 18 | 3.80 / 3.82 | 0.0277 | 0.190 | 0.313 | 0.376 | 0.434 | 0.842 | 0.196 | 1.42 | 0.596 |
| 20 | 3.24 / 3.27 | 0.0295 | 0.164 | 0.263 | 0.308 | 0.391 | 0.714 | 0.162 | 1.21 | 0.499 |

Ge ( Z=32 )  1s(2)2s(2)3s(2)2p(6)3p(6)3d(10)  [4s(2)4p(2)/free(4)]

| Q/Rs | ----> | 18.60 | 5.163 | 1.843 | 0.5034 | 5.491 | 1.686 | 0.3851 | 1.427 | 2.090 |
|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 2p(6) | 3p(6) | 4p(2) | 3d(10) | free(4) |
| 0.2 | 9.73 / 4.32 | 3.29(-4) | 0.00994 | 0.136 | 3.12 | 0.00972 | 0.205 | 5.83 | 0.338 | 3.62 |
| 0.4 | 19.9 / 8.71 | 6.63(-4) | 0.0199 | 0.274 | 6.38 | 0.0195 | 0.410 | 12.2 | 0.677 | 7.39 |
| 0.6 | 31.0 / 13.5 | 9.97(-4) | 0.0298 | 0.411 | 9.82 | 0.0292 | 0.615 | 19.0 | 1.02 | 11.3 |
| 0.8 | 41.4 / 18.1 | 0.00133 | 0.0397 | 0.546 | 13.3 | 0.0389 | 0.819 | 25.3 | 1.35 | 15.3 |
| 1.0 | 48.3 / 23.1 | 0.00166 | 0.0497 | 0.681 | 16.2 | 0.0486 | 1.02 | 28.5 | 1.69 | 19.5 |
| 1.2 | 49.7 / 28.3 | 0.00200 | 0.0596 | 0.815 | 18.0 | 0.0584 | 1.22 | 27.5 | 2.02 | 24.1 |
| 1.4 | 47.7 / 32.8 | 0.00233 | 0.0694 | 0.946 | 18.1 | 0.0681 | 1.42 | 24.8 | 2.35 | 28.0 |
| 1.6 | 43.4 / 31.8 | 0.00266 | 0.0792 | 1.07 | 17.0 | 0.0778 | 1.62 | 20.9 | 2.67 | 26.3 |
| 1.8 | 39.6 / 30.2 | 0.00300 | 0.0888 | 1.20 | 15.5 | 0.0874 | 1.81 | 18.0 | 2.99 | 24.1 |
| 2.0 | 35.8 / 28.8 | 0.00332 | 0.0985 | 1.32 | 13.3 | 0.0970 | 2.00 | 15.6 | 3.30 | 21.9 |
| 2.2 | 33.0 / 27.3 | 0.00365 | 0.108 | 1.43 | 11.8 | 0.107 | 2.18 | 13.7 | 3.60 | 19.8 |
| 2.4 | 30.7 / 26.0 | 0.00398 | 0.118 | 1.54 | 10.6 | 0.116 | 2.36 | 12.1 | 3.89 | 18.0 |
| 2.6 | 28.9 / 25.0 | 0.00431 | 0.127 | 1.64 | 9.51 | 0.126 | 2.53 | 10.8 | 4.17 | 16.4 |
| 2.8 | 27.4 / 24.2 | 0.00464 | 0.136 | 1.73 | 8.57 | 0.135 | 2.69 | 9.68 | 4.44 | 15.0 |
| 3.0 | 26.1 / 23.4 | 0.00497 | 0.145 | 1.80 | 7.76 | 0.144 | 2.84 | 8.73 | 4.70 | 13.8 |
| 3.2 | 25.1 / 22.7 | 0.00530 | 0.154 | 1.87 | 7.07 | 0.154 | 2.99 | 7.93 | 4.93 | 12.6 |
| 3.4 | 24.2 / 22.2 | 0.00563 | 0.163 | 1.92 | 6.47 | 0.163 | 3.12 | 7.21 | 5.15 | 11.7 |
| 3.6 | 23.5 / 21.7 | 0.00596 | 0.172 | 1.96 | 5.96 | 0.172 | 3.24 | 6.62 | 5.35 | 10.8 |
| 3.8 | 22.8 / 21.2 | 0.00629 | 0.181 | 1.98 | 5.49 | 0.181 | 3.35 | 6.08 | 5.53 | 9.98 |
| 4.0 | 22.2 / 20.8 | 0.00661 | 0.189 | 1.99 | 5.08 | 0.190 | 3.44 | 5.61 | 5.69 | 9.28 |
| 5 | 19.6 / 18.8 | 0.00823 | 0.229 | 1.86 | 3.59 | 0.233 | 3.68 | 3.90 | 6.09 | 6.66 |
| 6 | 17.1 / 16.6 | 0.00982 | 0.263 | 1.60 | 2.68 | 0.274 | 3.56 | 2.82 | 5.91 | 5.04 |
| 7 | 14.6 / 14.4 | 0.0114 | 0.290 | 1.26 | 2.01 | 0.312 | 3.22 | 2.13 | 5.35 | 3.93 |
| 8 | 12.3 / 12.2 | 0.0129 | 0.310 | 1.05 | 1.62 | 0.346 | 2.73 | 1.67 | 4.54 | 3.16 |
| 9 | 10.3 / 10.2 | 0.0144 | 0.321 | 0.889 | 1.31 | 0.376 | 2.27 | 1.35 | 3.78 | 2.60 |
| 10 | 9.06 / 9.05 | 0.0159 | 0.324 | 0.762 | 1.08 | 0.401 | 1.96 | 1.11 | 3.26 | 2.18 |
| 12 | 6.94 / 6.97 | 0.0186 | 0.308 | 0.580 | 0.774 | 0.436 | 1.51 | 0.797 | 2.52 | 1.60 |
| 14 | 5.60 / 5.65 | 0.0212 | 0.268 | 0.458 | 0.586 | 0.450 | 1.21 | 0.601 | 2.01 | 1.24 |
| 16 | 4.62 / 4.66 | 0.0235 | 0.224 | 0.378 | 0.459 | 0.442 | 0.985 | 0.465 | 1.64 | 0.962 |
| 18 | 3.86 / 3.92 | 0.0255 | 0.188 | 0.307 | 0.365 | 0.416 | 0.824 | 0.372 | 1.37 | 0.797 |
| 20 | 3.30 / 3.34 | 0.0272 | 0.160 | 0.259 | 0.301 | 0.379 | 0.695 | 0.317 | 1.16 | 0.661 |

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

| Q/Rs | ----> | 19.20 | 5.342 | 1.932 | 0.5583 | 5.961 | 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 | 7.68 | 3.02(-4) | 0.00909 | 0.121 | 2.45 | 0.00884 | 0.178 | 4.64 | 0.275 |
| 0.4 | 15.7 | 6.09(-4) | 0.0182 | 0.243 | 4.98 | 0.0177 | 0.355 | 9.48 | 0.550 |
| 0.6 | 24.0 | 9.16(-4) | 0.0273 | 0.365 | 7.62 | 0.0266 | 0.533 | 14.6 | 0.827 |
| 0.8 | 32.4 | 0.00122 | 0.0364 | 0.486 | 10.3 | 0.0354 | 0.710 | 19.7 | 1.10 |
| 1.0 | 39.8 | 0.00153 | 0.0455 | 0.606 | 12.7 | 0.0442 | 0.885 | 24.1 | 1.37 |
| 1.2 | 44.9 | 0.00183 | 0.0545 | 0.725 | 14.6 | 0.0531 | 1.06 | 26.8 | 1.64 |
| 1.4 | 46.4 | 0.00214 | 0.0635 | 0.841 | 15.3 | 0.0619 | 1.23 | 27.0 | 1.91 |
| 1.6 | 45.0 | 0.00244 | 0.0725 | 0.956 | 15.0 | 0.0707 | 1.40 | 25.3 | 2.17 |
| 1.8 | 42.3 | 0.00275 | 0.0814 | 1.07 | 14.0 | 0.0795 | 1.57 | 23.1 | 2.43 |
| 2.0 | 38.3 | 0.00305 | 0.0902 | 1.18 | 12.6 | 0.0882 | 1.73 | 19.9 | 2.69 |
| 2.2 | 36.2 | 0.00335 | 0.0989 | 1.28 | 12.2 | 0.0969 | 1.89 | 17.7 | 2.94 |
| 2.4 | 32.9 | 0.00366 | 0.107 | 1.38 | 10.2 | 0.106 | 2.05 | 15.9 | 3.18 |
| 2.6 | 30.7 | 0.00396 | 0.116 | 1.47 | 9.21 | 0.114 | 2.20 | 14.2 | 3.42 |
| 2.8 | 28.9 | 0.00426 | 0.125 | 1.55 | 8.32 | 0.123 | 2.34 | 12.8 | 3.64 |
| 3.0 | 27.4 | 0.00457 | 0.133 | 1.62 | 7.56 | 0.131 | 2.48 | 11.6 | 3.86 |
| 3.2 | 26.1 | 0.00487 | 0.141 | 1.69 | 6.88 | 0.140 | 2.61 | 10.6 | 4.06 |
| 3.4 | 25.0 | 0.00517 | 0.150 | 1.74 | 6.32 | 0.148 | 2.73 | 9.69 | 4.25 |
| 3.6 | 24.1 | 0.00547 | 0.158 | 1.78 | 5.81 | 0.156 | 2.84 | 8.89 | 4.43 |
| 3.8 | 23.3 | 0.00578 | 0.166 | 1.81 | 5.36 | 0.165 | 2.94 | 8.22 | 4.60 |
| 4.0 | 22.5 | 0.00608 | 0.173 | 1.83 | 4.98 | 0.173 | 3.04 | 7.61 | 4.75 |
| 5 | 19.6 | 0.00756 | 0.210 | 1.75 | 3.52 | 0.213 | 3.31 | 5.38 | 5.22 |
| 6 | 17.2 | 0.00903 | 0.242 | 1.53 | 2.64 | 0.250 | 3.28 | 4.02 | 5.24 |
| 7 | 14.9 | 0.0105 | 0.268 | 1.24 | 2.05 | 0.285 | 3.04 | 3.09 | 4.90 |
| 8 | 12.7 | 0.0119 | 0.288 | 1.02 | 1.63 | 0.317 | 2.65 | 2.43 | 4.33 |
| 9 | 10.7 | 0.0133 | 0.300 | 0.869 | 1.31 | 0.345 | 2.22 | 1.96 | 3.66 |
| 10 | 9.12 | 0.0146 | 0.305 | 0.746 | 1.08 | 0.369 | 1.89 | 1.62 | 3.10 |
| 12 | 7.11 | 0.0172 | 0.294 | 0.569 | 0.783 | 0.404 | 1.47 | 1.16 | 2.41 |
| 14 | 5.72 | 0.0195 | 0.261 | 0.448 | 0.589 | 0.420 | 1.18 | 0.875 | 1.93 |
| 16 | 4.70 | 0.0217 | 0.220 | 0.364 | 0.452 | 0.417 | 0.963 | 0.689 | 1.57 |
| 18 | 3.94 | 0.0236 | 0.185 | 0.302 | 0.363 | 0.398 | 0.802 | 0.551 | 1.32 |
| 20 | 3.36 | 0.0253 | 0.157 | 0.254 | 0.300 | 0.366 | 0.681 | 0.454 | 1.12 |

Se ( Z=34 )  1s(2)2s(2)3s(2)4s(2)2p(6)3p(6)3d(10) [4p(4)/free(4) ]

| Q/Rs | ----> | 19.81 | 5.525 | 2.020 | 0.6111 | 5.893 | 1.870 | 0.4809 | 1.671 | 2.222 |
|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 2p(6) | 3p(6) | 4p(4) | 3d(10) | free(4) |
| 0.2 | 6.53 / 6.65 | 2.77(-4) | 0.00833 | 0.109 | 1.98 | 0.00806 | 0.158 | 4.04 | 0.227 | 4.16 |
| 0.4 | 13.2 / 13.5 | 5.59(-4) | 0.0167 | 0.218 | 4.01 | 0.0162 | 0.315 | 8.19 | 0.454 | 8.51 |
| 0.6 | 20.1 / 20.7 | 0.000841 | 0.0250 | 0.326 | 6.11 | 0.0243 | 0.473 | 12.5 | 0.682 | 13.1 |
| 0.8 | 27.1 / 28.1 | 0.00112 | 0.0333 | 0.434 | 8.24 | 0.0323 | 0.630 | 16.8 | 0.908 | 17.8 |
| 1.0 | 33.7 / 35.6 | 0.00140 | 0.0417 | 0.542 | 10.3 | 0.0404 | 0.786 | 20.9 | 1.13 | 22.8 |
| 1.2 | 39.3 / 45.0 | 0.00168 | 0.0499 | 0.648 | 11.9 | 0.0484 | 0.941 | 24.3 | 1.36 | 30.0 |
| 1.4 | 42.8 / 46.8 | 0.00196 | 0.0582 | 0.752 | 12.9 | 0.0565 | 1.09 | 26.3 | 1.58 | 30.3 |
| 1.6 | 43.8 / 45.1 | 0.00224 | 0.0664 | 0.855 | 13.1 | 0.0645 | 1.25 | 26.6 | 1.80 | 27.9 |
| 1.8 | 42.6 / 42.4 | 0.00252 | 0.0746 | 0.955 | 12.6 | 0.0726 | 1.39 | 25.5 | 2.01 | 25.3 |
| 2.0 | 40.5 / 39.6 | 0.00280 | 0.0827 | 1.05 | 11.8 | 0.0805 | 1.54 | 23.7 | 2.22 | 22.8 |
| 2.2 | 38.0 / 36.8 | 0.00308 | 0.0907 | 1.15 | 10.8 | 0.0885 | 1.68 | 21.8 | 2.43 | 20.6 |
| 2.4 | 34.7 / 34.2 | 0.00336 | 0.0987 | 1.23 | 9.57 | 0.0964 | 1.82 | 19.2 | 2.63 | 18.7 |
| 2.6 | 32.3 / 31.9 | 0.00364 | 0.107 | 1.32 | 8.64 | 0.104 | 1.96 | 17.4 | 2.83 | 17.0 |
| 2.8 | 30.3 / 30.0 | 0.00392 | 0.114 | 1.40 | 7.82 | 0.112 | 2.09 | 15.8 | 3.02 | 15.5 |
| 3.0 | 28.6 / 28.4 | 0.00420 | 0.122 | 1.46 | 7.13 | 0.120 | 2.21 | 14.4 | 3.20 | 14.2 |
| 3.2 | 27.1 / 27.0 | 0.00447 | 0.130 | 1.53 | 6.54 | 0.128 | 2.33 | 13.1 | 3.38 | 13.0 |
| 3.4 | 25.9 / 25.9 | 0.00475 | 0.137 | 1.58 | 6.00 | 0.135 | 2.44 | 12.0 | 3.55 | 12.0 |
| 3.6 | 24.8 / 24.8 | 0.00503 | 0.145 | 1.62 | 5.51 | 0.143 | 2.55 | 11.1 | 3.71 | 11.1 |
| 3.8 | 23.8 / 23.9 | 0.00531 | 0.152 | 1.66 | 5.11 | 0.150 | 2.64 | 10.2 | 3.85 | 10.3 |
| 4.0 | 23.0 / 22.9 | 0.00558 | 0.159 | 1.68 | 4.73 | 0.158 | 2.73 | 9.52 | 3.99 | 9.51 |
| 5 | 19.7 / 19.7 | 0.00695 | 0.193 | 1.65 | 3.38 | 0.195 | 3.02 | 6.79 | 4.48 | 6.82 |
| 6 | 17.3 / 17.3 | 0.00830 | 0.223 | 1.47 | 2.54 | 0.229 | 3.05 | 5.10 | 4.62 | 5.12 |
| 7 | 15.0 / 15.0 | 0.00963 | 0.248 | 1.22 | 1.99 | 0.261 | 2.88 | 3.99 | 4.45 | 4.02 |
| 8 | 13.0 / 13.0 | 0.0109 | 0.267 | 0.994 | 1.59 | 0.291 | 2.57 | 3.19 | 4.07 | 3.22 |
| 9 | 11.0 / 11.1 | 0.0122 | 0.280 | 0.845 | 1.29 | 0.317 | 2.18 | 2.58 | 3.52 | 2.66 |
| 10 | 9.40 / 9.50 | 0.0134 | 0.287 | 0.726 | 1.06 | 0.340 | 1.85 | 2.12 | 3.01 | 2.22 |
| 12 | 7.18 / 7.29 | 0.0158 | 0.280 | 0.554 | 0.762 | 0.375 | 1.43 | 1.52 | 2.24 | 1.63 |
| 14 | 5.70 / 5.80 | 0.0180 | 0.253 | 0.439 | 0.572 | 0.393 | 1.14 | 1.15 | 1.73 | 1.25 |
| 16 | 4.65 / 4.75 | 0.0200 | 0.216 | 0.357 | 0.450 | 0.394 | 0.937 | 0.896 | 1.38 | 0.995 |
| 18 | 3.88 / 3.97 | 0.0219 | 0.182 | 0.297 | 0.363 | 0.380 | 0.787 | 0.723 | 1.13 | 0.817 |
| 20 | 3.43 / 3.50 | 0.0235 | 0.155 | 0.250 | 0.297 | 0.353 | 0.668 | 0.596 | 1.08 | 0.667 |

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

| Q/Rs | ----> | 20.41 | 5.704 | 2.110 | 0.6626 | 6.091 | 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 | 5.55 | 2.56(-4) | 0.00767 | 0.0974 | 1.64 | 0.00739 | 0.140 | 3.46 | 0.192 |
| 0.4 | 11.2 | 5.16(-4) | 0.0154 | 0.195 | 3.31 | 0.0148 | 0.279 | 6.99 | 0.384 |
| 0.6 | 16.9 | 7.76(-4) | 0.0230 | 0.293 | 5.02 | 0.0222 | 0.419 | 10.6 | 0.577 |
| 0.8 | 22.8 | 0.00104 | 0.0306 | 0.340 | 6.76 | 0.0296 | 0.558 | 14.2 | 0.769 |
| 1.0 | 28.4 | 0.00130 | 0.0383 | 0.485 | 8.43 | 0.0370 | 0.696 | 17.8 | 0.960 |
| 1.2 | 33.5 | 0.00155 | 0.0465 | 0.581 | 9.90 | 0.0444 | 0.833 | 21.0 | 1.15 |
| 1.4 | 37.6 | 0.00181 | 0.0536 | 0.675 | 11.0 | 0.0518 | 0.970 | 23.5 | 1.34 |
| 1.6 | 40.0 | 0.00207 | 0.0611 | 0.767 | 11.4 | 0.0592 | 1.10 | 25.1 | 1.52 |
| 1.8 | 40.7 | 0.00233 | 0.0686 | 0.858 | 11.3 | 0.0665 | 1.24 | 25.4 | 1.71 |
| 2.0 | 39.9 | 0.00259 | 0.0761 | 0.945 | 10.8 | 0.0738 | 1.37 | 24.8 | 1.89 |
| 2.2 | 38.4 | 0.00284 | 0.0835 | 1.03 | 10.1 | 0.0811 | 1.49 | 23.5 | 2.06 |
| 2.4 | 35.7 | 0.00310 | 0.0909 | 1.11 | 8.98 | 0.0884 | 1.62 | 21.5 | 2.24 |
| 2.6 | 34.4 | 0.00336 | 0.0982 | 1.19 | 8.05 | 0.0956 | 1.74 | 20.8 | 2.41 |
| 2.8 | 32.1 | 0.00361 | 0.105 | 1.26 | 7.32 | 0.103 | 1.86 | 18.9 | 2.57 |
| 3.0 | 30.2 | 0.00387 | 0.113 | 1.32 | 6.69 | 0.110 | 1.97 | 17.3 | 2.73 |
| 3.2 | 28.6 | 0.00413 | 0.120 | 1.38 | 6.15 | 0.117 | 2.08 | 15.9 | 2.89 |
| 3.4 | 27.2 | 0.00439 | 0.127 | 1.44 | 5.66 | 0.124 | 2.18 | 14.6 | 3.04 |
| 3.6 | 25.9 | 0.00464 | 0.134 | 1.48 | 5.23 | 0.131 | 2.28 | 13.5 | 3.18 |
| 3.8 | 24.7 | 0.00490 | 0.140 | 1.52 | 4.83 | 0.138 | 2.37 | 12.4 | 3.31 |
| 4.0 | 23.8 | 0.00515 | 0.147 | 1.54 | 4.50 | 0.145 | 2.45 | 11.6 | 3.43 |
| 5 | 20.1 | 0.00642 | 0.179 | 1.55 | 3.22 | 0.179 | 2.75 | 8.29 | 3.92 |
| 6 | 17.4 | 0.00767 | 0.207 | 1.40 | 2.44 | 0.211 | 2.83 | 6.23 | 4.13 |
| 7 | 15.3 | 0.00890 | 0.231 | 1.22 | 1.91 | 0.241 | 2.71 | 4.90 | 4.07 |
| 8 | 13.4 | 0.0101 | 0.250 | 0.992 | 1.54 | 0.269 | 2.51 | 3.95 | 3.84 |
| 9 | 11.6 | 0.0113 | 0.263 | 0.840 | 1.28 | 0.294 | 2.18 | 3.27 | 3.47 |
| 10 | 9.98 | 0.0125 | 0.271 | 0.727 | 1.07 | 0.316 | 1.86 | 2.73 | 2.99 |
| 12 | 7.68 | 0.0147 | 0.270 | 0.555 | 0.796 | 0.350 | 1.42 | 2.02 | 2.25 |
| 14 | 6.22 | 0.0167 | 0.250 | 0.440 | 0.614 | 0.371 | 1.14 | 1.56 | 1.83 |
| 16 | 5.14 | 0.0187 | 0.217 | 0.356 | 0.489 | 0.376 | 0.935 | 1.24 | 1.50 |
| 18 | 4.34 | 0.0204 | 0.184 | 0.295 | 0.396 | 0.368 | 0.785 | 1.02 | 1.26 |
| 20 | 3.68 | 0.0219 | 0.156 | 0.250 | 0.326 | 0.347 | 0.667 | 0.837 | 1.08 |

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

| Q/Rs | ----> | 21.00 | 5.888 | 2.199 | 0.7115 | 6.281 | 2.078 | 0.5679 | 1.898 |
|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 2p(6) | 3p(6) | 4p(6) | 3d(10) |
| 0.2 | 4.73 | 2.36(-4) | 0.00706 | 0.0878 | 1.38 | 0.00681 | 0.121 | 2.97 | 0.164 |
| 0.4 | 9.53 | 4.78(-4) | 0.0141 | 0.176 | 2.79 | 0.0137 | 0.241 | 5.97 | 0.328 |
| 0.6 | 14.4 | 7.18(-4) | 0.0212 | 0.264 | 4.22 | 0.0205 | 0.362 | 9.00 | 0.493 |
| 0.8 | 19.3 | 9.58(-4) | 0.0282 | 0.351 | 5.67 | 0.0273 | 0.482 | 12.1 | 0.657 |
| 1.0 | 24.1 | 0.00120 | 0.0353 | 0.438 | 7.09 | 0.0341 | 0.602 | 15.1 | 0.820 |
| 1.2 | 28.6 | 0.00144 | 0.0423 | 0.524 | 8.37 | 0.0409 | 0.720 | 17.9 | 0.982 |
| 1.4 | 32.6 | 0.00168 | 0.0493 | 0.689 | 9.39 | 0.0477 | 0.838 | 20.4 | 1.14 |
| 1.6 | 35.5 | 0.00192 | 0.0563 | 0.692 | 10.0 | 0.0545 | 0.954 | 22.4 | 1.30 |
| 1.8 | 37.2 | 0.00216 | 0.0632 | 0.774 | 10.2 | 0.0613 | 1.07 | 23.6 | 1.46 |
| 2.0 | 37.2 | 0.00239 | 0.0701 | 0.853 | 9.89 | 0.0681 | 1.18 | 24.0 | 1.16 |
| 2.2 | 37.1 | 0.00263 | 0.0769 | 0.930 | 9.36 | 0.0748 | 1.29 | 23.6 | 1.77 |
| 2.4 | 35.9 | 0.00287 | 0.0837 | 1.00 | 8.73 | 0.0815 | 1.40 | 22.6 | 1.91 |
| 2.6 | 34.4 | 0.00311 | 0.0904 | 1.07 | 8.14 | 0.0882 | 1.51 | 21.4 | 2.06 |
| 2.8 | 32.5 | 0.00334 | 0.0971 | 1.14 | 7.37 | 0.0948 | 1.61 | 20.0 | 2.20 |
| 3.0 | 28.9 | 0.00358 | 0.104 | 1.20 | 6.72 | 0.101 | 1.71 | 18.4 | 2.34 |
| 3.2 | 28.7 | 0.00382 | 0.110 | 1.26 | 6.18 | 0.108 | 1.80 | 16.7 | 2.48 |
| 3.4 | 27.2 | 0.00406 | 0.117 | 1.31 | 5.69 | 0.114 | 1.90 | 15.5 | 2.61 |
| 3.6 | 26.0 | 0.00430 | 0.123 | 1.35 | 5.25 | 0.121 | 1.98 | 14.4 | 2.73 |
| 3.8 | 24.8 | 0.00453 | 0.129 | 1.39 | 4.84 | 0.127 | 2.07 | 13.4 | 2.85 |
| 4.0 | 23.6 | 0.00477 | 0.136 | 1.42 | 4.53 | 0.134 | 2.14 | 12.5 | 2.96 |
| 5 | 19.9 | 0.00594 | 0.165 | 1.45 | 3.24 | 0.165 | 2.43 | 9.05 | 3.42 |
| 6 | 16.8 | 0.00710 | 0.191 | 1.31 | 2.34 | 0.200 | 2.55 | 6.55 | 3.68 |
| 7 | 15.1 | 0.00824 | 0.214 | 1.16 | 1.92 | 0.222 | 2.50 | 5.43 | 3.68 |
| 8 | 13.2 | 0.00936 | 0.232 | 0.951 | 1.55 | 0.248 | 2.33 | 4.39 | 3.52 |
| 9 | 11.5 | 0.0105 | 0.245 | 0.802 | 1.27 | 0.272 | 2.05 | 3.64 | 3.22 |
| 10 | 9.96 | 0.0115 | 0.253 | 0.691 | 1.06 | 0.292 | 1.77 | 3.07 | 2.83 |
| 12 | 7.59 | 0.0136 | 0.254 | 0.534 | 0.762 | 0.325 | 1.34 | 2.22 | 2.14 |
| 14 | 6.03 | 0.0155 | 0.236 | 0.372 | 0.578 | 0.345 | 1.08 | 1.68 | 1.72 |
| 16 | 5.00 | 0.0173 | 0.207 | 0.344 | 0.446 | 0.352 | 0.895 | 1.32 | 1.42 |
| 18 | 4.20 | 0.0189 | 0.177 | 0.286 | 0.361 | 0.346 | 0.748 | 1.06 | 1.20 |
| 20 | 3.58 | 0.0204 | 0.151 | 0.241 | 0.299 | 0.328 | 0.637 | 0.876 | 1.02 |

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

| Q/Rs | ----> | 21.44 | 6.084 | 2.294 | 0.7857 | 0.2084 | 6.483 | 2.175 | 0.6553 | 2.013 | 5.222 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(1) | 2p(6) | 3p(6) | 4p(6) | 3d(10) | free(1) |
| 0.2 | 25.2 / 10.5 | 0.000224 | 0.00648 | 0.0790 | 1.09 | 21.7 | 0.00626 | 0.108 | 2.10 | 0.141 | 6.95 |
| 0.4 | 57.9 / 23.3 | 0.000452 | 0.0130 | 0.158 | 2.20 | 50.8 | 0.0126 | 0.215 | 4.22 | 0.282 | 16.2 |
| 0.6 | 66.1 / 46.4 | 0.000679 | 0.0194 | 0.237 | 3.32 | 55.4 | 0.0189 | 0.323 | 6.36 | 0.424 | 35.7 |
| 0.8 | 54.3 / 45.9 | 0.000907 | 0.0259 | 0.316 | 4.45 | 40.0 | 0.0251 | 0.430 | 8.49 | 0.565 | 31.6 |
| 1.0 | 48.0 / 42.9 | 0.00113 | 0.0324 | 0.394 | 5.56 | 30.1 | 0.0314 | 0.536 | 10.6 | 0.705 | 25.0 |
| 1.2 | 44.7 / 41.3 | 0.00136 | 0.0389 | 0.471 | 6.60 | 23.4 | 0.0376 | 0.642 | 12.7 | 0.845 | 20.0 |
| 1.4 | 43.2 / 40.8 | 0.00159 | 0.0453 | 0.548 | 7.50 | 18.7 | 0.0439 | 0.747 | 14.6 | 0.983 | 16.3 |
| 1.6 | 42.4 / 40.6 | 0.00181 | 0.0517 | 0.623 | 8.17 | 15.3 | 0.0501 | 0.851 | 16.2 | 1.12 | 13.5 |
| 1.8 | 41.9 / 40.4 | 0.00204 | 0.0580 | 0.697 | 8.53 | 12.8 | 0.0564 | 0.953 | 17.5 | 1.26 | 11.3 |
| 2.0 | 41.2 / 40.0 | 0.00227 | 0.0644 | 0.769 | 8.56 | 10.9 | 0.0626 | 1.05 | 18.4 | 1.39 | 9.69 |
| 2.2 | 40.0 / 39.1 | 0.00249 | 0.0707 | 0.839 | 8.32 | 9.27 | 0.0688 | 1.15 | 18.8 | 1.52 | 8.38 |
| 2.4 | 38.6 / 38.0 | 0.00272 | 0.0769 | 0.906 | 7.91 | 7.95 | 0.0750 | 1.25 | 18.8 | 1.65 | 7.33 |
| 2.6 | 36.7 / 36.3 | 0.00294 | 0.0831 | 0.970 | 7.40 | 6.90 | 0.0811 | 1.35 | 18.2 | 1.78 | 6.48 |
| 2.8 | 34.9 / 34.6 | 0.00317 | 0.0892 | 1.03 | 6.94 | 6.03 | 0.0872 | 1.44 | 17.4 | 1.90 | 5.76 |
| 3.0 | 32.9 / 32.8 | 0.00339 | 0.0953 | 1.09 | 6.26 | 5.32 | 0.0933 | 1.53 | 16.5 | 2.02 | 5.17 |
| 3.2 | 31.1 / 31.0 | 0.00362 | 0.101 | 1.14 | 5.76 | 4.73 | 0.0993 | 1.62 | 15.5 | 2.14 | 4.65 |
| 3.4 | 29.6 / 29.6 | 0.00384 | 0.107 | 1.19 | 5.31 | 4.26 | 0.105 | 1.70 | 14.7 | 2.25 | 4.21 |
| 3.6 | 28.1 / 28.1 | 0.00407 | 0.113 | 1.23 | 4.92 | 3.83 | 0.111 | 1.78 | 13.7 | 2.36 | 3.85 |
| 3.8 | 26.6 / 26.6 | 0.00429 | 0.119 | 1.27 | 4.57 | 3.47 | 0.117 | 1.85 | 12.7 | 2.47 | 3.51 |
| 4.0 | 25.4 / 25.5 | 0.00451 | 0.125 | 1.30 | 4.25 | 3.18 | 0.123 | 1.93 | 11.9 | 2.57 | 3.24 |
| 5 | 20.8 / 21.0 | 0.00562 | 0.152 | 1.36 | 3.08 | 2.12 | 0.152 | 2.21 | 8.72 | 2.99 | 2.23 |
| 6 | 18.1 / 17.9 | 0.00672 | 0.177 | 1.28 | 2.34 | 1.89 | 0.179 | 2.34 | 6.66 | 3.25 | 1.65 |
| 7 | 15.5 / 15.6 | 0.00780 | 0.198 | 1.13 | 1.84 | 1.15 | 0.205 | 2.33 | 5.27 | 3.33 | 1.25 |
| 8 | 13.5 / 13.7 | 0.00886 | 0.215 | 0.934 | 1.49 | 0.903 | 0.229 | 2.21 | 4.27 | 3.25 | 0.998 |
| 9 | 11.8 / 11.9 | 0.00990 | 0.229 | 0.777 | 1.23 | 0.716 | 0.251 | 1.99 | 3.54 | 3.04 | 0.813 |
| 10 | 10.3 / 10.4 | 0.0109 | 0.237 | 0.676 | 1.03 | 0.602 | 0.271 | 1.73 | 2.99 | 2.72 | 0.691 |
| 12 | 7.86 / 7.90 | 0.0129 | 0.241 | 0.521 | 0.746 | 0.432 | 0.303 | 1.31 | 2.21 | 2.09 | 0.471 |
| 14 | 6.25 / 6.30 | 0.0147 | 0.227 | 0.414 | 0.565 | 0.317 | 0.323 | 1.06 | 1.67 | 1.66 | 0.363 |
| 16 | 5.82 / 5.86 | 0.0164 | 0.202 | 0.338 | 0.441 | 0.248 | 0.332 | 0.869 | 1.31 | 2.07 | 0.284 |
| 18 | 4.32 / 4.35 | 0.0180 | 0.174 | 0.281 | 0.355 | 0.199 | 0.329 | 0.733 | 1.06 | 1.17 | 0.225 |
| 20 | 3.69 / 3.71 | 0.0194 | 0.149 | 0.239 | 0.292 | 0.170 | 0.315 | 0.625 | 0.883 | 0.998 | 0.191 |

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

| Q/Rs | ----> | 22.09 | 6.267 | 2.392 | 0.8639 | 0.2546 | 6.681 | 2.276 | 0.7329 | 2.127 | 3.576 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 2p(6) | 3p(6) | 4p(6) | 3d(10) | free(2) |
| 0.2 | 18.0 / 8.80 | 0.000206 | 0.00599 | 0.0711 | 0.870 | 15.2 | 0.00578 | 0.0958 | 1.61 | 0.123 | 6.00 |
| 0.4 | 39.4 / 18.5 | 0.000416 | 0.0120 | 0.142 | 1.75 | 33.8 | 0.0116 | 0.191 | 3.22 | 0.245 | 12.9 |
| 0.6 | 60.9 / 29.2 | 0.000626 | 0.0180 | 0.214 | 2.64 | 52.5 | 0.0174 | 0.287 | 4.84 | 0.368 | 20.8 |
| 0.8 | 67.4 / 47.4 | 0.000836 | 0.0240 | 0.284 | 3.53 | 56.3 | 0.0232 | 0.383 | 6.46 | 0.491 | 36.3 |
| 1.0 | 60.3 / 49.9 | 0.00105 | 0.0300 | 0.355 | 4.41 | 46.3 | 0.0290 | 0.478 | 8.06 | 0.613 | 35.9 |
| 1.2 | 54.2 / 47.5 | 0.00125 | 0.0360 | 0.424 | 5.25 | 37.5 | 0.0347 | 0.572 | 9.63 | 0.734 | 30.8 |
| 1.4 | 49.9 / 45.2 | 0.00146 | 0.0419 | 0.493 | 6.01 | 30.7 | 0.0405 | 0.666 | 11.1 | 0.854 | 26.0 |
| 1.6 | 47.1 / 43.6 | 0.00167 | 0.0478 | 0.561 | 6.64 | 25.6 | 0.0463 | 0.758 | 12.5 | 0.974 | 22.1 |
| 1.8 | 45.1 / 42.4 | 0.00188 | 0.0537 | 0.628 | 7.07 | 21.6 | 0.0521 | 0.850 | 13.7 | 1.09 | 18.9 |
| 2.0 | 43.4 / 41.2 | 0.00209 | 0.0596 | 0.693 | 7.28 | 18.6 | 0.0578 | 0.940 | 14.6 | 1.21 | 16.4 |
| 2.2 | 41.8 / 40.0 | 0.00230 | 0.0654 | 0.756 | 7.27 | 16.1 | 0.0635 | 1.03 | 15.2 | 1.32 | 14.3 |
| 2.4 | 40.2 / 38.7 | 0.00250 | 0.0712 | 0.817 | 7.07 | 14.1 | 0.0692 | 1.12 | 15.5 | 1.44 | 12.6 |
| 2.6 | 38.5 / 37.2 | 0.00271 | 0.0769 | 0.876 | 6.74 | 12.5 | 0.0749 | 1.20 | 15.5 | 1.55 | 11.2 |
| 2.8 | 36.7 / 35.6 | 0.00292 | 0.0826 | 0.932 | 6.34 | 11.1 | 0.0806 | 1.29 | 15.2 | 1.66 | 10.0 |
| 3.0 | 34.9 / 33.9 | 0.00313 | 0.0883 | 0.985 | 5.97 | 9.99 | 0.0862 | 1.37 | 14.7 | 1.76 | 9.01 |
| 3.2 | 33.0 / 32.2 | 0.00333 | 0.0939 | 1.03 | 5.45 | 8.99 | 0.0918 | 1.45 | 14.0 | 1.87 | 8.16 |
| 3.4 | 31.2 / 30.5 | 0.00354 | 0.0994 | 1.08 | 5.00 | 8.09 | 0.0973 | 1.52 | 13.4 | 1.97 | 7.42 |
| 3.6 | 29.5 / 29.0 | 0.00375 | 0.105 | 1.12 | 4.64 | 7.32 | 0.103 | 1.59 | 12.6 | 2.07 | 6.80 |
| 3.8 | 28.1 / 27.7 | 0.00396 | 0.110 | 1.16 | 4.32 | 6.63 | 0.108 | 1.66 | 11.9 | 2.16 | 6.24 |
| 4.0 | 26.5 / 26.2 | 0.00416 | 0.116 | 1.19 | 4.02 | 6.06 | 0.114 | 1.73 | 11.0 | 2.25 | 5.74 |
| 5 | 21.3 / 21.3 | 0.00519 | 0.141 | 1.26 | 2.94 | 4.04 | 0.141 | 2.00 | 8.12 | 2.64 | 4.01 |
| 6 | 18.0 / 18.1 | 0.00620 | 0.164 | 1.21 | 2.24 | 2.91 | 0.166 | 2.15 | 6.27 | 2.90 | 2.96 |
| 7 | 15.6 / 15.7 | 0.00720 | 0.184 | 1.09 | 1.77 | 2.19 | 0.190 | 2.17 | 4.98 | 3.02 | 2.29 |
| 8 | 13.6 / 13.7 | 0.00818 | 0.201 | 0.917 | 1.44 | 1.71 | 0.213 | 2.08 | 4.06 | 2.99 | 1.83 |
| 9 | 12.0 / 12.1 | 0.00914 | 0.214 | 0.763 | 1.19 | 1.40 | 0.233 | 1.92 | 3.38 | 2.85 | 1.49 |
| 10 | 10.5 / 10.6 | 0.0101 | 0.223 | 0.662 | 1.00 | 1.15 | 0.252 | 1.68 | 2.85 | 2.61 | 1.24 |
| 12 | 8.04 / 8.14 | 0.0119 | 0.229 | 0.510 | 0.733 | 0.823 | 0.283 | 1.28 | 2.13 | 2.04 | 0.918 |
| 14 | 6.39 / 6.47 | 0.0136 | 0.219 | 0.406 | 0.554 | 0.616 | 0.303 | 1.03 | 1.64 | 1.61 | 0.698 |
| 16 | 5.24 / 5.30 | 0.0152 | 0.197 | 0.332 | 0.434 | 0.480 | 0.313 | 0.850 | 1.29 | 1.33 | 0.544 |
| 18 | 4.41 / 4.45 | 0.0167 | 0.171 | 0.276 | 0.350 | 0.393 | 0.313 | 0.718 | 1.04 | 1.13 | 0.430 |
| 20 | 3.75 / 3.78 | 0.0180 | 0.147 | 0.235 | 0.289 | 0.324 | 0.303 | 0.612 | 0.856 | 0.966 | 0.355 |

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

| Q/Rs | ----> | 22.77 | 6.446 | 2.478 | 0.9202 | 0.2692 | 6.878 | 2.375 | 0.7913 | 2.198 | 0.4980 | 2.376 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 2p(6) | 3p(6) | 4p(6) | 3d(10) | 4d(1) | free(3) |
| 0.2 | 17.8 / 5.93 | 0.000190 | 0.00557 | 0.0651 | 0.748 | 13.4 | 0.00535 | 0.0859 | 1.33 | 0.113 | 2.09 | 3.62 |
| 0.4 | 39.8 / 12.2 | 0.000383 | 0.0112 | 0.130 | 1.50 | 29.4 | 0.0107 | 0.171 | 2.67 | 0.225 | 5.71 | 7.46 |
| 0.6 | 62.1 / 18.7 | 0.000577 | 0.0167 | 0.195 | 2.26 | 46.0 | 0.0161 | 0.258 | 4.01 | 0.338 | 8.92 | 11.5 |
| 0.8 | 73.3 / 25.3 | 0.000770 | 0.0223 | 0.260 | 3.02 | 51.9 | 0.0215 | 0.343 | 5.35 | 0.451 | 11.9 | 15.8 |
| 1.0 | 71.7 / 32.2 | 0.000963 | 0.0278 | 0.325 | 3.78 | 46.2 | 0.0268 | 0.429 | 6.68 | 0.563 | 13.6 | 20.3 |
| 1.2 | 64.3 / 42.1 | 0.00116 | 0.0334 | 0.388 | 4.50 | 36.9 | 0.0322 | 0.513 | 7.98 | 0.675 | 13.3 | 28.0 |
| 1.4 | 58.6 / 43.5 | 0.00135 | 0.0389 | 0.451 | 5.17 | 30.3 | 0.0375 | 0.597 | 9.23 | 0.785 | 12.0 | 27.2 |
| 1.6 | 53.8 / 42.9 | 0.00154 | 0.0445 | 0.514 | 5.75 | 25.3 | 0.0429 | 0.680 | 10.4 | 0.895 | 10.2 | 24.6 |
| 1.8 | 50.3 / 41.9 | 0.00173 | 0.0499 | 0.575 | 6.19 | 21.5 | 0.0482 | 0.763 | 11.4 | 1.00 | 8.82 | 21.9 |
| 2.0 | 47.6 / 40.9 | 0.00192 | 0.0554 | 0.634 | 6.47 | 18.4 | 0.0535 | 0.844 | 12.3 | 1.11 | 7.67 | 19.4 |
| 2.2 | 45.3 / 39.8 | 0.00212 | 0.0608 | 0.693 | 6.56 | 16.0 | 0.0588 | 0.924 | 13.0 | 1.22 | 6.76 | 17.3 |
| 2.4 | 43.1 / 38.5 | 0.00231 | 0.0662 | 0.749 | 6.48 | 14.0 | 0.0641 | 1.00 | 13.4 | 1.32 | 5.98 | 15.4 |
| 2.6 | 41.0 / 37.2 | 0.00250 | 0.0715 | 0.804 | 6.27 | 12.4 | 0.0694 | 1.08 | 13.6 | 1.42 | 5.32 | 13.9 |
| 2.8 | 39.0 / 35.7 | 0.00269 | 0.0768 | 0.856 | 5.98 | 11.0 | 0.0746 | 1.16 | 13.6 | 1.52 | 4.77 | 12.5 |
| 3.0 | 37.1 / 34.3 | 0.00288 | 0.0821 | 0.905 | 5.64 | 9.91 | 0.0798 | 1.23 | 13.3 | 1.62 | 4.31 | 11.4 |
| 3.2 | 35.1 / 32.7 | 0.00307 | 0.0873 | 0.951 | 5.27 | 8.94 | 0.0850 | 1.30 | 12.9 | 1.72 | 3.91 | 10.4 |
| 3.4 | 33.4 / 31.2 | 0.00326 | 0.0924 | 0.994 | 5.06 | 8.08 | 0.0902 | 1.37 | 12.4 | 1.81 | 3.57 | 9.49 |
| 3.6 | 31.6 / 29.7 | 0.00345 | 0.0975 | 1.03 | 4.63 | 7.34 | 0.0953 | 1.44 | 11.8 | 1.91 | 3.27 | 8.71 |
| 3.8 | 30.0 / 28.3 | 0.00364 | 0.103 | 1.07 | 4.32 | 6.68 | 0.100 | 1.50 | 11.2 | 1.99 | 3.01 | 8.03 |
| 4.0 | 28.5 / 27.1 | 0.00383 | 0.108 | 1.10 | 4.03 | 6.08 | 0.106 | 1.56 | 10.6 | 2.08 | 2.78 | 7.43 |
| 5 | 22.4 / 21.7 | 0.00478 | 0.131 | 1.18 | 2.94 | 4.06 | 0.130 | 1.82 | 7.78 | 2.45 | 1.93 | 5.27 |
| 6 | 18.7 / 18.3 | 0.00571 | 0.153 | 1.16 | 2.24 | 2.93 | 0.154 | 1.97 | 6.01 | 2.71 | 1.40 | 3.95 |
| 7 | 16.1 / 15.9 | 0.00663 | 0.172 | 1.05 | 1.77 | 2.20 | 0.177 | 2.02 | 4.83 | 2.84 | 1.06 | 3.06 |
| 8 | 14.0 / 13.9 | 0.00754 | 0.188 | 0.901 | 1.44 | 1.73 | 0.198 | 1.96 | 3.93 | 2.84 | 0.831 | 2.46 |
| 9 | 12.3 / 12.2 | 0.00843 | 0.201 | 0.752 | 1.19 | 1.41 | 0.217 | 1.83 | 3.27 | 2.73 | 0.669 | 2.02 |
| 10 | 10.7 / 10.7 | 0.00931 | 0.211 | 0.642 | 1.01 | 1.14 | 0.235 | 1.64 | 2.77 | 2.53 | 0.555 | 1.70 |
| 12 | 8.28 / 8.33 | 0.0110 | 0.218 | 0.500 | 0.746 | 0.809 | 0.264 | 1.26 | 2.07 | 2.01 | 0.395 | 1.25 |
| 14 | 6.59 / 6.61 | 0.0126 | 0.210 | 0.400 | 0.566 | 0.626 | 0.285 | 0.995 | 1.61 | 1.58 | 0.301 | 0.943 |
| 16 | 5.40 / 5.44 | 0.0141 | 0.191 | 0.327 | 0.445 | 0.479 | 0.296 | 0.831 | 1.28 | 1.31 | 0.231 | 0.759 |
| 18 | 4.53 / 4.54 | 0.0155 | 0.168 | 0.272 | 0.354 | 0.402 | 0.298 | 0.703 | 1.02 | 1.11 | 0.187 | 0.599 |
| 20 | 3.85 / 3.88 | 0.0167 | 0.145 | 0.231 | 0.287 | 0.322 | 0.290 | 0.600 | 0.847 | 0.957 | 0.157 | 0.505 |

Zr ( Z=40 )  1s(2)2s(2)3s(2)4s(2)2p(6)3p(6)4p(6)3d(10) [4d(2)5s(2)/free(4)]

| Q/Rs | ----> | 23.32 | 6.633 | 2.570 | 0.9719 | 0.2826 | 7.079 | 2.473 | 0.8435 | 2.326 | 0.5400 | 2.117 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 2p(6) | 3p(6) | 4p(6) | 3d(10) | 4d(2) | free(4) |
| 0.2 | 16.6 / 5.77 | 0.000178 | 0.00517 | 0.0594 | 0.655 | 11.9 | 0.00495 | 0.0774 | 1.14 | 0.0976 | 2.65 | 3.72 |
| 0.4 | 35.5 / 11.7 | 0.000359 | 0.0104 | 0.119 | 1.32 | 26.0 | 0.00995 | 0.155 | 2.29 | 0.195 | 5.40 | 7.61 |
| 0.6 | 55.4 / 17.8 | 0.000541 | 0.0155 | 0.178 | 1.98 | 41.0 | 0.0149 | 0.232 | 3.43 | 0.292 | 8.27 | 11.7 |
| 0.8 | 67.4 / 23.9 | 0.000721 | 0.0207 | 0.237 | 2.64 | 48.1 | 0.0199 | 0.309 | 4.57 | 0.390 | 11.2 | 15.8 |
| 1.0 | 67.5 / 30.4 | 0.000902 | 0.0258 | 0.296 | 3.30 | 43.5 | 0.0248 | 0.386 | 5.71 | 0.487 | 13.8 | 20.2 |
| 1.2 | 63.3 / 37.7 | 0.00108 | 0.0310 | 0.354 | 3.94 | 35.5 | 0.0298 | 0.463 | 6.82 | 0.584 | 15.6 | 25.5 |
| 1.4 | 59.6 / 44.9 | 0.00126 | 0.0361 | 0.412 | 4.54 | 29.3 | 0.0348 | 0.539 | 7.90 | 0.679 | 16.2 | 30.8 |
| 1.6 | 56.1 / 45.1 | 0.00144 | 0.0413 | 0.469 | 5.07 | 24.5 | 0.0397 | 0.614 | 8.91 | 0.774 | 15.6 | 29.1 |
| 1.8 | 52.7 / 44.0 | 0.00162 | 0.0463 | 0.525 | 5.50 | 20.8 | 0.0447 | 0.688 | 9.84 | 0.869 | 14.4 | 26.5 |
| 2.0 | 49.7 / 42.6 | 0.00180 | 0.0514 | 0.579 | 5.80 | 17.9 | 0.0496 | 0.761 | 10.7 | 0.962 | 13.0 | 23.8 |
| 2.2 | 46.9 / 41.4 | 0.00198 | 0.0564 | 0.633 | 5.95 | 15.5 | 0.0545 | 0.834 | 11.3 | 1.05 | 11.4 | 21.4 |
| 2.4 | 44.5 / 39.9 | 0.00216 | 0.0614 | 0.685 | 5.96 | 13.6 | 0.0594 | 0.905 | 11.8 | 1.15 | 10.2 | 19.2 |
| 2.6 | 42.3 / 38.4 | 0.00234 | 0.0664 | 0.735 | 5.84 | 12.1 | 0.0643 | 0.975 | 12.1 | 1.23 | 9.19 | 17.4 |
| 2.8 | 40.2 / 36.8 | 0.00252 | 0.0713 | 0.783 | 5.63 | 10.8 | 0.0692 | 1.04 | 12.2 | 1.32 | 8.29 | 15.7 |
| 3.0 | 38.2 / 35.3 | 0.00270 | 0.0762 | 0.829 | 5.35 | 9.70 | 0.0740 | 1.11 | 12.1 | 1.41 | 7.52 | 14.3 |
| 3.2 | 36.3 / 33.8 | 0.00288 | 0.0811 | 0.872 | 5.08 | 8.76 | 0.0788 | 1.18 | 11.9 | 1.49 | 6.86 | 13.1 |
| 3.4 | 34.4 / 32.2 | 0.00306 | 0.0859 | 0.913 | 4.72 | 7.94 | 0.0856 | 1.24 | 11.5 | 1.58 | 6.31 | 12.0 |
| 3.6 | 32.7 / 30.8 | 0.00324 | 0.0906 | 0.950 | 4.51 | 7.24 | 0.0883 | 1.30 | 11.1 | 1.67 | 5.79 | 11.1 |
| 3.8 | 30.9 / 29.2 | 0.00342 | 0.0953 | 0.984 | 4.15 | 6.60 | 0.0931 | 1.36 | 10.6 | 1.73 | 5.33 | 10.2 |
| 4.0 | 29.4 / 27.9 | 0.00359 | 0.0999 | 1.02 | 3.89 | 6.01 | 0.0978 | 1.42 | 10.2 | 1.81 | 4.94 | 9.46 |
| 5 | 23.1 / 22.3 | 0.00448 | 0.122 | 1.11 | 2.85 | 4.02 | 0.121 | 1.66 | 7.58 | 2.15 | 3.51 | 6.73 |
| 6 | 19.2 / 18.7 | 0.00536 | 0.143 | 1.10 | 2.18 | 2.89 | 0.143 | 1.81 | 5.85 | 2.39 | 2.64 | 5.06 |
| 7 | 16.4 / 16.1 | 0.00622 | 0.161 | 1.01 | 1.73 | 2.19 | 0.164 | 1.88 | 4.70 | 2.54 | 2.03 | 3.95 |
| 8 | 14.3 / 14.2 | 0.00708 | 0.176 | 0.883 | 1.41 | 1.72 | 0.184 | 1.85 | 3.84 | 2.58 | 1.60 | 3.18 |
| 9 | 12.5 / 12.4 | 0.00791 | 0.189 | 0.741 | 1.17 | 1.38 | 0.202 | 1.75 | 3.21 | 2.53 | 1.30 | 2.62 |
| 10 | 11.0 / 11.0 | 0.00874 | 0.198 | 0.629 | 0.986 | 1.14 | 0.219 | 1.59 | 2.73 | 2.39 | 1.07 | 2.19 |
| 12 | 8.50 / 8.52 | 0.0103 | 0.207 | 0.491 | 0.731 | 0.821 | 0.247 | 1.24 | 2.04 | 1.95 | 0.771 | 1.61 |
| 14 | 6.72 / 6.77 | 0.0118 | 0.202 | 0.392 | 0.556 | 0.608 | 0.268 | 0.972 | 1.59 | 1.55 | 0.580 | 1.24 |
| 16 | 5.06 / 5.09 | 0.0132 | 0.186 | 0.321 | 0.437 | 0.479 | 0.280 | 0.813 | 1.26 | 1.27 | 0.452 | 0.965 |
| 18 | 4.25 / 4.30 | 0.0146 | 0.164 | 0.268 | 0.351 | 0.383 | 0.283 | 0.688 | 1.02 | 1.08 | 0.368 | 0.796 |
| 20 | 3.63 / 3.67 | 0.0158 | 0.143 | 0.227 | 0.289 | 0.320 | 0.278 | 0.588 | 0.842 | 0.925 | 0.299 | 0.663 |

Nb ( Z=41 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 3d(10)  [ 4d(3)/free(3) ]

| Q/Rs | ----> | 23.96 | 6.813 | 2.661 | 1.022 | 0.2934 | 7.318 | 2.572 | 0.8935 | 2.440 | 0.5890 | 2.126 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 2p(6) | 3p(6) | 4p(6) | 3d(10) | 4d(3) | free(3) |
| 0.2 | 15.7 / 16.2 | 1.65(-4) | 0.00482 | 0.0544 | 0.580 | 10.9 | 0.00454 | 0.700 | 0.990 | 0.0863 | 2.36 | 2.82 |
| 0.4 | 32.0 / 33.0 | 3.34(-4) | 0.00965 | 0.109 | 1.17 | 23.7 | 0.00911 | 0.140 | 1.99 | 0.172 | 4.76 | 5.76 |
| 0.6 | 50.0 / 51.6 | 5.02(-4) | 0.0145 | 0.163 | 1.75 | 37.4 | 0.0137 | 0.210 | 2.98 | 0.258 | 7.22 | 8.82 |
| 0.8 | 61.9 / 64.2 | 6.70(-4) | 0.0193 | 0.217 | 2.34 | 45.0 | 0.0182 | 0.280 | 3.97 | 0.345 | 9.71 | 12.0 |
| 1.0 | 63.1 / 66.3 | 8.38(-4) | 0.0241 | 0.271 | 2.92 | 42.0 | 0.0228 | 0.350 | 4.95 | 0.431 | 12.1 | 15.3 |
| 1.2 | 59.3 / 64.5 | 0.00101 | 0.0289 | 0.325 | 3.49 | 34.3 | 0.0273 | 0.419 | 5.92 | 0.516 | 14.3 | 19.5 |
| 1.4 | 56.8 / 64.3 | 0.00117 | 0.0337 | 0.377 | 4.02 | 28.5 | 0.0318 | 0.487 | 6.86 | 0.601 | 15.8 | 23.3 |
| 1.6 | 54.6 / 59.9 | 0.00134 | 0.0385 | 0.429 | 4.51 | 23.9 | 0.0364 | 0.555 | 7.75 | 0.685 | 16.6 | 21.9 |
| 1.8 | 52.4 / 55.7 | 0.00151 | 0.0432 | 0.481 | 4.91 | 20.4 | 0.0409 | 0.623 | 8.58 | 0.769 | 16.6 | 19.9 |
| 2.0 | 50.1 / 51.8 | 0.00168 | 0.0479 | 0.531 | 5.22 | 17.5 | 0.0454 | 0.689 | 9.33 | 0.851 | 15.9 | 17.9 |
| 2.2 | 47.8 / 49.1 | 0.00184 | 0.0526 | 0.580 | 5.41 | 15.2 | 0.0499 | 0.755 | 9.96 | 0.933 | 14.8 | 16.1 |
| 2.4 | 45.5 / 46.4 | 0.00201 | 0.0573 | 0.628 | 5.48 | 13.4 | 0.0544 | 0.820 | 10.5 | 1.01 | 13.6 | 14.5 |
| 2.6 | 43.0 / 44.0 | 0.00218 | 0.0619 | 0.675 | 5.43 | 11.9 | 0.0589 | 0.883 | 10.8 | 1.09 | 12.1 | 13.1 |
| 2.8 | 40.9 / 41.6 | 0.00234 | 0.0665 | 0.719 | 5.29 | 10.6 | 0.0633 | 0.946 | 11.0 | 1.17 | 11.1 | 11.8 |
| 3.0 | 38.9 / 39.6 | 0.00251 | 0.0711 | 0.762 | 5.08 | 9.53 | 0.0678 | 1.01 | 11.0 | 1.25 | 10.1 | 10.8 |
| 3.2 | 37.0 / 37.6 | 0.00267 | 0.0756 | 0.803 | 4.83 | 8.64 | 0.0722 | 1.07 | 10.9 | 1.32 | 9.28 | 9.84 |
| 3.4 | 35.2 / 35.7 | 0.00284 | 0.0801 | 0.841 | 4.56 | 7.85 | 0.0766 | 1.12 | 10.7 | 1.40 | 8.54 | 9.02 |
| 3.6 | 33.5 / 33.9 | 0.00301 | 0.0846 | 0.876 | 4.36 | 7.13 | 0.0809 | 1.18 | 10.4 | 1.47 | 7.87 | 8.30 |
| 3.8 | 31.7 / 32.1 | 0.00317 | 0.0889 | 0.909 | 4.05 | 6.52 | 0.0853 | 1.24 | 10.0 | 1.54 | 7.27 | 7.67 |
| 4.0 | 30.1 / 30.4 | 0.00334 | 0.0933 | 0.939 | 3.74 | 5.97 | 0.0896 | 1.29 | 9.59 | 1.61 | 6.79 | 7.11 |
| 5 | 23.9 / 24.1 | 0.00416 | 0.114 | 1.03 | 2.77 | 3.99 | 0.111 | 1.51 | 7.57 | 1.92 | 4.86 | 5.06 |
| 6 | 19.7 / 19.8 | 0.00498 | 0.133 | 1.04 | 2.13 | 2.86 | 0.131 | 1.67 | 5.88 | 2.15 | 3.67 | 3.80 |
| 7 | 16.8 / 16.9 | 0.00579 | 0.151 | 0.974 | 1.68 | 2.17 | 0.151 | 1.75 | 4.72 | 2.31 | 2.87 | 2.97 |
| 8 | 14.6 / 14.7 | 0.00658 | 0.165 | 0.863 | 1.37 | 1.70 | 0.169 | 1.74 | 3.85 | 2.37 | 2.33 | 2.39 |
| 9 | 12.8 / 12.9 | 0.00736 | 0.178 | 0.730 | 1.14 | 1.38 | 0.186 | 1.67 | 3.21 | 2.35 | 1.90 | 1.96 |
| 10 | 11.2 / 11.3 | 0.00813 | 0.187 | 0.618 | 0.964 | 1.12 | 0.202 | 1.54 | 2.73 | 2.25 | 1.57 | 1.64 |
| 12 | 8.72 / 8.80 | 0.00961 | 0.197 | 0.481 | 0.718 | 0.811 | 0.229 | 1.21 | 2.04 | 1.89 | 1.13 | 1.21 |
| 14 | 6.91 / 6.99 | 0.0110 | 0.194 | 0.386 | 0.550 | 0.609 | 0.249 | 0.95 | 1.59 | 1.52 | 0.850 | 0.928 |
| 16 | 5.65 / 5.72 | 0.0124 | 0.180 | 0.316 | 0.430 | 0.480 | 0.261 | 0.795 | 1.28 | 1.23 | 0.668 | 0.739 |
| 18 | 4.73 / 4.79 | 0.0136 | 0.161 | 0.263 | 0.347 | 0.382 | 0.266 | 0.674 | 1.03 | 1.05 | 0.536 | 0.597 |
| 20 | 4.01 / 4.07 | 0.0147 | 0.141 | 0.223 | 0.286 | 0.313 | 0.263 | 0.576 | 0.853 | 0.902 | 0.441 | 0.497 |

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

| Q/Rs | ----> | 24.50 | 6.997 | 2.752 | 1.070 | 0.3032 | 7.477 | 2.670 | 0.9416 | 2.552 | 0.6356 | 2.320 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 2p(6) | 3p(6) | 4p(6) | 3d(10) | 4d(4) | free(2) |
| 0.2 | 13.8 / 5.99 | 0.000155 | 0.00449 | 0.0499 | 0.519 | 10.1 | 0.00428 | 0.0636 | 0.870 | 0.0768 | 2.09 | 2.29 |
| 0.4 | 29.2 / 12.0 | 0.000314 | 0.00900 | 0.0998 | 1.04 | 21.8 | 0.00860 | 0.127 | 1.75 | 0.154 | 4.20 | 4.70 |
| 0.6 | 45.6 / 18.3 | 0.000473 | 0.0135 | 0.150 | 1.57 | 34.5 | 0.0129 | 0.191 | 2.62 | 0.230 | 6.34 | 7.24 |
| 0.8 | 57.3 / 24.8 | 0.000631 | 0.0180 | 0.200 | 2.09 | 42.4 | 0.0172 | 0.254 | 3.49 | 0.307 | 8.49 | 9.90 |
| 1.0 | 59.1 / 31.2 | 0.000789 | 0.0224 | 0.249 | 2.61 | 40.6 | 0.0215 | 0.318 | 4.35 | 0.384 | 10.6 | 12.7 |
| 1.2 | 55.7 / 39.8 | 0.000947 | 0.0269 | 0.298 | 3.12 | 33.6 | 0.0258 | 0.380 | 5.20 | 0.460 | 12.6 | 17.7 |
| 1.4 | 53.3 / 42.9 | 0.00111 | 0.0314 | 0.347 | 3.60 | 28.0 | 0.0300 | 0.443 | 6.03 | 0.535 | 14.4 | 17.6 |
| 1.6 | 51.4 / 43.9 | 0.00126 | 0.0359 | 0.395 | 4.04 | 23.5 | 0.0343 | 0.505 | 6.82 | 0.611 | 15.5 | 16.0 |
| 1.8 | 50.3 / 44.5 | 0.00142 | 0.0403 | 0.442 | 4.43 | 20.1 | 0.0386 | 0.566 | 7.57 | 0.685 | 16.5 | 14.3 |
| 2.0 | 48.8 / 44.2 | 0.00158 | 0.0447 | 0.488 | 4.73 | 17.3 | 0.0429 | 0.627 | 8.25 | 0.759 | 16.6 | 12.7 |
| 2.2 | 47.2 / 43.4 | 0.00173 | 0.0491 | 0.534 | 4.95 | 15.1 | 0.0472 | 0.687 | 8.85 | 0.832 | 16.2 | 11.3 |
| 2.4 | 45.4 / 42.4 | 0.00189 | 0.0535 | 0.578 | 5.05 | 13.2 | 0.0514 | 0.746 | 9.34 | 0.904 | 15.5 | 10.2 |
| 2.6 | 43.6 / 41.0 | 0.00205 | 0.0578 | 0.621 | 5.06 | 11.7 | 0.0556 | 0.804 | 9.72 | 0.975 | 14.6 | 9.13 |
| 2.8 | 42.4 / 40.2 | 0.00220 | 0.0621 | 0.662 | 4.97 | 10.5 | 0.0598 | 0.861 | 9.97 | 1.05 | 13.7 | 8.25 |
| 3.0 | 39.7 / 37.7 | 0.00236 | 0.0664 | 0.702 | 4.82 | 9.47 | 0.0640 | 0.917 | 10.1 | 1.11 | 12.4 | 7.49 |
| 3.2 | 37.6 / 35.9 | 0.00252 | 0.0706 | 0.740 | 4.62 | 8.53 | 0.0682 | 0.971 | 10.1 | 1.18 | 11.4 | 6.83 |
| 3.4 | 35.8 / 34.3 | 0.00267 | 0.0748 | 0.776 | 4.40 | 7.77 | 0.0724 | 1.03 | 9.96 | 1.25 | 10.5 | 6.25 |
| 3.6 | 34.0 / 32.7 | 0.00283 | 0.0789 | 0.810 | 4.14 | 7.07 | 0.0765 | 1.08 | 9.74 | 1.31 | 9.72 | 5.75 |
| 3.8 | 32.5 / 31.3 | 0.00299 | 0.0830 | 0.841 | 3.95 | 6.49 | 0.0806 | 1.13 | 9.46 | 1.38 | 9.04 | 5.31 |
| 4.0 | 30.8 / 29.8 | 0.00314 | 0.0871 | 0.870 | 3.66 | 5.95 | 0.0847 | 1.18 | 9.13 | 1.44 | 8.40 | 4.91 |
| 5 | 24.5 / 24.0 | 0.00392 | 0.107 | 0.967 | 2.70 | 4.00 | 0.105 | 1.39 | 7.36 | 1.72 | 6.10 | 3.48 |
| 6 | 20.0 / 19.8 | 0.00469 | 0.125 | 0.985 | 2.07 | 2.86 | 0.124 | 1.54 | 5.70 | 1.94 | 4.63 | 2.61 |
| 7 | 17.0 / 16.9 | 0.00545 | 0.141 | 0.935 | 1.65 | 2.17 | 0.143 | 1.63 | 4.58 | 2.10 | 3.65 | 2.03 |
| 8 | 14.7 / 14.6 | 0.00620 | 0.155 | 0.842 | 1.34 | 1.70 | 0.160 | 1.64 | 3.75 | 2.18 | 2.96 | 1.63 |
| 9 | 12.9 / 12.9 | 0.00694 | 0.167 | 0.718 | 1.12 | 1.38 | 0.176 | 1.59 | 3.13 | 2.18 | 2.45 | 1.34 |
| 10 | 11.4 / 11.4 | 0.00766 | 0.176 | 0.610 | 0.948 | 1.13 | 0.191 | 1.48 | 2.66 | 2.12 | 2.06 | 1.13 |
| 12 | 8.89 / 8.92 | 0.00906 | 0.187 | 0.472 | 0.705 | 0.800 | 0.217 | 1.19 | 1.99 | 1.83 | 1.49 | 0.825 |
| 14 | 7.08 / 7.09 | 0.0104 | 0.186 | 0.379 | 0.546 | 0.619 | 0.237 | 0.940 | 1.56 | 1.49 | 1.12 | 0.626 |
| 16 | 5.77 / 5.79 | 0.0117 | 0.175 | 0.310 | 0.429 | 0.482 | 0.250 | 0.779 | 1.25 | 1.21 | 0.877 | 0.503 |
| 18 | 4.83 / 4.85 | 0.0128 | 0.157 | 0.259 | 0.345 | 0.381 | 0.256 | 0.660 | 1.02 | 1.03 | 0.707 | 0.399 |
| 20 | 4.10 / 4.12 | 0.0139 | 0.138 | 0.220 | 0.285 | 0.316 | 0.254 | 0.565 | 0.842 | 0.881 | 0.582 | 0.335 |

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

| Q/Rs | ----> | 25.76 | 7.178 | 2.843 | 1.117 | 0.3114 | 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 | 12.8 | 1.35(-4) | 0.00420 | 0.0460 | 0.468 | 9.53 | 0.00399 | 0.0581 | 0.782 | 0.0686 | 1.86 |
| 0.4 | 27.0 | 2.74(-4) | 0.00841 | 0.0919 | 0.939 | 20.4 | 0.00802 | 0.116 | 1.57 | 0.137 | 3.73 |
| 0.6 | 42.2 | 4.12(-4) | 0.0126 | 0.138 | 1.41 | 32.3 | 0.0120 | 0.174 | 2.36 | 0.205 | 5.62 |
| 0.8 | 53.5 | 5.51(-4) | 0.0168 | 0.184 | 1.88 | 40.3 | 0.0161 | 0.232 | 3.14 | 0.274 | 7.51 |
| 1.0 | 55.8 | 6.89(-4) | 0.0210 | 0.229 | 2.35 | 39.3 | 0.0201 | 0.290 | 3.91 | 0.343 | 9.38 |
| 1.2 | 53.5 | 8.27(-4) | 0.0252 | 0.275 | 2.80 | 33.7 | 0.0240 | 0.348 | 4.68 | 0.411 | 11.2 |
| 1.4 | 50.8 | 9.64(-4) | 0.0294 | 0.319 | 3.24 | 28.0 | 0.0280 | 0.405 | 5.42 | 0.478 | 12.9 |
| 1.6 | 49.1 | 0.00110 | 0.0335 | 0.364 | 3.65 | 23.6 | 0.0320 | 0.461 | 6.14 | 0.545 | 14.3 |
| 1.8 | 47.9 | 0.00124 | 0.0377 | 0.407 | 4.01 | 20.1 | 0.0360 | 0.517 | 6.82 | 0.612 | 15.4 |
| 2.0 | 46.9 | 0.00138 | 0.0418 | 0.450 | 4.31 | 17.3 | 0.0400 | 0.573 | 7.45 | 0.678 | 16.1 |
| 2.2 | 45.9 | 0.00151 | 0.0459 | 0.492 | 4.53 | 15.1 | 0.0440 | 0.628 | 8.01 | 0.743 | 16.3 |
| 2.4 | 44.7 | 0.00165 | 0.0500 | 0.533 | 4.66 | 13.3 | 0.0479 | 0.682 | 8.49 | 0.808 | 16.1 |
| 2.6 | 43.3 | 0.00179 | 0.0541 | 0.573 | 4.71 | 11.8 | 0.0519 | 0.735 | 8.87 | 0.872 | 15.6 |
| 2.8 | 41.7 | 0.00193 | 0.0581 | 0.612 | 4.67 | 10.5 | 0.0588 | 0.788 | 9.15 | 0.935 | 14.9 |
| 3.0 | 40.0 | 0.00206 | 0.0621 | 0.649 | 4.56 | 9.47 | 0.0597 | 0.839 | 9.32 | 0.997 | 14.1 |
| 3.2 | 38.3 | 0.00220 | 0.0660 | 0.684 | 4.41 | 8.58 | 0.0636 | 0.889 | 9.37 | 1.06 | 13.2 |
| 3.4 | 36.9 | 0.00234 | 0.0700 | 0.718 | 4.22 | 7.80 | 0.0675 | 0.939 | 9.32 | 1.12 | 12.6 |
| 3.6 | 34.9 | 0.00247 | 0.0739 | 0.750 | 4.00 | 7.12 | 0.0714 | 0.987 | 9.19 | 1.18 | 11.6 |
| 3.8 | 33.2 | 0.00261 | 0.0777 | 0.780 | 3.83 | 6.46 | 0.0752 | 1.03 | 8.97 | 1.23 | 10.8 |
| 4.0 | 31.6 | 0.00275 | 0.0815 | 0.807 | 3.59 | 5.94 | 0.0790 | 1.08 | 8.71 | 1.29 | 10.1 |
| 5 | 25.1 | 0.00342 | 0.100 | 0.906 | 2.63 | 4.03 | 0.0978 | 1.28 | 7.18 | 1.55 | 7.34 |
| 6 | 20.4 | 0.00410 | 0.117 | 0.933 | 2.03 | 2.88 | 0.116 | 1.43 | 5.54 | 1.76 | 5.62 |
| 7 | 17.3 | 0.00476 | 0.133 | 0.897 | 1.62 | 2.19 | 0.133 | 1.52 | 4.46 | 1.91 | 4.42 |
| 8 | 14.9 | 0.00542 | 0.146 | 0.818 | 1.32 | 1.69 | 0.150 | 1.54 | 3.65 | 2.00 | 3.58 |
| 9 | 13.1 | 0.00607 | 0.158 | 0.708 | 1.10 | 1.36 | 0.165 | 1.51 | 3.07 | 2.03 | 2.97 |
| 10 | 11.6 | 0.00670 | 0.167 | 0.602 | 0.930 | 1.15 | 0.179 | 1.43 | 2.61 | 1.99 | 2.51 |
| 12 | 9.13 | 0.00794 | 0.178 | 0.464 | 0.696 | 0.823 | 0.204 | 1.17 | 1.96 | 1.76 | 1.86 |
| 14 | 7.25 | 0.00912 | 0.178 | 0.372 | 0.538 | 0.604 | 0.224 | 0.927 | 1.53 | 1.45 | 1.41 |
| 16 | 5.91 | 0.0103 | 0.169 | 0.304 | 0.425 | 0.472 | 0.237 | 0.761 | 1.23 | 1.19 | 1.11 |
| 18 | 5.41 | 0.0113 | 0.154 | 0.255 | 0.843 | 0.381 | 0.243 | 0.647 | 1.01 | 0.989 | 0.880 |
| 20 | 4.17 | 0.0123 | 0.136 | 0.217 | 0.282 | 0.312 | 0.243 | 0.555 | 0.838 | 0.861 | 0.718 |

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

| Q/Rs | ----> | 25.86 | 7.379 | 2.906 | 1.161 | 0.3027 | 7.887 | 2.858 | 1.020 | 2.778 | 0.6662 | 1.956 | 0.6662 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(1) | 2p(6) | 3p(6) | 4p(6) | 3d(10) | 4d(7) | free(3) | 4d(5) |
| 0.2 | 12.1 / 5.61 | 0.000134 | 0.00390 | 0.0435 | 0.426 | 8.70 | 0.00371 | 0.0534 | 0.714 | 0.0617 | 2.08 | 2.34 | 1.95 |
| 0.4 | 26.4 / 11.3 | 0.000271 | 0.00783 | 0.0869 | 0.855 | 19.6 | 0.00746 | 0.107 | 1.44 | 0.123 | 4.18 | 4.75 | 3.92 |
| 0.6 | 40.1 / 17.1 | 0.000408 | 0.0117 | 0.131 | 1.28 | 29.9 | 0.0112 | 0.160 | 2.15 | 0.185 | 6.29 | 7.24 | 5.90 |
| 0.8 | 43.9 / 22.9 | 0.000545 | 0.0156 | 0.174 | 1.71 | 30.3 | 0.0149 | 0.214 | 2.87 | 0.247 | 8.39 | 9.81 | 7.89 |
| 1.0 | 45.0 / 32.4 | 0.000682 | 0.0195 | 0.217 | 2.14 | 24.4 | 0.0187 | 0.267 | 3.57 | 0.308 | 10.5 | 12.4 | 9.86 |
| 1.2 | 39.9 / 34.9 | 0.000818 | 0.0234 | 0.260 | 2.55 | 19.5 | 0.0224 | 0.320 | 4.27 | 0.369 | 12.5 | 15.2 | 11.8 |
| 1.4 | 39.4 / 41.4 | 0.000954 | 0.0273 | 0.302 | 2.95 | 16.0 | 0.0261 | 0.372 | 4.95 | 0.430 | 14.4 | 18.9 | 13.5 |
| 1.6 | 39.7 / 43.7 | 0.00109 | 0.0312 | 0.344 | 3.33 | 13.2 | 0.0298 | 0.424 | 5.61 | 0.491 | 16.2 | 18.4 | 15.0 |
| 1.8 | 40.2 / 44.6 | 0.00123 | 0.0351 | 0.385 | 3.67 | 11.2 | 0.0335 | 0.476 | 6.24 | 0.551 | 17.6 | 17.1 | 16.1 |
| 2.0 | 40.7 / 44.7 | 0.00136 | 0.0389 | 0.426 | 3.95 | 9.56 | 0.0372 | 0.527 | 6.83 | 0.610 | 18.7 | 15.6 | 16.7 |
| 2.2 | 40.9 / 44.4 | 0.00150 | 0.0427 | 0.466 | 4.18 | 8.28 | 0.0409 | 0.577 | 7.36 | 0.669 | 19.3 | 14.2 | 16.9 |
| 2.4 | 40.9 / 43.8 | 0.00163 | 0.0465 | 0.505 | 4.33 | 7.24 | 0.0446 | 0.627 | 7.82 | 0.728 | 19.5 | 13.0 | 16.6 |
| 2.6 | 40.4 / 42.6 | 0.00177 | 0.0503 | 0.543 | 4.40 | 6.41 | 0.0483 | 0.676 | 8.20 | 0.785 | 19.3 | 11.9 | 16.0 |
| 2.8 | 39.6 / 41.1 | 0.00191 | 0.0541 | 0.579 | 4.40 | 5.70 | 0.0519 | 0.725 | 8.49 | 0.842 | 18.8 | 10.9 | 15.1 |
| 3.0 | 38.5 / 39.9 | 0.00204 | 0.0578 | 0.615 | 4.33 | 5.10 | 0.0556 | 0.772 | 8.69 | 0.898 | 18.0 | 9.97 | 14.5 |
| 3.2 | 37.2 / 38.2 | 0.00218 | 0.0615 | 0.649 | 4.21 | 4.57 | 0.0592 | 0.819 | 8.78 | 0.954 | 17.1 | 9.18 | 13.5 |
| 3.4 | 35.7 / 36.3 | 0.00231 | 0.0652 | 0.681 | 4.05 | 4.10 | 0.0628 | 0.865 | 8.79 | 1.01 | 16.1 | 8.48 | 12.3 |
| 3.6 | 34.5 / 34.6 | 0.00245 | 0.0688 | 0.712 | 3.88 | 3.70 | 0.0664 | 0.909 | 8.71 | 1.06 | 15.4 | 7.84 | 11.4 |
| 3.8 | 32.8 / 33.1 | 0.00258 | 0.0724 | 0.741 | 3.68 | 3.36 | 0.0700 | 0.952 | 8.55 | 1.11 | 14.2 | 7.28 | 10.6 |
| 4.0 | 31.3 / 31.7 | 0.00272 | 0.0760 | 0.767 | 3.55 | 3.05 | 0.0736 | 0.994 | 8.34 | 1.17 | 13.2 | 6.77 | 9.92 |
| 5 | 24.9 / 25.2 | 0.00339 | 0.0932 | 0.865 | 2.57 | 2.04 | 0.0912 | 1.18 | 6.92 | 1.40 | 9.77 | 4.88 | 7.25 |
| 6 | 20.4 / 20.7 | 0.00406 | 0.109 | 0.898 | 2.00 | 1.47 | 0.108 | 1.33 | 5.39 | 1.60 | 7.50 | 3.68 | 5.54 |
| 7 | 17.3 / 17.5 | 0.00471 | 0.124 | 0.870 | 1.59 | 1.11 | 0.124 | 1.42 | 4.35 | 1.75 | 5.94 | 2.89 | 4.37 |
| 8 | 15.0 / 15.2 | 0.00536 | 0.137 | 0.801 | 1.30 | 0.862 | 0.140 | 1.45 | 3.59 | 1.84 | 4.82 | 2.32 | 3.55 |
| 9 | 13.3 / 13.5 | 0.00600 | 0.148 | 0.698 | 1.08 | 0.697 | 0.154 | 1.44 | 3.00 | 1.88 | 4.01 | 1.91 | 2.95 |
| 10 | 11.6 / 11.7 | 0.00664 | 0.157 | 0.597 | 0.919 | 0.571 | 0.168 | 1.37 | 2.56 | 1.87 | 3.40 | 1.61 | 2.49 |
| 12 | 9.20 / 9.30 | 0.00786 | 0.168 | 0.456 | 0.685 | 0.408 | 0.191 | 1.14 | 1.92 | 1.70 | 2.52 | 1.18 | 1.85 |
| 14 | 7.37 / 7.49 | 0.00903 | 0.170 | 0.366 | 0.534 | 0.307 | 0.210 | 0.915 | 1.51 | 1.42 | 1.93 | 0.918 | 1.44 |
| 16 | 6.01 / 6.11 | 0.0102 | 0.163 | 0.301 | 0.422 | 0.243 | 0.223 | 0.744 | 1.22 | 1.17 | 1.52 | 0.713 | 1.15 |
| 18 | 5.00 / 5.12 | 0.0112 | 0.150 | 0.254 | 0.342 | 0.194 | 0.230 | 0.633 | 1.00 | 0.969 | 1.22 | 0.590 | 0.942 |
| 20 | 4.25 / 4.37 | 0.0122 | 0.134 | 0.215 | 0.281 | 0.159 | 0.232 | 0.545 | 0.832 | 0.840 | 1.00 | 0.492 | 0.788 |

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

| Q/Rs | ----> | 26.37 | 7.555 | 3.000 | 1.202 | 0.3040 | 8.089 | 2.953 | 1.065 | 2.884 | 0.7091 | 1.903 | 0.7091 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(1) | 2p(6) | 3p(6) | 4p(6) | 3d(10) | 4d(8) | free(3) | 4d(6) |
| 0.2 | 11.6 / 5.07 | 0.000127 | 0.00367 | 0.0401 | 0.391 | 8.62 | 0.00347 | 0.0491 | 0.642 | 0.0560 | 1.84 | 2.19 | 1.74 |
| 0.4 | 26.3 / 11.2 | 0.000257 | 0.00735 | 0.0801 | 0.785 | 19.4 | 0.00697 | 0.981 | 1.29 | 0.112 | 3.69 | 4.46 | 3.49 |
| 0.6 | 38.7 / 15.6 | 0.000387 | 0.0110 | 0.120 | 1.18 | 29.6 | 0.0105 | 0.147 | 1.93 | 0.168 | 5.53 | 6.79 | 5.24 |
| 0.8 | 42.3 / 21.0 | 0.000516 | 0.0147 | 0.160 | 1.57 | 30.1 | 0.0140 | 0.196 | 2.58 | 0.224 | 7.38 | 9.17 | 7.00 |
| 1.0 | 39.2 / 26.0 | 0.000646 | 0.0183 | 0.200 | 1.96 | 24.3 | 0.0174 | 0.245 | 3.21 | 0.280 | 9.21 | 11.6 | 8.74 |
| 1.2 | 37.6 / 32.0 | 0.000775 | 0.0220 | 0.240 | 2.34 | 19.5 | 0.0209 | 0.294 | 3.84 | 0.335 | 11.0 | 14.2 | 10.4 |
| 1.4 | 36.8 / 38.1 | 0.000905 | 0.0257 | 0.279 | 2.71 | 15.9 | 0.0244 | 0.342 | 4.45 | 0.391 | 12.7 | 17.9 | 12.0 |
| 1.6 | 36.8 / 40.6 | 0.00103 | 0.0293 | 0.317 | 3.06 | 13.2 | 0.0278 | 0.390 | 5.05 | 0.446 | 14.3 | 17.8 | 13.5 |
| 1.8 | 37.3 / 41.6 | 0.00116 | 0.0330 | 0.356 | 3.38 | 11.2 | 0.0313 | 0.437 | 5.62 | 0.500 | 15.8 | 16.6 | 14.7 |
| 2.0 | 37.8 / 42.2 | 0.00129 | 0.0366 | 0.393 | 3.65 | 9.53 | 0.0348 | 0.485 | 6.16 | 0.554 | 17.0 | 15.3 | 15.6 |
| 2.2 | 38.3 / 42.4 | 0.00142 | 0.0402 | 0.430 | 3.87 | 8.26 | 0.0383 | 0.531 | 6.65 | 0.608 | 17.8 | 14.0 | 16.2 |
| 2.4 | 38.5 / 42.1 | 0.00155 | 0.0438 | 0.466 | 4.03 | 7.24 | 0.0417 | 0.577 | 7.08 | 0.661 | 18.4 | 12.8 | 16.4 |
| 2.6 | 38.5 / 41.5 | 0.00168 | 0.0473 | 0.501 | 4.13 | 6.39 | 0.0451 | 0.622 | 7.46 | 0.714 | 18.6 | 11.7 | 16.3 |
| 2.8 | 38.1 / 40.5 | 0.00181 | 0.0508 | 0.535 | 4.15 | 5.69 | 0.0486 | 0.667 | 7.76 | 0.765 | 18.5 | 10.7 | 15.9 |
| 3.0 | 37.5 / 39.3 | 0.00193 | 0.0543 | 0.569 | 4.11 | 5.10 | 0.0520 | 0.711 | 7.98 | 0.817 | 18.1 | 9.83 | 15.2 |
| 3.2 | 36.5 / 38.0 | 0.00206 | 0.0578 | 0.600 | 4.02 | 4.56 | 0.0554 | 0.754 | 8.11 | 0.867 | 17.5 | 9.05 | 14.5 |
| 3.4 | 35.4 / 36.9 | 0.00219 | 0.0613 | 0.631 | 3.90 | 4.10 | 0.0588 | 0.797 | 8.16 | 0.917 | 16.7 | 8.36 | 13.9 |
| 3.6 | 34.1 / 35.1 | 0.00232 | 0.0647 | 0.660 | 3.75 | 3.69 | 0.0621 | 0.838 | 8.14 | 0.966 | 15.9 | 7.74 | 12.8 |
| 3.8 | 32.9 / 33.3 | 0.00245 | 0.0681 | 0.687 | 3.57 | 3.36 | 0.0655 | 0.878 | 8.05 | 1.01 | 15.2 | 7.19 | 11.8 |
| 4.0 | 31.5 / 31.7 | 0.00258 | 0.0715 | 0.713 | 3.43 | 3.05 | 0.0688 | 0.917 | 7.89 | 1.06 | 14.3 | 6.69 | 10.9 |
| 5 | 25.0 / 25.5 | 0.00321 | 0.0877 | 0.809 | 2.52 | 2.04 | 0.0852 | 1.09 | 6.63 | 1.28 | 10.4 | 4.83 | 8.11 |
| 6 | 20.5 / 20.8 | 0.00384 | 0.103 | 0.848 | 1.97 | 1.47 | 0.101 | 1.23 | 5.23 | 1.46 | 8.08 | 3.65 | 6.24 |
| 7 | 17.4 / 17.7 | 0.00447 | 0.117 | 0.832 | 1.58 | 1.11 | 0.116 | 1.33 | 4.26 | 1.61 | 6.43 | 2.87 | 4.96 |
| 8 | 15.0 / 15.2 | 0.00509 | 0.129 | 0.774 | 1.29 | 0.864 | 0.131 | 1.37 | 3.50 | 1.71 | 5.25 | 2.30 | 4.04 |
| 9 | 13.2 / 13.4 | 0.00570 | 0.140 | 0.684 | 1.07 | 0.697 | 0.145 | 1.36 | 2.95 | 1.76 | 4.37 | 1.90 | 3.36 |
| 10 | 11.3 / 11.8 | 0.00629 | 0.149 | 0.588 | 0.908 | 0.572 | 0.158 | 1.32 | 2.51 | 1.76 | 3.38 | 1.61 | 2.84 |
| 12 | 9.30 / 9.41 | 0.00746 | 0.160 | 0.446 | 0.679 | 0.409 | 0.180 | 1.12 | 1.89 | 1.63 | 2.78 | 1.18 | 2.12 |
| 14 | 6.58 / 6.68 | 0.00858 | 0.163 | 0.360 | 0.531 | 0.307 | 0.198 | 0.901 | 1.48 | 1.39 | 2.15 | 0.910 | 1.65 |
| 16 | 5.96 / 6.05 | 0.00964 | 0.158 | 0.298 | 0.423 | 0.244 | 0.211 | 0.731 | 1.20 | 1.15 | 1.70 | 0.718 | 1.32 |
| 18 | 5.02 / 5.13 | 0.0106 | 0.146 | 0.250 | 0.343 | 0.194 | 0.219 | 0.620 | 0.907 | 0.956 | 1.37 | 0.586 | 1.09 |
| 20 | 4.33 / 4.44 | 0.0116 | 0.131 | 0.213 | 0.282 | 0.159 | 0.222 | 0.538 | 0.823 | 0.820 | 1.13 | 0.491 | 0.911 |

Pd ( Z=46 )  1s(2) 2s(2) 3s(2) 4s(2) 2p(6) 3p(6) 4p(6) 3d(10) 4d(8)  [ 5s(1) 4d(9)/4d(8) free(2) ]

| Q/Rs | ----> | 27.01 | 7.741 | 3.095 | 1.243 | 0.3037 | 8.291 | 3.048 | 1.110 | 2.981 | 0.7509 | 2.281 | 0.7509 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(1) | 2p(6) | 3p(6) | 4p(6) | 3d(10) | 4d(9) | free(2) | 4d(8) |
| 0.2 | 11.4 / 4.93 | 0.000119 | 0.00344 | 0.0371 | 0.360 | 8.64 | 0.00325 | 0.0452 | 0.579 | 0.0514 | 1.632 | 2.20 | 1.60 |
| 0.4 | 24.8 / 9.85 | 0.000241 | 0.00690 | 0.0740 | 0.723 | 19.4 | 0.00654 | 0.0904 | 1.16 | 0.103 | 3.28 | 4.52 | 3.21 |
| 0.6 | 37.9 / 15.0 | 0.000362 | 0.0104 | 0.111 | 1.09 | 29.7 | 0.00980 | 0.136 | 1.75 | 0.154 | 4.92 | 6.95 | 4.81 |
| 0.8 | 41.2 / 20.3 | 0.000484 | 0.0138 | 0.148 | 1.45 | 30.3 | 0.0131 | 0.181 | 2.33 | 0.205 | 6.55 | 9.49 | 6.41 |
| 1.0 | 38.4 / 25.6 | 0.000605 | 0.0172 | 0.185 | 1.81 | 24.8 | 0.0163 | 0.226 | 2.90 | 0.257 | 8.17 | 12.2 | 8.00 |
| 1.2 | 36.0 / 32.0 | 0.000726 | 0.0207 | 0.221 | 2.16 | 19.8 | 0.0196 | 0.271 | 3.47 | 0.308 | 9.77 | 16.0 | 9.56 |
| 1.4 | 34.9 / 34.2 | 0.000848 | 0.0241 | 0.258 | 2.50 | 16.1 | 0.0228 | 0.315 | 4.02 | 0.359 | 11.3 | 15.6 | 11.1 |
| 1.6 | 34.6 / 35.2 | 0.000969 | 0.0275 | 0.293 | 2.82 | 13.4 | 0.0261 | 0.360 | 4.56 | 0.409 | 12.8 | 14.3 | 12.5 |
| 1.8 | 34.9 / 36.2 | 0.00109 | 0.0309 | 0.329 | 3.12 | 11.3 | 0.0293 | 0.403 | 5.08 | 0.459 | 14.1 | 12.9 | 13.8 |
| 2.0 | 35.3 / 36.9 | 0.00121 | 0.0343 | 0.364 | 3.38 | 9.65 | 0.0326 | 0.447 | 5.57 | 0.509 | 15.3 | 11.6 | 14.9 |
| 2.2 | 35.8 / 37.5 | 0.00133 | 0.0377 | 0.400 | 3.60 | 8.35 | 0.0358 | 0.490 | 6.03 | 0.558 | 16.3 | 10.5 | 15.8 |
| 2.4 | 36.2 / 37.8 | 0.00145 | 0.0411 | 0.431 | 3.77 | 7.31 | 0.0391 | 0.533 | 6.44 | 0.607 | 17.0 | 9.48 | 16.4 |
| 2.6 | 36.4 / 37.9 | 0.00157 | 0.0444 | 0.464 | 3.87 | 6.45 | 0.0423 | 0.575 | 6.80 | 0.656 | 17.5 | 8.61 | 16.8 |
| 2.8 | 36.4 / 37.6 | 0.00169 | 0.0477 | 0.496 | 3.92 | 5.75 | 0.0455 | 0.616 | 7.10 | 0.704 | 17.7 | 7.84 | 16.8 |
| 3.0 | 36.1 / 37.2 | 0.00181 | 0.0510 | 0.527 | 3.90 | 5.17 | 0.0487 | 0.657 | 7.33 | 0.751 | 17.6 | 7.17 | 16.7 |
| 3.2 | 35.5 / 36.3 | 0.00193 | 0.0543 | 0.557 | 3.84 | 4.66 | 0.0519 | 0.697 | 7.49 | 0.798 | 17.4 | 6.58 | 16.3 |
| 3.4 | 34.7 / 35.3 | 0.00205 | 0.0576 | 0.585 | 3.74 | 4.23 | 0.0551 | 0.736 | 7.58 | 0.844 | 16.9 | 6.06 | 15.7 |
| 3.6 | 33.7 / 34.3 | 0.00217 | 0.0608 | 0.613 | 3.61 | 3.85 | 0.0582 | 0.775 | 7.60 | 0.889 | 16.3 | 5.59 | 15.2 |
| 3.8 | 32.9 / 33.3 | 0.00229 | 0.0640 | 0.639 | 3.50 | 3.53 | 0.0614 | 0.812 | 7.56 | 0.933 | 15.8 | 5.18 | 14.5 |
| 4.0 | 31.5 / 31.8 | 0.00241 | 0.0672 | 0.663 | 3.30 | 3.25 | 0.0645 | 0.849 | 7.46 | 0.977 | 14.9 | 4.81 | 13.6 |
| 5 | 26.2 / 25.5 | 0.00301 | 0.0825 | 0.758 | 2.62 | 2.25 | 0.0799 | 1.02 | 6.35 | 1.18 | 11.9 | 3.44 | 10.0 |
| 6 | 21.6 / 21.2 | 0.00360 | 0.0969 | 0.802 | 2.05 | 1.65 | 0.0949 | 1.15 | 5.27 | 1.36 | 9.13 | 2.59 | 7.76 |
| 7 | 18.2 / 17.9 | 0.00419 | 0.110 | 0.796 | 1.62 | 1.25 | 0.109 | 1.24 | 4.25 | 1.50 | 7.33 | 2.02 | 6.22 |
| 8 | 15.6 / 15.4 | 0.00477 | 0.122 | 0.753 | 1.33 | 0.972 | 0.123 | 1.29 | 3.51 | 1.60 | 5.91 | 1.62 | 5.10 |
| 9 | 13.7 / 13.6 | 0.00534 | 0.133 | 0.686 | 1.11 | 0.794 | 0.136 | 1.30 | 2.94 | 1.65 | 4.93 | 1.34 | 4.24 |
| 10 | 12.1 / 12.0 | 0.00591 | 0.141 | 0.594 | 0.925 | 0.653 | 0.149 | 1.27 | 2.51 | 1.67 | 4.19 | 1.12 | 3.62 |
| 12 | 9.65 / 9.62 | 0.00701 | 0.153 | 0.448 | 0.704 | 0.459 | 0.170 | 1.12 | 1.90 | 1.59 | 3.10 | 0.821 | 2.71 |
| 14 | 7.82 / 7.76 | 0.00807 | 0.158 | 0.361 | 0.539 | 0.344 | 0.188 | 0.910 | 1.48 | 1.39 | 2.44 | 0.625 | 2.10 |
| 16 | 6.43 / 6.39 | 0.00907 | 0.155 | 0.299 | 0.436 | 0.268 | 0.202 | 0.739 | 1.19 | 1.16 | 1.97 | 0.501 | 1.70 |
| 18 | 5.35 / 5.34 | 0.0100 | 0.145 | 0.250 | 0.363 | 0.215 | 0.210 | 0.621 | 0.986 | 0.965 | 1.58 | 0.398 | 1.39 |
| 20 | 4.61 / 4.56 | 0.0109 | 0.132 | 0.213 | 0.302 | 0.184 | 0.214 | 0.538 | 0.831 | 0.819 | 1.37 | 0.335 | 1.17 |

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

| θ/Rs | ----> | 28.25 | 7.886 | 3.180 | 1.278 | 0.3045 | 8.456 | 3.126 | 1.138 | 3.634 | 0.7370 | 3.020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(1) | 2p(6) | 3p(6) | 4p(6) | 3d(10) | 4d(10) | free(1) |
| 0.2 | 11.3 / 4.79 | 0.000105 | 0.00328 | 0.0346 | 0.337 | 8.57 | 0.00308 | 0.0424 | 0.545 | 0.0491 | 1.74 | 2.06 |
| 0.4 | 24.8 / 9.87 | 0.000213 | 0.00657 | 0.0690 | 0.676 | 19.3 | 0.00620 | 0.0847 | 1.10 | 0.0982 | 3.50 | 4.34 |
| 0.6 | 37.8 / 15.2 | 0.000321 | 0.00985 | 0.104 | 1.01 | 29.5 | 0.00930 | 0.127 | 1.64 | 0.147 | 5.25 | 6.84 |
| 0.8 | 41.1 / 20.6 | 0.000428 | 0.0131 | 0.138 | 1.35 | 30.1 | 0.0124 | 0.169 | 2.19 | 0.196 | 6.99 | 9.58 |
| 1.0 | 38.0 / 26.3 | 0.000535 | 0.0164 | 0.173 | 1.69 | 24.2 | 0.0155 | 0.212 | 2.73 | 0.245 | 8.72 | 12.5 |
| 1.2 | 36.0 / 27.8 | 0.000643 | 0.0197 | 0.207 | 2.01 | 19.5 | 0.0186 | 0.254 | 3.26 | 0.294 | 10.4 | 11.3 |
| 1.4 | 35.0 / 29.1 | 0.000750 | 0.0229 | 0.240 | 2.33 | 15.9 | 0.0217 | 0.295 | 3.78 | 0.343 | 12.1 | 9.96 |
| 1.6 | 34.8 / 30.3 | 0.000857 | 0.0262 | 0.274 | 2.64 | 13.2 | 0.0247 | 0.337 | 4.29 | 0.391 | 13.6 | 8.73 |
| 1.8 | 35.1 / 31.7 | 0.000964 | 0.0295 | 0.307 | 2.92 | 11.1 | 0.0278 | 0.378 | 4.78 | 0.439 | 15.1 | 7.69 |
| 2.0 | 35.6 / 32.9 | 0.00107 | 0.0327 | 0.339 | 3.17 | 9.53 | 0.0309 | 0.419 | 5.25 | 0.486 | 16.4 | 6.82 |
| 2.2 | 36.2 / 34.2 | 0.00118 | 0.0359 | 0.371 | 3.38 | 8.26 | 0.0340 | 0.459 | 5.68 | 0.533 | 17.5 | 6.08 |
| 2.4 | 36.7 / 34.9 | 0.00129 | 0.0391 | 0.403 | 3.55 | 7.23 | 0.0371 | 0.499 | 6.08 | 0.580 | 18.3 | 5.46 |
| 2.6 | 37.0 / 35.5 | 0.00139 | 0.0423 | 0.433 | 3.67 | 6.39 | 0.0401 | 0.538 | 6.42 | 0.626 | 18.8 | 4.92 |
| 2.8 | 37.0 / 35.7 | 0.00150 | 0.0455 | 0.463 | 3.73 | 5.69 | 0.0432 | 0.577 | 6.73 | 0.672 | 19.1 | 4.46 |
| 3.0 | 36.8 / 35.8 | 0.00160 | 0.0486 | 0.492 | 3.73 | 5.09 | 0.0462 | 0.616 | 6.96 | 0.717 | 19.1 | 4.06 |
| 3.2 | 36.3 / 35.5 | 0.00171 | 0.0517 | 0.521 | 3.69 | 4.56 | 0.0492 | 0.653 | 7.13 | 0.762 | 18.8 | 3.71 |
| 3.4 | 35.5 / 34.8 | 0.00182 | 0.0548 | 0.548 | 3.61 | 4.10 | 0.0522 | 0.690 | 7.24 | 0.806 | 18.4 | 3.39 |
| 3.6 | 34.5 / 34.0 | 0.00192 | 0.0579 | 0.573 | 3.50 | 3.69 | 0.0552 | 0.726 | 7.28 | 0.849 | 17.8 | 3.12 |
| 3.8 | 33.5 / 33.0 | 0.00203 | 0.0609 | 0.598 | 3.37 | 3.36 | 0.0582 | 0.762 | 7.26 | 0.892 | 17.1 | 2.89 |
| 4.0 | 32.3 / 31.9 | 0.00214 | 0.0640 | 0.621 | 3.22 | 3.05 | 0.0612 | 0.796 | 7.19 | 0.934 | 16.3 | 2.68 |
| 5 | 26.6 / 26.5 | 0.00267 | 0.0786 | 0.714 | 2.53 | 2.04 | 0.0758 | 0.954 | 6.30 | 1.129 | 12.8 | 1.89 |
| 6 | 21.8 / 21.7 | 0.00319 | 0.0923 | 0.761 | 1.97 | 1.47 | 0.0900 | 1.08 | 5.08 | 1.298 | 9.94 | 1.41 |
| 7 | 18.3 / 18.3 | 0.00371 | 0.105 | 0.761 | 1.58 | 1.11 | 0.104 | 1.18 | 4.08 | 1.434 | 7.95 | 1.09 |
| 8 | 15.7 / 15.7 | 0.00423 | 0.116 | 0.723 | 1.29 | 0.864 | 0.117 | 1.23 | 3.38 | 1.533 | 6.48 | 0.873 |
| 9 | 13.8 / 13.8 | 0.00473 | 0.126 | 0.656 | 1.08 | 0.696 | 0.129 | 1.24 | 2.84 | 1.591 | 5.39 | 0.717 |
| 10 | 12.2 / 12.2 | 0.00523 | 0.135 | 0.571 | 0.910 | 0.572 | 0.141 | 1.21 | 2.42 | 1.608 | 4.59 | 0.600 |
| 12 | 9.72 / 9.75 | 0.00621 | 0.147 | 0.431 | 0.683 | 0.410 | 0.162 | 1.07 | 1.84 | 1.530 | 3.44 | 0.435 |
| 14 | 7.85 / 7.88 | 0.00715 | 0.151 | 0.350 | 0.533 | 0.307 | 0.179 | 0.876 | 1.44 | 1.335 | 2.67 | 0.338 |
| 16 | 6.44 / 6.46 | 0.00805 | 0.148 | 0.289 | 0.424 | 0.244 | 0.192 | 0.716 | 1.17 | 1.119 | 2.14 | 0.265 |
| 18 | 5.37 / 5.39 | 0.00891 | 0.139 | 0.243 | 0.347 | 0.194 | 0.200 | 0.602 | 0.960 | 0.937 | 1.74 | 0.213 |
| 20 | 4.52 / 4.54 | 0.00971 | 0.127 | 0.207 | 0.286 | 0.160 | 0.204 | 0.492 | 0.808 | 0.797 | 1.43 | 0.184 |

Cd ( Z=48 ) 1s(2)2s(2)3s(2)4s(2)2p(6)3p(6)4p(6)3d(10)4d(10) [5s(2)/free(2) ]

| Q/Rs | ----> | 28.11 | 8.103 | 3.298 | 1.344 | 0.3492 | 8.694 | 3.241 | 1.213 | 3.209 | 0.8742 | 2.592 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 2p(6) | 3p(6) | 4p(6) | 3d(10) | 4d(10) | free(2) |
| 0.2 | 9.33 / 4.96 | 0.000106 | 0.00305 | 0.0315 | 0.298 | 7.31 | 0.00286 | 0.0386 | 0.466 | 0.0424 | 1.14 | 2.94 |
| 0.4 | 19.5 / 10.2 | 0.000216 | 0.00612 | 0.0629 | 0.598 | 15.4 | 0.00575 | 0.0772 | 0.934 | 0.0849 | 2.30 | 6.08 |
| 0.6 | 32.0 / 17.1 | 0.000325 | 0.00917 | 0.0946 | 0.896 | 24.3 | 0.00864 | 0.116 | 1.40 | 0.170 | 4.59 | 9.44 |
| 0.8 | 39.8 / 21.1 | 0.000434 | 0.0122 | 0.126 | 1.19 | 31.7 | 0.0115 | 0.154 | 1.87 | 0.170 | 4.59 | 13.0 |
| 1.0 | 43.7 / 27.4 | 0.000543 | 0.0153 | 0.157 | 1.49 | 33.6 | 0.0144 | 0.193 | 2.33 | 0.212 | 5.72 | 17.3 |
| 1.2 | 42.7 / 31.5 | 0.000651 | 0.0183 | 0.188 | 1.78 | 30.6 | 0.0173 | 0.231 | 2.78 | 0.254 | 6.84 | 19.4 |
| 1.4 | 39.6 / 31.7 | 0.000760 | 0.0214 | 0.219 | 2.06 | 25.6 | 0.0201 | 0.269 | 3.23 | 0.296 | 7.94 | 17.7 |
| 1.6 | 37.7 / 31.7 | 0.000868 | 0.0244 | 0.250 | 2.34 | 21.8 | 0.0230 | 0.307 | 3.66 | 0.338 | 8.99 | 15.8 |
| 1.8 | 36.4 / 31.8 | 0.000977 | 0.0274 | 0.280 | 2.59 | 18.7 | 0.0258 | 0.344 | 4.09 | 0.379 | 10.0 | 14.1 |
| 2.0 | 35.6 / 32.0 | 0.00109 | 0.0304 | 0.310 | 2.82 | 16.2 | 0.0287 | 0.382 | 4.49 | 0.421 | 11.0 | 12.6 |
| 2.2 | 35.1 / 32.3 | 0.00119 | 0.0334 | 0.339 | 3.02 | 14.1 | 0.0316 | 0.419 | 4.87 | 0.462 | 11.8 | 11.3 |
| 2.4 | 34.9 / 32.5 | 0.00130 | 0.0364 | 0.368 | 3.19 | 12.5 | 0.0344 | 0.455 | 5.23 | 0.502 | 12.6 | 10.1 |
| 2.6 | 34.7 / 32.8 | 0.00141 | 0.0394 | 0.396 | 3.31 | 11.1 | 0.0373 | 0.491 | 5.55 | 0.542 | 13.2 | 9.18 |
| 2.8 | 34.5 / 32.9 | 0.00152 | 0.0423 | 0.423 | 3.39 | 9.96 | 0.0401 | 0.527 | 5.83 | 0.582 | 13.7 | 8.33 |
| 3.0 | 34.2 / 32.8 | 0.00163 | 0.0453 | 0.450 | 3.43 | 8.97 | 0.0429 | 0.562 | 6.07 | 0.621 | 14.0 | 7.60 |
| 3.2 | 33.8 / 32.7 | 0.00173 | 0.0482 | 0.476 | 3.42 | 8.11 | 0.0457 | 0.596 | 6.26 | 0.660 | 14.2 | 6.96 |
| 3.4 | 33.4 / 32.4 | 0.00184 | 0.0511 | 0.501 | 3.37 | 7.39 | 0.0485 | 0.630 | 6.40 | 0.699 | 14.3 | 6.40 |
| 3.6 | 32.7 / 31.8 | 0.00195 | 0.0539 | 0.525 | 3.29 | 6.77 | 0.0513 | 0.663 | 6.48 | 0.736 | 14.2 | 5.89 |
| 3.8 | 32.0 / 31.2 | 0.00206 | 0.0568 | 0.548 | 3.19 | 6.22 | 0.0541 | 0.696 | 6.52 | 0.774 | 13.9 | 5.45 |
| 4.0 | 31.2 / 30.5 | 0.00216 | 0.0596 | 0.570 | 3.08 | 5.73 | 0.0569 | 0.728 | 6.51 | 0.810 | 13.6 | 5.05 |
| 5 | 26.3 / 26.0 | 0.00270 | 0.0733 | 0.659 | 2.47 | 3.92 | 0.0705 | 0.875 | 5.91 | 0.983 | 11.3 | 3.59 |
| 6 | 21.5 / 21.4 | 0.00323 | 0.0862 | 0.709 | 1.91 | 2.82 | 0.0837 | 0.996 | 4.93 | 1.13 | 8.87 | 2.69 |
| 7 | 18.0 / 18.0 | 0.00376 | 0.0981 | 0.717 | 1.53 | 2.13 | 0.0965 | 1.09 | 3.90 | 1.26 | 7.21 | 2.10 |
| 8 | 15.5 / 15.5 | 0.00428 | 0.109 | 0.690 | 1.25 | 1.67 | 0.109 | 1.14 | 3.25 | 1.36 | 5.92 | 1.69 |
| 9 | 13.6 / 13.6 | 0.00480 | 0.119 | 0.635 | 1.05 | 1.35 | 0.120 | 1.16 | 2.75 | 1.42 | 4.98 | 1.38 |
| 10 | 12.0 / 12.0 | 0.00530 | 0.127 | 0.560 | 0.890 | 1.11 | 0.131 | 1.15 | 2.35 | 1.45 | 4.24 | 1.15 |
| 12 | 9.61 / 9.66 | 0.00629 | 0.138 | 0.425 | 0.670 | 0.796 | 0.151 | 1.03 | 1.79 | 1.42 | 3.19 | 0.845 |
| 14 | 7.81 / 7.85 | 0.00725 | 0.144 | 0.343 | 0.521 | 0.596 | 0.168 | 0.859 | 1.40 | 1.27 | 2.50 | 0.639 |
| 16 | 6.44 / 6.48 | 0.00816 | 0.142 | 0.283 | 0.419 | 0.468 | 0.180 | 0.705 | 1.14 | 1.08 | 2.01 | 0.509 |
| 18 | 5.39 / 5.43 | 0.00902 | 0.135 | 0.239 | 0.341 | 0.376 | 0.189 | 0.589 | 0.941 | 0.915 | 1.66 | 0.416 |
| 20 | 4.57 / 4.60 | 0.00983 | 0.124 | 0.204 | 0.282 | 0.311 | 0.193 | 0.507 | 0.788 | 0.776 | 1.38 | 0.342 |

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

| Q/Rs | ----> | 28.77 | 8.289 | 3.378 | 1.403 | 0.4054 | 8.905 | 3.344 | 1.264 | 0.3020 | 3.317 | 0.9545 | 2.408 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(1) | 3d(10) | 4d(10) | free(3) |
| 0.2 | 15.6 / 5.42 | 0.997(-4) | 0.00287 | 0.0297 | 0.268 | 5.17 | 0.00268 | 0.0356 | 0.420 | 8.75 | 0.0389 | 0.921 | 3.74 |
| 0.4 | 33.9 / 11.2 | 0.000203 | 0.00576 | 0.0592 | 0.537 | 10.7 | 0.00539 | 0.0712 | 0.844 | 19.7 | 0.0779 | 1.85 | 7.70 |
| 0.6 | 52.0 / 17.0 | 0.000305 | 0.00864 | 0.0890 | 0.806 | 16.8 | 0.00810 | 0.107 | 1.27 | 30.1 | 0.117 | 2.77 | 11.9 |
| 0.8 | 59.7 / 23.3 | 0.000407 | 0.0115 | 0.119 | 1.073 | 22.4 | 0.0108 | 0.142 | 1.68 | 30.3 | 0.156 | 3.69 | 16.3 |
| 1.0 | 58.9 / 29.6 | 0.000509 | 0.0144 | 0.148 | 1.34 | 25.9 | 0.0135 | 0.178 | 2.10 | 24.4 | 0.194 | 4.60 | 21.0 |
| 1.2 | 55.6 / 36.6 | 0.000611 | 0.0172 | 0.177 | 1.60 | 25.8 | 0.0162 | 0.213 | 2.51 | 19.6 | 0.233 | 5.50 | 26.4 |
| 1.4 | 51.2 / 36.7 | 0.000713 | 0.0201 | 0.206 | 1.86 | 23.3 | 0.0189 | 0.248 | 2.91 | 16.0 | 0.272 | 6.39 | 24.8 |
| 1.6 | 46.8 / 35.9 | 0.000815 | 0.0230 | 0.235 | 2.10 | 20.0 | 0.0215 | 0.283 | 3.31 | 13.3 | 0.310 | 7.25 | 22.4 |
| 1.8 | 43.6 / 35.2 | 0.000917 | 0.0258 | 0.263 | 2.33 | 17.3 | 0.0242 | 0.318 | 3.69 | 11.2 | 0.348 | 8.08 | 20.1 |
| 2.0 | 41.3 / 34.6 | 0.00102 | 0.0287 | 0.291 | 2.55 | 15.1 | 0.0269 | 0.352 | 4.06 | 9.57 | 0.386 | 8.86 | 18.0 |
| 2.2 | 39.5 / 34.1 | 0.00112 | 0.0315 | 0.319 | 2.74 | 13.3 | 0.0296 | 0.386 | 4.41 | 8.30 | 0.424 | 9.59 | 16.2 |
| 2.4 | 38.2 / 33.8 | 0.00122 | 0.0343 | 0.346 | 2.90 | 11.8 | 0.0323 | 0.419 | 4.74 | 7.25 | 0.461 | 10.3 | 14.6 |
| 2.6 | 37.2 / 33.6 | 0.00132 | 0.0371 | 0.372 | 3.03 | 10.5 | 0.0350 | 0.453 | 5.04 | 6.41 | 0.498 | 10.8 | 13.3 |
| 2.8 | 36.4 / 33.4 | 0.00143 | 0.0399 | 0.399 | 3.12 | 9.42 | 0.0376 | 0.486 | 5.31 | 5.71 | 0.535 | 11.3 | 12.1 |
| 3.0 | 35.6 / 33.0 | 0.00153 | 0.0427 | 0.424 | 3.17 | 8.50 | 0.0403 | 0.519 | 5.54 | 5.10 | 0.571 | 11.7 | 11.0 |
| 3.2 | 34.9 / 32.7 | 0.00163 | 0.0454 | 0.449 | 3.18 | 7.72 | 0.0429 | 0.551 | 5.74 | 4.57 | 0.607 | 12.0 | 10.1 |
| 3.4 | 34.2 / 32.4 | 0.00173 | 0.0481 | 0.472 | 3.16 | 7.04 | 0.0455 | 0.582 | 5.89 | 4.11 | 0.642 | 12.2 | 9.31 |
| 3.6 | 33.4 / 31.8 | 0.00183 | 0.0508 | 0.495 | 3.11 | 6.44 | 0.0482 | 0.613 | 5.99 | 3.71 | 0.677 | 12.3 | 8.58 |
| 3.8 | 32.6 / 31.3 | 0.00193 | 0.0535 | 0.517 | 3.03 | 5.93 | 0.0508 | 0.643 | 6.05 | 3.36 | 0.711 | 12.2 | 7.94 |
| 4.0 | 31.7 / 30.5 | 0.00203 | 0.0562 | 0.538 | 2.94 | 5.48 | 0.0534 | 0.673 | 6.07 | 3.06 | 0.745 | 12.1 | 7.37 |
| 5 | 27.0 / 26.4 | 0.00254 | 0.0691 | 0.625 | 2.41 | 3.84 | 0.0662 | 0.810 | 5.65 | 2.04 | 0.905 | 10.6 | 5.27 |
| 6 | 22.2 / 21.9 | 0.00304 | 0.0814 | 0.676 | 1.85 | 2.78 | 0.0786 | 0.926 | 4.82 | 1.47 | 1.05 | 8.48 | 3.96 |
| 7 | 18.4 / 18.3 | 0.00353 | 0.0927 | 0.689 | 1.49 | 2.11 | 0.0907 | 1.01 | 3.82 | 1.11 | 1.17 | 6.81 | 3.07 |
| 8 | 15.8 / 15.8 | 0.00402 | 0.103 | 0.668 | 1.23 | 1.65 | 0.102 | 1.07 | 3.18 | 0.864 | 1.26 | 5.65 | 2.47 |
| 9 | 13.8 / 13.8 | 0.00450 | 0.112 | 0.621 | 1.03 | 1.33 | 0.113 | 1.10 | 2.69 | 0.698 | 1.33 | 4.76 | 2.03 |
| 10 | 12.2 / 12.2 | 0.00498 | 0.120 | 0.551 | 0.874 | 1.10 | 0.124 | 1.09 | 2.31 | 0.572 | 1.36 | 4.07 | 1.71 |
| 12 | 9.73 / 9.78 | 0.00592 | 0.132 | 0.421 | 0.655 | 0.791 | 0.143 | 1.00 | 1.76 | 0.409 | 1.35 | 3.07 | 1.25 |
| 14 | 7.91 / 7.96 | 0.00681 | 0.137 | 0.336 | 0.512 | 0.592 | 0.158 | 0.843 | 1.38 | 0.307 | 1.23 | 2.40 | 0.945 |
| 16 | 6.53 / 6.58 | 0.00768 | 0.137 | 0.278 | 0.412 | 0.467 | 0.171 | 0.696 | 1.11 | 0.243 | 1.06 | 1.95 | 0.762 |
| 18 | 5.48 / 5.53 | 0.00850 | 0.131 | 0.236 | 0.338 | 0.378 | 0.179 | 0.578 | 0.923 | 0.194 | 0.901 | 1.61 | 0.618 |
| 20 | 4.65 / 4.69 | 0.00927 | 0.121 | 0.201 | 0.279 | 0.306 | 0.184 | 0.502 | 0.779 | 0.159 | 0.766 | 1.35 | 0.507 |

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

| Q/Rs | ----> | 29.38 | 8.482 | 3.480 | 1.460 | 0.4511 | 9.103 | 3.442 | 1.326 | 0.3537 | 3.415 | 1.035 | 2.304 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(2) | 3d(10) | 4d(10) | free(4) |
| 0.2 | 12.6 / 6.00 | 9.41(-5) | 0.00270 | 0.0275 | 0.243 | 4.03 | 0.00253 | 0.0330 | 0.373 | 7.08 | 0.0360 | 0.755 | 4.51 |
| 0.4 | 26.2 / 12.3 | 1.91(-4) | 0.00542 | 0.0549 | 0.487 | 8.31 | 0.00509 | 0.0661 | 0.749 | 14.9 | 0.0722 | 1.52 | 9.26 |
| 0.6 | 40.8 / 18.6 | 2.88(-4) | 0.00813 | 0.0824 | 0.731 | 12.9 | 0.00764 | 0.0989 | 1.12 | 23.5 | 0.108 | 2.27 | 14.2 |
| 0.8 | 54.0 / 25.5 | 3.85(-4) | 0.0108 | 0.110 | 0.973 | 17.3 | 0.0102 | 0.132 | 1.49 | 30.7 | 0.144 | 3.02 | 19.5 |
| 1.0 | 61.1 / 32.3 | 4.81(-4) | 0.0135 | 0.137 | 1.21 | 20.8 | 0.0127 | 0.165 | 1.86 | 32.9 | 0.180 | 3.77 | 24.9 |
| 1.2 | 61.0 / 41.5 | 5.77(-4) | 0.0162 | 0.164 | 1.45 | 22.0 | 0.0153 | 0.198 | 2.23 | 30.2 | 0.216 | 4.51 | 32.7 |
| 1.4 | 56.5 / 41.8 | 6.74(-4) | 0.0189 | 0.191 | 1.68 | 20.9 | 0.0178 | 0.230 | 2.59 | 25.4 | 0.252 | 5.23 | 31.6 |
| 1.6 | 52.0 / 40.4 | 7.70(-4) | 0.0216 | 0.218 | 1.91 | 18.8 | 0.0203 | 0.263 | 2.94 | 21.6 | 0.287 | 5.94 | 28.8 |
| 1.8 | 48.1 / 38.8 | 8.66(-4) | 0.0243 | 0.244 | 2.12 | 16.6 | 0.0229 | 0.295 | 3.28 | 18.6 | 0.323 | 6.63 | 25.9 |
| 2.0 | 44.8 / 37.6 | 9.62(-4) | 0.0270 | 0.270 | 2.32 | 14.5 | 0.0254 | 0.327 | 3.61 | 16.1 | 0.358 | 7.29 | 23.4 |
| 2.2 | 42.3 / 36.5 | 0.00106 | 0.0297 | 0.296 | 2.50 | 12.8 | 0.0279 | 0.359 | 3.93 | 14.1 | 0.393 | 7.91 | 21.1 |
| 2.4 | 40.3 / 35.6 | 0.00115 | 0.0323 | 0.321 | 2.65 | 11.4 | 0.0304 | 0.390 | 4.23 | 12.4 | 0.427 | 8.49 | 19.1 |
| 2.6 | 38.8 / 34.9 | 0.00125 | 0.0349 | 0.346 | 2.78 | 10.2 | 0.0330 | 0.421 | 4.50 | 11.0 | 0.462 | 9.01 | 17.3 |
| 2.8 | 37.5 / 34.3 | 0.00135 | 0.0376 | 0.370 | 2.87 | 9.15 | 0.0355 | 0.452 | 4.76 | 9.90 | 0.496 | 9.48 | 15.8 |
| 3.0 | 36.5 / 33.7 | 0.00144 | 0.0402 | 0.394 | 2.94 | 8.26 | 0.0380 | 0.482 | 4.98 | 8.92 | 0.529 | 9.87 | 14.4 |
| 3.2 | 35.5 / 33.1 | 0.00154 | 0.0428 | 0.417 | 2.97 | 7.51 | 0.0405 | 0.512 | 5.17 | 8.09 | 0.563 | 10.2 | 13.2 |
| 3.4 | 34.6 / 32.6 | 0.00163 | 0.0453 | 0.439 | 2.97 | 6.87 | 0.0429 | 0.541 | 5.33 | 7.37 | 0.596 | 10.4 | 12.2 |
| 3.6 | 33.7 / 31.9 | 0.00173 | 0.0479 | 0.460 | 2.94 | 6.28 | 0.0454 | 0.570 | 5.45 | 6.74 | 0.628 | 10.6 | 11.2 |
| 3.8 | 32.9 / 31.3 | 0.00182 | 0.0504 | 0.481 | 2.88 | 5.78 | 0.0479 | 0.598 | 5.53 | 6.21 | 0.660 | 10.7 | 10.4 |
| 4.0 | 32.0 / 30.6 | 0.00192 | 0.0529 | 0.501 | 2.81 | 5.35 | 0.0503 | 0.626 | 5.58 | 5.70 | 0.692 | 10.7 | 9.66 |
| 5 | 27.4 / 26.6 | 0.00240 | 0.0652 | 0.584 | 2.33 | 3.77 | 0.0624 | 0.755 | 5.33 | 3.91 | 0.842 | 9.73 | 6.90 |
| 6 | 22.9 / 22.5 | 0.00287 | 0.0767 | 0.636 | 1.81 | 2.79 | 0.0742 | 0.865 | 4.64 | 2.82 | 0.975 | 8.17 | 5.19 |
| 7 | 18.8 / 10.5 | 0.00334 | 0.0875 | 0.654 | 1.46 | 2.11 | 0.0856 | 0.951 | 3.73 | 2.13 | 1.09 | 6.48 | 4.04 |
| 8 | 16.0 / 15.9 | 0.00380 | 0.0974 | 0.640 | 1.20 | 1.65 | 0.0966 | 1.01 | 3.09 | 1.67 | 1.18 | 5.40 | 3.24 |
| 9 | 14.0 / 14.0 | 0.00426 | 0.106 | 0.601 | 1.01 | 1.34 | 0.107 | 1.04 | 2.62 | 1.35 | 1.25 | 4.56 | 2.68 |
| 10 | 12.3 / 12.3 | 0.00471 | 0.114 | 0.540 | 0.855 | 1.11 | 0.117 | 1.04 | 2.25 | 1.11 | 1.29 | 3.90 | 2.24 |
| 12 | 9.82 / 9.88 | 0.00559 | 0.125 | 0.416 | 0.645 | 0.779 | 0.135 | 0.969 | 1.71 | 0.790 | 1.29 | 2.95 | 1.65 |
| 14 | 8.00 / 8.07 | 0.00645 | 0.131 | 0.330 | 0.505 | 0.586 | 0.150 | 0.827 | 1.35 | 0.595 | 1.19 | 2.33 | 1.25 |
| 16 | 6.61 / 6.68 | 0.00727 | 0.132 | 0.276 | 0.406 | 0.462 | 0.162 | 0.686 | 1.10 | 0.467 | 1.04 | 1.88 | 1.00 |
| 18 | 5.54 / 5.59 | 0.00805 | 0.127 | 0.231 | 0.334 | 0.374 | 0.171 | 0.572 | 0.907 | 0.376 | 0.888 | 1.56 | 0.797 |
| 20 | 4.72 / 4.78 | 0.00878 | 0.118 | 0.198 | 0.278 | 0.303 | 0.176 | 0.491 | 0.766 | 0.310 | 0.757 | 1.31 | 0.670 |

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

| Q/Rs | ----> | 30.03 | 8.664 | 3.572 | 1.520 | 0.4933 | 9.302 | 3.539 | 1.391 | 0.4000 | 3.520 | 1.111 | 2.533 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(3) | 3d(10) | 4d(10) | free(3) |
| 0.2 | 10.4 / 8.74 | 0.886(-4) | 0.00255 | 0.0257 | 0.219 | 3.27 | 0.00239 | 0.0307 | 0.331 | 5.84 | 0.0333 | 0.632 | 4.18 |
| 0.4 | 21.4 / 18.1 | 0.000180 | 0.00512 | 0.0513 | 0.441 | 6.70 | 0.00480 | 0.0615 | 0.664 | 12.0 | 0.0667 | 1.27 | 8.65 |
| 0.6 | 32.8 / 27.6 | 0.000271 | 0.00769 | 0.0771 | 0.662 | 10.3 | 0.00721 | 0.0920 | 0.996 | 18.6 | 0.1000 | 1.90 | 13.4 |
| 0.8 | 44.1 / 37.4 | 0.000362 | 0.0102 | 0.103 | 0.881 | 13.9 | 0.00961 | 0.123 | 1.33 | 25.1 | 0.133 | 2.53 | 18.4 |
| 1.0 | 53.5 / 47.3 | 0.000453 | 0.0128 | 0.128 | 1.10 | 17.0 | 0.0120 | 0.154 | 1.65 | 30.2 | 0.167 | 3.16 | 24.0 |
| 1.2 | 58.5 / 54.7 | 0.000544 | 0.0153 | 0.154 | 1.31 | 18.7 | 0.0144 | 0.184 | 1.98 | 32.1 | 0.200 | 3.78 | 28.3 |
| 1.4 | 58.3 / 53.5 | 0.000635 | 0.0180 | 0.179 | 1.52 | 18.6 | 0.0168 | 0.214 | 2.30 | 30.8 | 0.233 | 4.38 | 26.0 |
| 1.6 | 55.3 / 50.7 | 0.000726 | 0.0205 | 0.204 | 1.73 | 17.3 | 0.0192 | 0.245 | 2.61 | 27.9 | 0.266 | 4.98 | 23.3 |
| 1.8 | 51.6 / 47.8 | 0.000816 | 0.0230 | 0.290 | 1.92 | 15.7 | 0.0216 | 0.275 | 2.92 | 24.6 | 0.298 | 5.56 | 20.8 |
| 2.0 | 47.5 / 44.6 | 0.000907 | 0.0255 | 0.253 | 2.10 | 13.6 | 0.0240 | 0.304 | 3.21 | 21.5 | 0.331 | 6.12 | 18.6 |
| 2.2 | 44.5 / 42.2 | 0.000997 | 0.0280 | 0.277 | 2.27 | 12.0 | 0.0264 | 0.334 | 3.50 | 19.0 | 0.363 | 6.65 | 16.7 |
| 2.4 | 42.1 / 40.2 | 0.00109 | 0.0305 | 0.301 | 2.42 | 10.7 | 0.0287 | 0.363 | 3.77 | 16.9 | 0.395 | 7.16 | 15.0 |
| 2.6 | 40.1 / 38.6 | 0.00118 | 0.0330 | 0.324 | 2.54 | 9.62 | 0.0311 | 0.392 | 4.02 | 15.1 | 0.427 | 7.62 | 13.6 |
| 2.8 | 38.5 / 37.4 | 0.00127 | 0.0355 | 0.347 | 2.64 | 8.67 | 0.0335 | 0.421 | 4.25 | 13.6 | 0.459 | 8.05 | 12.4 |
| 3.0 | 37.1 / 36.1 | 0.00136 | 0.0380 | 0.369 | 2.72 | 7.87 | 0.0358 | 0.449 | 4.46 | 12.3 | 0.490 | 8.42 | 11.3 |
| 3.2 | 36.0 / 35.1 | 0.00145 | 0.0404 | 0.391 | 2.76 | 7.16 | 0.0382 | 0.477 | 4.65 | 11.2 | 0.521 | 8.74 | 10.3 |
| 3.4 | 34.9 / 34.2 | 0.00154 | 0.0429 | 0.412 | 2.77 | 6.54 | 0.0405 | 0.504 | 4.81 | 10.2 | 0.551 | 9.00 | 9.51 |
| 3.6 | 33.9 / 33.3 | 0.00163 | 0.0453 | 0.432 | 2.76 | 6.01 | 0.0429 | 0.531 | 4.94 | 9.37 | 0.581 | 9.20 | 8.77 |
| 3.8 | 33.0 / 32.5 | 0.00172 | 0.0477 | 0.452 | 2.72 | 5.54 | 0.0452 | 0.558 | 5.03 | 8.64 | 0.611 | 9.34 | 8.11 |
| 4.0 | 32.1 / 31.7 | 0.00181 | 0.0501 | 0.470 | 2.67 | 5.13 | 0.0475 | 0.584 | 5.10 | 7.97 | 0.641 | 9.41 | 7.52 |
| 5 | 27.6 / 27.3 | 0.00226 | 0.0617 | 0.551 | 2.23 | 3.62 | 0.0590 | 0.705 | 5.00 | 5.61 | 0.780 | 8.96 | 5.35 |
| 6 | 23.3 / 23.2 | 0.00270 | 0.0727 | 0.603 | 1.76 | 2.70 | 0.0701 | 0.810 | 4.43 | 4.15 | 0.906 | 7.79 | 4.01 |
| 7 | 19.2 / 19.2 | 0.00314 | 0.0830 | 0.624 | 1.42 | 2.07 | 0.0809 | 0.893 | 3.66 | 3.14 | 1.01 | 6.24 | 3.12 |
| 8 | 16.3 / 16.3 | 0.00358 | 0.0924 | 0.616 | 1.18 | 1.62 | 0.0913 | 0.952 | 2.99 | 2.47 | 1.10 | 5.16 | 2.51 |
| 9 | 14.2 / 14.2 | 0.00401 | 0.101 | 0.583 | 0.986 | 1.31 | 0.101 | 0.985 | 2.54 | 2.01 | 1.17 | 4.37 | 2.05 |
| 10 | 12.5 / 12.6 | 0.00444 | 0.108 | 0.530 | 0.840 | 1.08 | 0.111 | 0.993 | 2.20 | 1.65 | 1.21 | 3.75 | 1.73 |
| 12 | 9.94 / 10.0 | 0.00528 | 0.120 | 0.411 | 0.632 | 0.780 | 0.128 | 0.937 | 1.67 | 1.18 | 1.23 | 2.86 | 1.27 |
| 14 | 8.29 / 8.35 | 0.00608 | 0.126 | 0.324 | 0.497 | 0.581 | 0.143 | 0.811 | 1.49 | 0.893 | 1.15 | 2.26 | 0.955 |
| 16 | 6.71 / 6.78 | 0.00686 | 0.127 | 0.270 | 0.400 | 0.456 | 0.155 | 0.677 | 1.08 | 0.698 | 1.02 | 1.83 | 0.766 |
| 18 | 5.62 / 5.69 | 0.00760 | 0.123 | 0.229 | 0.330 | 0.370 | 0.163 | 0.566 | 0.891 | 0.556 | 0.873 | 1.51 | 0.622 |
| 20 | 4.78 / 4.84 | 0.00830 | 0.115 | 0.196 | 0.275 | 0.304 | 0.169 | 0.481 | 0.750 | 0.452 | 0.748 | 1.28 | 0.511 |

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/Rs | ----> | 30.54 | 8.844 | 3.664 | 1.578 | 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 | 9.12 | 8.46(-5) | 0.00242 | 0.0241 | 0.200 | 2.72 | 0.00226 | 0.0286 | 0.299 | 5.27 | 0.0309 | 0.539 |
| 0.4 | 18.6 | 1.72(-4) | 0.00485 | 0.0481 | 0.402 | 5.55 | 0.00545 | 0.0573 | 0.600 | 10.7 | 0.0618 | 1.08 |
| 0.6 | 28.3 | 2.59(-4) | 0.00728 | 0.0722 | 0.603 | 8.51 | 0.00682 | 0.0857 | 0.899 | 16.5 | 0.0927 | 1.62 |
| 0.8 | 38.2 | 3.46(-4) | 0.00970 | 0.0963 | 0.802 | 11.5 | 0.00909 | 0.114 | 1.20 | 22.2 | 0.123 | 2.16 |
| 1.0 | 47.2 | 4.33(-4) | 0.0121 | 0.120 | 1.00 | 14.2 | 0.0114 | 0.143 | 1.49 | 27.4 | 0.154 | 2.69 |
| 1.2 | 53.8 | 5.20(-4) | 0.0145 | 0.144 | 1.20 | 16.0 | 0.0136 | 0.171 | 1.79 | 31.1 | 0.185 | 3.21 |
| 1.4 | 56.6 | 6.06(-4) | 0.0170 | 0.168 | 1.39 | 16.5 | 0.0159 | 0.200 | 2.07 | 32.3 | 0.216 | 3.73 |
| 1.6 | 56.0 | 6.93(-4) | 0.0194 | 0.191 | 1.57 | 15.9 | 0.0181 | 0.228 | 2.36 | 31.2 | 0.246 | 4.24 |
| 1.8 | 53.2 | 7.80(-4) | 0.0218 | 0.214 | 1.75 | 14.6 | 0.0204 | 0.256 | 2.64 | 28.8 | 0.277 | 4.74 |
| 2.0 | 49.8 | 8.66(-4) | 0.0242 | 0.237 | 1.92 | 13.0 | 0.0227 | 0.284 | 2.90 | 25.9 | 0.307 | 5.22 |
| 2.2 | 46.1 | 9.52(-4) | 0.0266 | 0.260 | 2.08 | 11.4 | 0.0249 | 0.311 | 3.16 | 22.8 | 0.337 | 5.69 |
| 2.4 | 43.5 | 0.00104 | 0.0289 | 0.282 | 2.22 | 10.2 | 0.0272 | 0.338 | 3.41 | 20.4 | 0.367 | 6.13 |
| 2.6 | 41.2 | 0.00113 | 0.0313 | 0.304 | 2.34 | 9.20 | 0.0294 | 0.365 | 3.65 | 18.3 | 0.396 | 6.54 |
| 2.8 | 39.3 | 0.00121 | 0.0337 | 0.325 | 2.44 | 8.31 | 0.0317 | 0.392 | 3.86 | 16.6 | 0.425 | 6.92 |
| 3.0 | 37.8 | 0.00130 | 0.0360 | 0.346 | 2.52 | 7.56 | 0.0339 | 0.418 | 4.06 | 15.1 | 0.454 | 7.27 |
| 3.2 | 36.4 | 0.00138 | 0.0383 | 0.367 | 2.57 | 6.90 | 0.0361 | 0.445 | 4.24 | 13.7 | 0.483 | 7.58 |
| 3.4 | 35.2 | 0.00147 | 0.0406 | 0.386 | 2.59 | 6.30 | 0.0384 | 0.470 | 4.40 | 12.6 | 0.512 | 7.84 |
| 3.6 | 34.0 | 0.00156 | 0.0429 | 0.406 | 2.60 | 5.79 | 0.0406 | 0.495 | 4.53 | 11.5 | 0.540 | 8.06 |
| 3.8 | 33.1 | 0.00164 | 0.0452 | 0.424 | 2.58 | 5.34 | 0.0428 | 0.520 | 4.63 | 10.7 | 0.567 | 8.22 |
| 4.0 | 32.1 | 0.00173 | 0.0475 | 0.442 | 2.54 | 4.95 | 0.0450 | 0.545 | 4.71 | 9.87 | 0.595 | 8.34 |
| 5 | 27.6 | 0.00216 | 0.0585 | 0.519 | 2.17 | 3.51 | 0.0558 | 0.659 | 4.72 | 6.99 | 0.725 | 8.22 |
| 6 | 23.5 | 0.00258 | 0.0690 | 0.571 | 1.72 | 2.63 | 0.0664 | 0.758 | 4.26 | 5.27 | 0.844 | 7.31 |
| 7 | 19.7 | 0.00300 | 0.0788 | 0.595 | 1.39 | 2.04 | 0.0766 | 0.839 | 3.59 | 4.11 | 0.947 | 6.07 |
| 8 | 16.5 | 0.00342 | 0.0878 | 0.592 | 1.15 | 1.61 | 0.0865 | 0.898 | 2.92 | 3.20 | 1.03 | 4.95 |
| 9 | 14.4 | 0.00384 | 0.0960 | 0.565 | 0.968 | 1.30 | 0.0960 | 0.934 | 2.49 | 2.60 | 1.10 | 4.22 |
| 10 | 12.6 | 0.00424 | 0.103 | 0.519 | 0.826 | 1.07 | 0.105 | 0.946 | 2.14 | 2.13 | 1.14 | 3.63 |
| 12 | 10.1 | 0.00504 | 0.114 | 0.407 | 0.622 | 0.765 | 0.122 | 0.905 | 1.64 | 1.54 | 1.17 | 2.77 |
| 14 | 8.21 | 0.00582 | 0.121 | 0.321 | 0.487 | 0.583 | 0.136 | 0.794 | 1.30 | 1.16 | 1.11 | 2.20 |
| 16 | 6.79 | 0.00656 | 0.123 | 0.266 | 0.394 | 0.452 | 0.147 | 0.668 | 1.06 | 0.905 | 0.992 | 1.78 |
| 18 | 5.71 | 0.00728 | 0.120 | 0.226 | 0.326 | 0.365 | 0.156 | 0.560 | 0.877 | 0.735 | 0.859 | 1.48 |
| 20 | 4.85 | 0.00795 | 0.113 | 0.193 | 0.272 | 0.301 | 0.162 | 0.476 | 0.739 | 0.598 | 0.738 | 1.25 |

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/Rs | ----> | 31.27 | 9.026 | 3.760 | 1.637 | 0.5723 | 9.709 | 3.732 | 1.506 | 0.4633 | 3.729 | 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 | 7.94 | 7.92(-5) | 0.00229 | 0.0225 | 0.183 | 2.31 | 0.00213 | 0.0268 | 0.272 | 4.63 | 0.0286 | 0.463 |
| 0.4 | 16.1 | 1.61(-4) | 0.00460 | 0.0450 | 0.367 | 4.70 | 0.00428 | 0.0535 | 0.544 | 9.37 | 0.0574 | 0.928 |
| 0.6 | 24.4 | 2.43(-4) | 0.00690 | 0.0676 | 0.550 | 7.17 | 0.00643 | 0.0802 | 0.816 | 14.3 | 0.0860 | 1.39 |
| 0.8 | 32.9 | 3.24(-4) | 0.00919 | 0.0901 | 0.733 | 9.68 | 0.00857 | 0.107 | 1.09 | 19.2 | 0.114 | 1.85 |
| 1.0 | 40.9 | 4.06(-4) | 0.0115 | 0.113 | 0.913 | 12.0 | 0.0107 | 0.134 | 1.36 | 23.9 | 0.143 | 2.31 |
| 1.2 | 47.5 | 4.87(-4) | 0.0138 | 0.135 | 1.09 | 13.8 | 0.0129 | 0.160 | 1.62 | 27.9 | 0.172 | 2.76 |
| 1.4 | 52.1 | 5.68(-4) | 0.0161 | 0.157 | 1.27 | 14.6 | 0.0150 | 0.187 | 1.88 | 30.5 | 0.200 | 3.21 |
| 1.6 | 53.7 | 6.50(-4) | 0.0184 | 0.179 | 1.44 | 14.5 | 0.0171 | 0.213 | 2.14 | 31.3 | 0.229 | 3.65 |
| 1.8 | 52.9 | 7.31(-4) | 0.0206 | 0.200 | 1.60 | 13.6 | 0.0192 | 0.239 | 2.39 | 30.4 | 0.257 | 4.08 |
| 2.0 | 50.7 | 8.12(-4) | 0.0229 | 0.222 | 1.76 | 12.4 | 0.0214 | 0.265 | 2.64 | 28.5 | 0.285 | 4.50 |
| 2.2 | 48.3 | 8.93(-4) | 0.0252 | 0.243 | 1.90 | 11.2 | 0.0235 | 0.291 | 2.88 | 26.5 | 0.313 | 4.90 |
| 2.4 | 44.9 | 9.74(-4) | 0.0274 | 0.264 | 2.04 | 10.1 | 0.0256 | 0.317 | 3.10 | 23.4 | 0.340 | 5.29 |
| 2.6 | 42.4 | 0.00106 | 0.0297 | 0.284 | 2.15 | 9.05 | 0.0277 | 0.342 | 3.32 | 21.2 | 0.368 | 5.66 |
| 2.8 | 40.4 | 0.00114 | 0.0319 | 0.305 | 2.25 | 8.21 | 0.0299 | 0.367 | 3.52 | 19.3 | 0.395 | 6.00 |
| 3.0 | 38.6 | 0.00122 | 0.0341 | 0.324 | 2.33 | 7.44 | 0.0320 | 0.392 | 3.71 | 17.6 | 0.422 | 6.32 |
| 3.2 | 37.0 | 0.00130 | 0.0363 | 0.344 | 2.39 | 6.81 | 0.0341 | 0.416 | 3.88 | 16.0 | 0.449 | 6.61 |
| 3.4 | 35.6 | 0.00138 | 0.0385 | 0.362 | 2.42 | 6.24 | 0.0362 | 0.440 | 4.03 | 14.7 | 0.475 | 6.86 |
| 3.6 | 34.4 | 0.00146 | 0.0407 | 0.381 | 2.44 | 5.73 | 0.0383 | 0.464 | 4.16 | 13.6 | 0.501 | 7.08 |
| 3.8 | 33.3 | 0.00154 | 0.0429 | 0.398 | 2.43 | 5.30 | 0.0403 | 0.487 | 4.27 | 12.6 | 0.527 | 7.26 |
| 4.0 | 32.3 | 0.00162 | 0.0450 | 0.415 | 2.41 | 4.91 | 0.0424 | 0.510 | 4.36 | 11.6 | 0.553 | 7.40 |
| 5 | 27.8 | 0.00202 | 0.0555 | 0.489 | 2.10 | 3.49 | 0.0526 | 0.619 | 4.45 | 8.34 | 0.675 | 7.52 |
| 6 | 23.7 | 0.00242 | 0.0655 | 0.541 | 1.69 | 2.62 | 0.0626 | 0.713 | 4.09 | 6.27 | 0.786 | 6.89 |
| 7 | 20.1 | 0.00282 | 0.0748 | 0.567 | 1.36 | 2.04 | 0.0723 | 0.791 | 3.51 | 4.91 | 0.883 | 5.89 |
| 8 | 16.9 | 0.00321 | 0.0835 | 0.568 | 1.13 | 1.61 | 0.0817 | 0.849 | 2.87 | 3.94 | 0.966 | 4.80 |
| 9 | 15.4 | 0.00360 | 0.0913 | 0.546 | 0.946 | 1.31 | 0.0967 | 0.887 | 2.42 | 3.20 | 1.03 | 4.07 |
| 10 | 12.8 | 0.00398 | 0.0983 | 0.507 | 0.808 | 1.08 | 0.0992 | 0.903 | 2.10 | 2.64 | 1.08 | 3.51 |
| 12 | 10.2 | 0.00474 | 0.109 | 0.402 | 0.613 | 0.768 | 0.115 | 0.873 | 1.61 | 1.89 | 1.11 | 2.69 |
| 14 | 8.32 | 0.00546 | 0.116 | 0.316 | 0.480 | 0.579 | 0.129 | 0.777 | 1.28 | 1.43 | 1.07 | 2.14 |
| 16 | 6.89 | 0.00617 | 0.118 | 0.259 | 0.389 | 0.456 | 0.140 | 0.658 | 1.04 | 1.12 | 0.967 | 1.74 |
| 18 | 5.80 | 0.00684 | 0.116 | 0.222 | 0.321 | 0.373 | 0.149 | 0.554 | 0.864 | 0.903 | 0.843 | 1.44 |
| 20 | 4.82 | 0.00748 | 0.110 | 0.192 | 0.270 | 0.302 | 0.155 | 0.469 | 0.728 | 0.744 | 0.728 | 1.22 |

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/Rs | ----> | 31.82 | 9.215 | 3.844 | 1.691 | 0.6078 | 9.916 | 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 | 6.97 | 7.55(-5) | 0.00217 | 0.0213 | 0.169 | 2.01 | 0.00201 | 0.0251 | 0.242 | 4.07 | 0.0266 | 0.405 |
| 0.4 | 14.1 | 1.54(-4) | 0.00435 | 0.0426 | 0.339 | 4.07 | 0.00404 | 0.0503 | 0.485 | 8.20 | 0.0533 | 0.812 |
| 0.6 | 21.3 | 2.32(-4) | 0.00653 | 0.0639 | 0.508 | 6.20 | 0.00607 | 0.0753 | 0.728 | 12.4 | 0.0799 | 1.22 |
| 0.8 | 28.6 | 3.09(-4) | 0.00870 | 0.0852 | 0.677 | 8.35 | 0.00810 | 0.100 | 0.969 | 16.7 | 0.106 | 1.62 |
| 1.0 | 35.7 | 3.87(-4) | 0.0109 | 0.106 | 0.844 | 10.4 | 0.0101 | 0.126 | 1.21 | 20.8 | 0.133 | 2.02 |
| 1.2 | 42.0 | 4.64(-4) | 0.0130 | 0.127 | 1.01 | 12.1 | 0.0121 | 0.151 | 1.45 | 24.6 | 0.160 | 2.42 |
| 1.4 | 46.9 | 5.42(-4) | 0.0152 | 0.148 | 1.17 | 13.1 | 0.0142 | 0.175 | 1.68 | 27.7 | 0.186 | 2.81 |
| 1.6 | 50.2 | 6.19(-4) | 0.0174 | 0.169 | 1.33 | 13.2 | 0.0162 | 0.200 | 1.91 | 29.5 | 0.212 | 3.57 |
| 1.8 | 50.6 | 6.97(-4) | 0.0195 | 0.190 | 1.48 | 12.7 | 0.0182 | 0.225 | 2.14 | 30.0 | 0.239 | 3.57 |
| 2.0 | 49.9 | 7.74(-4) | 0.0217 | 0.210 | 1.63 | 11.8 | 0.0202 | 0.249 | 2.36 | 29.3 | 0.265 | 3.94 |
| 2.2 | 48.2 | 8.51(-4) | 0.0238 | 0.230 | 1.76 | 10.9 | 0.0222 | 0.273 | 2.57 | 27.8 | 0.291 | 4.30 |
| 2.4 | 45.8 | 9.29(-4) | 0.0260 | 0.250 | 1.89 | 9.59 | 0.0242 | 0.297 | 2.78 | 26.0 | 0.316 | 4.65 |
| 2.6 | 43.7 | 0.00101 | 0.0281 | 0.269 | 2.00 | 8.66 | 0.0262 | 0.321 | 2.97 | 24.1 | 0.342 | 4.97 |
| 2.8 | 41.4 | 0.00108 | 0.0302 | 0.288 | 2.10 | 7.87 | 0.0282 | 0.345 | 3.16 | 21.9 | 0.367 | 5.29 |
| 3.0 | 39.4 | 0.00116 | 0.0323 | 0.307 | 2.18 | 7.18 | 0.0302 | 0.368 | 3.33 | 20.0 | 0.392 | 5.57 |
| 3.2 | 37.8 | 0.00124 | 0.0344 | 0.325 | 2.24 | 6.55 | 0.0322 | 0.391 | 3.49 | 18.4 | 0.417 | 5.84 |
| 3.4 | 36.2 | 0.00131 | 0.0365 | 0.343 | 2.28 | 6.01 | 0.0342 | 0.414 | 3.64 | 16.9 | 0.442 | 6.08 |
| 3.6 | 34.9 | 0.00139 | 0.0385 | 0.360 | 2.30 | 5.54 | 0.0362 | 0.436 | 3.77 | 15.6 | 0.466 | 6.30 |
| 3.8 | 33.7 | 0.00147 | 0.0406 | 0.377 | 2.31 | 5.12 | 0.0381 | 0.458 | 3.88 | 14.5 | 0.490 | 6.48 |
| 4.0 | 32.6 | 0.00154 | 0.0426 | 0.394 | 2.29 | 4.74 | 0.0461 | 0.480 | 3.97 | 13.5 | 0.514 | 6.63 |
| 5 | 27.9 | 0.00193 | 0.0526 | 0.465 | 2.04 | 3.39 | 0.0498 | 0.582 | 4.13 | 9.68 | 0.628 | 6.86 |
| 6 | 24.0 | 0.00231 | 0.0621 | 0.516 | 1.67 | 2.55 | 0.0593 | 0.673 | 3.88 | 7.32 | 0.733 | 6.48 |
| 7 | 20.4 | 0.00269 | 0.0710 | 0.543 | 1.34 | 1.99 | 0.0684 | 0.748 | 3.42 | 5.74 | 0.825 | 5.70 |
| 8 | 17.3 | 0.00366 | 0.0793 | 0.547 | 1.11 | 1.59 | 0.0773 | 0.805 | 2.81 | 4.65 | 0.904 | 4.69 |
| 9 | 14.8 | 0.00343 | 0.0868 | 0.530 | 0.932 | 1.29 | 0.0859 | 0.844 | 2.36 | 3.81 | 0.968 | 3.94 |
| 10 | 13.0 | 0.00380 | 0.0936 | 0.496 | 0.796 | 1.06 | 0.0940 | 0.863 | 2.04 | 3.17 | 1.014 | 3.39 |
| 12 | 10.4 | 0.00452 | 0.104 | 0.397 | 0.604 | 0.761 | 0.109 | 0.844 | 1.58 | 2.28 | 1.054 | 2.63 |
| 14 | 8.39 | 0.00522 | 0.111 | 0.314 | 0.474 | 0.574 | 0.122 | 0.760 | 1.25 | 1.69 | 1.026 | 2.08 |
| 16 | 6.98 | 0.00589 | 0.114 | 0.259 | 0.384 | 0.449 | 0.133 | 0.649 | 1.02 | 1.34 | 0.940 | 1.69 |
| 18 | 5.88 | 0.00653 | 0.112 | 0.221 | 0.318 | 0.362 | 0.142 | 0.548 | 0.844 | 1.09 | 0.827 | 1.41 |
| 20 | 5.01 | 0.00715 | 0.107 | 0.189 | 0.267 | 0.297 | 0.148 | 0.465 | 0.716 | 0.905 | 0.718 | 1.19 |

Cs ( Z = 55 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) [ 6s(1)/free(1) ]

| Q/Rs | ----> | 32.25 | 9.405 | 3.943 | 1.765 | 0.6642 | 0.1900 | 10.11 | 3.917 | 1.641 | 0.5642 | 3.942 | 1.398 | 5.753 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(1) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | free(1) |
| 0.2 | 31.9 / 14.2 | 0.728(-4) | 0.00206 | 0.0200 | 0.152 | 1.63 | 26.4 | 0.00191 | 0.0236 | 0.219 | 3.01 | 0.0248 | 0.356 | 8.65 |
| 0.4 | 74.4 / 31.6 | 0.000148 | 0.00412 | 0.0399 | 0.305 | 3.29 | 63.5 | 0.00384 | 0.0472 | 0.439 | 6.06 | 0.0496 | 0.713 | 20.7 |
| 0.6 | 75.7 / 58.7 | 0.000223 | 0.00619 | 0.0598 | 0.457 | 4.99 | 59.2 | 0.00577 | 0.0707 | 0.658 | 9.14 | 0.0744 | 1.07 | 42.2 |
| 0.8 | 64.7 / 56.4 | 0.000298 | 0.00825 | 0.0798 | 0.608 | 6.72 | 42.6 | 0.00769 | 0.0943 | 0.876 | 12.3 | 0.0990 | 1.42 | 34.3 |
| 1.0 | 59.4 / 54.4 | 0.000373 | 0.0103 | 0.0996 | 0.758 | 8.38 | 31.7 | 0.00961 | 0.118 | 1.09 | 15.3 | 0.124 | 1.78 | 26.7 |
| 1.2 | 57.3 / 53.9 | 0.000448 | 0.0123 | 0.119 | 0.907 | 9.84 | 24.5 | 0.0115 | 0.141 | 1.31 | 18.2 | 0.149 | 2.13 | 21.1 |
| 1.4 | 56.7 / 54.2 | 0.000523 | 0.0144 | 0.139 | 1.05 | 10.9 | 19.5 | 0.0134 | 0.165 | 1.52 | 20.8 | 0.173 | 2.47 | 17.0 |
| 1.6 | 56.4 / 54.3 | 0.000597 | 0.0165 | 0.158 | 1.20 | 11.4 | 15.9 | 0.0154 | 0.188 | 1.73 | 22.7 | 0.198 | 2.81 | 14.0 |
| 1.8 | 55.6 / 54.1 | 0.000672 | 0.0185 | 0.178 | 1.33 | 11.3 | 13.3 | 0.0173 | 0.211 | 1.93 | 23.9 | 0.222 | 3.14 | 11.8 |
| 2.0 | 54.0 / 52.7 | 0.000746 | 0.0206 | 0.197 | 1.47 | 10.7 | 11.3 | 0.0192 | 0.234 | 2.14 | 24.3 | 0.247 | 3.47 | 10.0 |
| 2.2 | 52.1 / 51.1 | 0.000821 | 0.0226 | 0.216 | 1.59 | 10.1 | 9.70 | 0.0211 | 0.257 | 2.33 | 23.8 | 0.271 | 3.79 | 8.67 |
| 2.4 | 49.5 / 48.6 | 0.000895 | 0.0246 | 0.234 | 1.71 | 8.97 | 8.44 | 0.0230 | 0.280 | 2.52 | 22.9 | 0.295 | 4.10 | 7.58 |
| 2.6 | 46.6 / 45.9 | 0.000970 | 0.0266 | 0.253 | 1.81 | 8.01 | 7.41 | 0.0249 | 0.302 | 2.70 | 21.4 | 0.319 | 4.39 | 6.69 |
| 2.8 | 44.7 / 44.1 | 0.00104 | 0.0286 | 0.271 | 1.91 | 7.32 | 6.58 | 0.0268 | 0.324 | 2.87 | 20.4 | 0.342 | 4.67 | 5.94 |
| 3.0 | 42.5 / 41.9 | 0.00112 | 0.0306 | 0.288 | 1.98 | 6.69 | 5.88 | 0.0287 | 0.346 | 3.03 | 18.9 | 0.366 | 4.94 | 5.31 |
| 3.2 | 40.2 / 39.7 | 0.00119 | 0.0326 | 0.305 | 2.05 | 6.15 | 5.28 | 0.0306 | 0.368 | 3.18 | 17.2 | 0.389 | 5.18 | 4.77 |
| 3.4 | 38.3 / 37.8 | 0.00127 | 0.0346 | 0.322 | 2.10 | 6.65 | 4.78 | 0.0325 | 0.389 | 3.32 | 15.9 | 0.412 | 5.41 | 4.33 |
| 3.6 | 36.7 / 36.3 | 0.00134 | 0.0366 | 0.339 | 2.13 | 5.22 | 4.35 | 0.0344 | 0.411 | 3.45 | 14.7 | 0.435 | 5.61 | 3.94 |
| 3.8 | 35.3 / 34.9 | 0.00141 | 0.0385 | 0.355 | 2.14 | 4.83 | 3.96 | 0.0362 | 0.432 | 3.55 | 13.7 | 0.458 | 5.79 | 3.61 |
| 4.0 | 34.0 / 33.7 | 0.00149 | 0.0405 | 0.370 | 2.14 | 4.50 | 3.61 | 0.0381 | 0.452 | 3.65 | 12.8 | 0.480 | 5.95 | 3.31 |
| 5 | 28.6 / 28.5 | 0.00186 | 0.0499 | 0.439 | 1.95 | 3.22 | 2.40 | 0.0473 | 0.549 | 3.86 | 9.22 | 0.587 | 6.32 | 2.28 |
| 6 | 24.5 / 24.4 | 0.00223 | 0.0590 | 0.489 | 1.68 | 2.44 | 1.72 | 0.0563 | 0.636 | 3.70 | 6.99 | 0.686 | 6.08 | 1.66 |
| 7 | 21.1 / 21.1 | 0.00259 | 0.0675 | 0.518 | 1.33 | 1.91 | 1.29 | 0.0651 | 0.709 | 3.37 | 5.51 | 0.775 | 5.55 | 1.29 |
| 8 | 18.0 / 18.0 | 0.00295 | 0.0755 | 0.526 | 1.11 | 1.54 | 1.01 | 0.0736 | 0.766 | 2.84 | 4.46 | 0.851 | 4.71 | 1.01 |
| 9 | 15.4 / 15.5 | 0.00331 | 0.0828 | 0.515 | 0.934 | 1.27 | 0.818 | 0.0818 | 0.806 | 2.36 | 3.69 | 0.913 | 3.91 | 0.827 |
| 10 | 13.5 / 13.5 | 0.00367 | 0.0894 | 0.490 | 0.798 | 1.07 | 0.670 | 0.0897 | 0.828 | 2.04 | 3.11 | 0.961 | 3.39 | 0.684 |
| 12 | 10.8 / 10.8 | 0.00436 | 0.100 | 0.401 | 0.605 | 0.795 | 0.469 | 0.104 | 0.823 | 1.57 | 2.31 | 1.01 | 2.60 | 0.485 |
| 14 | 8.85 / 8.87 | 0.00504 | 0.107 | 0.318 | 0.475 | 0.613 | 0.353 | 0.117 | 0.758 | 1.25 | 1.79 | 0.999 | 2.07 | 0.371 |
| 16 | 7.38 / 7.38 | 0.00569 | 0.111 | 0.260 | 0.383 | 0.489 | 0.279 | 0.128 | 0.654 | 1.02 | 1.43 | 0.932 | 1.69 | 0.284 |
| 18 | 6.22 / 6.22 | 0.00632 | 0.110 | 0.221 | 0.317 | 0.396 | 0.230 | 0.137 | 0.554 | 0.845 | 1.17 | 0.829 | 1.41 | 0.226 |
| 20 | 5.30 / 5.30 | 0.00692 | 0.106 | 0.189 | 0.267 | 0.326 | 0.185 | 0.143 | 0.471 | 0.716 | 0.978 | 0.723 | 1.19 | 0.192 |

Ba ( Z=56 ) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) [ 6s(2) / free(2) ]

| Q/Rs | ----> | 32.94 | 9.589 | 4.039 | 1.807 | 0.7238 | 0.2280 | 10.30 | 4.015 | 1.704 | 0.6226 | 4.048 | 1.468 | 3.745 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | free(2) |
| 0.2 | 24.1 / 11.0 | 0.686(-4) | 0.00195 | 0.0188 | 0.143 | 1.33 | 19.7 | 0.00181 | 0.0221 | 0.199 | 2.38 | 0.0231 | 0.315 | 6.64 |
| 0.4 | 53.6 / 23.8 | 0.000140 | 0.00392 | 0.0375 | 0.287 | 2.68 | 44.7 | 0.00365 | 0.0443 | 0.399 | 4.78 | 0.0463 | 0.630 | 14.4 |
| 0.6 | 80.3 / 36.7 | 0.000211 | 0.00588 | 0.0562 | 0.431 | 4.05 | 66.9 | 0.00548 | 0.0663 | 0.599 | 7.20 | 0.0694 | 0.946 | 23.3 |
| 0.8 | 81.9 / 58.5 | 0.000281 | 0.00783 | 0.0750 | 0.574 | 5.44 | 63.9 | 0.00732 | 0.0884 | 0.797 | 9.63 | 0.0924 | 1.26 | 40.5 |
| 1.0 | 73.9 / 60.2 | 0.000352 | 0.00978 | 0.0937 | 0.715 | 6.80 | 51.5 | 0.00914 | 0.111 | 0.994 | 12.0 | 0.115 | 1.57 | 37.8 |
| 1.2 | 67.5 / 58.7 | 0.000423 | 0.0117 | 0.112 | 0.855 | 8.04 | 40.8 | 0.0110 | 0.133 | 1.19 | 14.3 | 0.139 | 1.88 | 32.0 |
| 1.4 | 63.8 / 57.4 | 0.000493 | 0.0137 | 0.131 | 0.993 | 9.04 | 33.2 | 0.0128 | 0.155 | 1.38 | 16.5 | 0.162 | 2.19 | 26.8 |
| 1.6 | 61.1 / 56.4 | 0.000564 | 0.0156 | 0.149 | 1.13 | 9.67 | 27.4 | 0.0146 | 0.176 | 1.57 | 18.3 | 0.185 | 2.49 | 22.7 |
| 1.8 | 58.9 / 55.3 | 0.000634 | 0.0176 | 0.167 | 1.26 | 9.87 | 23.0 | 0.0164 | 0.198 | 1.76 | 19.6 | 0.207 | 2.78 | 19.4 |
| 2.0 | 56.8 / 53.8 | 0.000705 | 0.0195 | 0.185 | 1.38 | 9.67 | 19.7 | 0.0182 | 0.220 | 1.94 | 20.3 | 0.230 | 3.07 | 16.7 |
| 2.2 | 54.6 / 52.0 | 0.000775 | 0.0215 | 0.203 | 1.50 | 9.19 | 17.2 | 0.0201 | 0.241 | 2.12 | 20.5 | 0.253 | 3.36 | 14.6 |
| 2.4 | 51.9 / 49.7 | 0.000845 | 0.0234 | 0.220 | 1.61 | 8.51 | 15.0 | 0.0219 | 0.262 | 2.30 | 20.1 | 0.275 | 3.63 | 12.8 |
| 2.6 | 49.6 / 47.8 | 0.000915 | 0.0253 | 0.238 | 1.72 | 7.97 | 13.2 | 0.0237 | 0.283 | 2.46 | 19.4 | 0.297 | 3.90 | 11.4 |
| 2.8 | 47.0 / 45.4 | 0.000986 | 0.0272 | 0.255 | 1.81 | 7.48 | 11.8 | 0.0255 | 0.304 | 2.62 | 18.2 | 0.319 | 4.15 | 10.2 |
| 3.0 | 45.1 / 43.7 | 0.00106 | 0.0291 | 0.271 | 1.88 | 6.83 | 10.6 | 0.0273 | 0.325 | 2.77 | 17.6 | 0.341 | 4.39 | 9.16 |
| 3.2 | 42.5 / 41.4 | 0.00113 | 0.0310 | 0.288 | 1.95 | 6.27 | 9.44 | 0.0291 | 0.345 | 2.91 | 16.3 | 0.363 | 4.62 | 8.29 |
| 3.4 | 40.3 / 39.2 | 0.00120 | 0.0329 | 0.304 | 2.00 | 5.77 | 8.67 | 0.0309 | 0.366 | 3.04 | 14.9 | 0.385 | 4.83 | 7.53 |
| 3.6 | 38.2 / 37.3 | 0.00127 | 0.0348 | 0.319 | 2.03 | 5.33 | 7.76 | 0.0327 | 0.386 | 3.16 | 13.8 | 0.406 | 5.02 | 6.88 |
| 3.8 | 36.7 / 35.8 | 0.00134 | 0.0366 | 0.334 | 2.05 | 4.92 | 7.24 | 0.0345 | 0.405 | 3.27 | 12.8 | 0.427 | 5.19 | 6.32 |
| 4.0 | 35.1 / 34.4 | 0.00141 | 0.0385 | 0.349 | 2.06 | 4.57 | 6.55 | 0.0363 | 0.425 | 3.36 | 11.9 | 0.448 | 5.35 | 5.83 |
| 5 | 29.5 / 28.9 | 0.00175 | 0.0475 | 0.414 | 1.91 | 3.28 | 4.62 | 0.0450 | 0.517 | 3.61 | 8.72 | 0.549 | 5.79 | 4.06 |
| 6 | 25.2 / 24.9 | 0.00210 | 0.0561 | 0.464 | 1.66 | 2.48 | 3.33 | 0.0536 | 0.599 | 3.52 | 6.67 | 0.642 | 5.69 | 2.99 |
| 7 | 21.5 / 21.3 | 0.00245 | 0.0643 | 0.494 | 1.31 | 1.94 | 2.51 | 0.0620 | 0.669 | 3.22 | 5.27 | 0.726 | 5.23 | 2.31 |
| 8 | 18.4 / 18.3 | 0.00279 | 0.0719 | 0.504 | 1.09 | 1.56 | 1.94 | 0.0701 | 0.725 | 2.79 | 4.27 | 0.799 | 4.59 | 1.84 |
| 9 | 15.8 / 15.7 | 0.00313 | 0.0790 | 0.497 | 0.921 | 1.29 | 1.59 | 0.0780 | 0.765 | 2.32 | 3.55 | 0.860 | 3.84 | 1.50 |
| 10 | 13.8 / 13.8 | 0.00346 | 0.0853 | 0.476 | 0.788 | 1.09 | 1.29 | 0.0855 | 0.789 | 2.00 | 2.99 | 0.907 | 3.28 | 1.24 |
| 12 | 11.0 / 11.0 | 0.00412 | 0.0958 | 0.396 | 0.598 | 0.806 | 0.940 | 0.0995 | 0.791 | 1.54 | 2.23 | 0.960 | 2.53 | 0.925 |
| 14 | 9.00 / 8.99 | 0.00476 | 0.103 | 0.315 | 0.469 | 0.623 | 0.708 | 0.112 | 0.737 | 1.23 | 1.73 | 0.957 | 2.02 | 0.698 |
| 16 | 7.48 / 7.49 | 0.00538 | 0.107 | 0.258 | 0.380 | 0.495 | 0.534 | 0.122 | 0.643 | 1.00 | 1.38 | 0.903 | 1.65 | 0.545 |
| 18 | 6.32 / 6.32 | 0.00598 | 0.107 | 0.217 | 0.315 | 0.403 | 0.445 | 0.131 | 0.547 | 0.832 | 1.13 | 0.812 | 1.38 | 0.445 |
| 20 | 5.38 / 5.38 | 0.00655 | 0.103 | 0.188 | 0.264 | 0.336 | 0.350 | 0.137 | 0.466 | 0.705 | 0.947 | 0.712 | 1.17 | 0.354 |

La ( Z=57 ) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) [ 6s(2) 5d(1) / free(3) ]

| Q/Rs | ----> | 33.51 | 9.778 | 4.129 | 1.869 | 0.7658 | 0.2421 | 10.51 | 4.109 | 1.769 | 0.6650 | 4.164 | 1.529 | 0.4208 | 2.722 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 5d(1) | free(3) |
| 0.2 | 25.0 / 8.76 | 0.654(-4) | 0.00185 | 0.0177 | 0.132 | 1.16 | 17.1 | 0.00172 | 0.0208 | 0.181 | 2.03 | 0.0111 | 0.284 | 4.05 | 4.91 |
| 0.4 | 54.7 / 17.9 | 0.000133 | 0.00372 | 0.0354 | 0.264 | 2.34 | 38.4 | 0.00345 | 0.0417 | 0.363 | 4.08 | 0.0223 | 0.568 | 8.61 | 10.2 |
| 0.6 | 84.0 / 27.5 | 0.000201 | 0.00558 | 0.0531 | 0.396 | 3.53 | 58.8 | 0.00519 | 0.0625 | 0.545 | 6.13 | 0.0334 | 0.854 | 13.6 | 15.9 |
| 0.8 | 93.2 / 37.7 | 0.000268 | 0.00744 | 0.0709 | 0.528 | 4.74 | 60.2 | 0.00692 | 0.0832 | 0.725 | 8.19 | 0.0445 | 1.14 | 17.4 | 22.1 |
| 1.0 | 86.6 / 52.7 | 0.000336 | 0.00929 | 0.0885 | 0.658 | 5.92 | 49.2 | 0.00865 | 0.104 | 0.905 | 10.2 | 0.0556 | 1.42 | 17.9 | 33.2 |
| 1.2 | 78.8 / 68.0 | 0.000403 | 0.0111 | 0.106 | 0.787 | 7.02 | 39.4 | 0.0104 | 0.125 | 1.08 | 12.2 | 0.0667 | 1.70 | 16.3 | 34.9 |
| 1.4 | 72.2 / 57.9 | 0.000470 | 0.0130 | 0.124 | 0.913 | 7.96 | 32.2 | 0.0121 | 0.146 | 1.26 | 14.1 | 0.0778 | 1.97 | 13.5 | 31.4 |
| 1.6 | 67.5 / 56.9 | 0.000538 | 0.0149 | 0.141 | 1.04 | 8.62 | 26.7 | 0.0138 | 0.166 | 1.43 | 15.7 | 0.0889 | 2.25 | 11.4 | 27.5 |
| 1.8 | 63.9 / 55.8 | 0.000605 | 0.0167 | 0.158 | 1.16 | 8.94 | 22.5 | 0.0155 | 0.187 | 1.60 | 17.0 | 0.106 | 2.51 | 9.74 | 24.1 |
| 2.0 | 60.8 / 54.2 | 0.000672 | 0.0185 | 0.175 | 1.28 | 8.91 | 19.3 | 0.0173 | 0.207 | 1.77 | 17.9 | 0.111 | 2.78 | 8.43 | 21.1 |
| 2.2 | 57.8 / 52.4 | 0.000739 | 0.0204 | 0.192 | 1.39 | 8.58 | 16.7 | 0.0190 | 0.227 | 1.93 | 18.3 | 0.122 | 3.03 | 7.36 | 18.7 |
| 2.4 | 55.0 / 50.5 | 0.000806 | 0.0222 | 0.208 | 1.49 | 8.15 | 14.6 | 0.0207 | 0.247 | 2.09 | 18.3 | 0.133 | 3.28 | 6.47 | 16.6 |
| 2.6 | 51.9 / 48.0 | 0.000873 | 0.0240 | 0.225 | 1.59 | 7.44 | 12.9 | 0.0224 | 0.267 | 2.25 | 17.8 | 0.144 | 3.53 | 5.75 | 14.8 |
| 2.8 | 49.6 / 46.3 | 0.000940 | 0.0258 | 0.241 | 1.67 | 7.23 | 11.5 | 0.0241 | 0.287 | 2.39 | 17.2 | 0.155 | 3.76 | 5.15 | 13.3 |
| 3.0 | 46.6 / 43.8 | 0.00101 | 0.0277 | 0.257 | 1.75 | 6.51 | 10.3 | 0.0258 | 0.306 | 2.53 | 16.1 | 0.165 | 3.98 | 4.64 | 12.1 |
| 3.2 | 44.6 / 42.1 | 0.00107 | 0.0294 | 0.272 | 1.81 | 5.99 | 9.30 | 0.0275 | 0.325 | 2.67 | 15.6 | 0.176 | 4.19 | 4.19 | 11.0 |
| 3.4 | 42.1 / 39.9 | 0.00114 | 0.0312 | 0.287 | 1.86 | 5.54 | 8.43 | 0.0292 | 0.345 | 2.79 | 14.4 | 0.187 | 4.39 | 3.81 | 10.0 |
| 3.6 | 39.8 / 37.8 | 0.00121 | 0.0330 | 0.302 | 1.90 | 5.13 | 7.69 | 0.0309 | 0.363 | 2.90 | 13.2 | 0.197 | 4.57 | 3.48 | 9.20 |
| 3.8 | 37.9 / 36.1 | 0.00127 | 0.0348 | 0.316 | 1.93 | 4.74 | 7.05 | 0.0326 | 0.382 | 3.00 | 12.2 | 0.208 | 4.74 | 3.20 | 8.47 |
| 4.0 | 36.2 / 34.6 | 0.00134 | 0.0365 | 0.331 | 1.94 | 4.42 | 6.48 | 0.0343 | 0.400 | 3.10 | 11.5 | 0.218 | 4.89 | 2.95 | 7.82 |
| 5 | 29.9 / 28.9 | 0.00167 | 0.0451 | 0.393 | 1.83 | 3.18 | 4.49 | 0.0426 | 0.488 | 3.37 | 8.41 | 0.269 | 5.36 | 2.06 | 5.51 |
| 6 | 25.4 / 24.7 | 0.00201 | 0.0534 | 0.442 | 1.61 | 2.40 | 3.30 | 0.0508 | 0.566 | 3.33 | 6.45 | 0.318 | 5.35 | 1.53 | 4.10 |
| 7 | 21.6 / 21.1 | 0.00234 | 0.0612 | 0.472 | 1.29 | 1.89 | 2.49 | 0.0587 | 0.633 | 3.08 | 5.11 | 0.364 | 4.98 | 1.19 | 3.19 |
| 8 | 18.6 / 18.3 | 0.00266 | 0.0685 | 0.485 | 1.07 | 1.53 | 1.95 | 0.0665 | 0.688 | 2.73 | 4.16 | 0.406 | 4.48 | 0.943 | 2.55 |
| 9 | 15.8 / 15.5 | 0.00299 | 0.0752 | 0.480 | 0.905 | 1.26 | 1.58 | 0.0739 | 0.728 | 2.29 | 3.45 | 0.445 | 3.77 | 0.765 | 2.09 |
| 10 | 13.7 / 13.5 | 0.00331 | 0.0814 | 0.462 | 0.775 | 1.06 | 1.30 | 0.0811 | 0.754 | 1.94 | 2.92 | 0.480 | 3.20 | 0.630 | 1.74 |
| 12 | 10.8 / 10.9 | 0.00394 | 0.0916 | 0.390 | 0.589 | 0.788 | 0.920 | 0.0944 | 0.762 | 1.51 | 2.17 | 0.535 | 2.48 | 0.450 | 1.26 |
| 14 | 8.77 / 8.71 | 0.00455 | 0.0987 | 0.312 | 0.463 | 0.608 | 0.689 | 0.106 | 0.717 | 1.20 | 1.69 | 0.570 | 1.98 | 0.335 | 0.965 |
| 16 | 7.30 / 7.26 | 0.00514 | 0.103 | 0.254 | 0.375 | 0.484 | 0.534 | 0.117 | 0.632 | 0.984 | 1.35 | 0.584 | 1.62 | 0.264 | 0.762 |
| 18 | 6.20 / 6.18 | 0.00571 | 0.103 | 0.216 | 0.311 | 0.399 | 0.430 | 0.125 | 0.541 | 0.818 | 1.11 | 0.577 | 1.36 | 0.212 | 0.625 |
| 20 | 5.34 / 5.31 | 0.00626 | 0.100 | 0.185 | 0.261 | 0.330 | 0.366 | 0.131 | 0.462 | 0.694 | 0.929 | 0.552 | 1.15 | 0.175 | 0.515 |

Ce ( Z=58 ) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(2)

| Q/Rs | ----> | 34.13 | 9.963 | 4.221 | 1.902 | 0.7539 | 0.2335 | 10.72 | 4.204 | 1.800 | 0.6484 | 4.256 | 1.562 | 1.069 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 4f(2) |
| 0.2 | 23.1 | 0.622(-4) | 0.00176 | 0.0167 | 0.126 | 1.21 | 18.6 | 0.00163 | 0.0196 | 0.174 | 2.16 | 0.0202 | 0.269 | 0.521 |
| 0.4 | 51.1 | 0.000127 | 0.00354 | 0.0335 | 0.253 | 2.43 | 42.1 | 0.00328 | 0.0393 | 0.347 | 4.33 | 0.0406 | 0.538 | 1.04 |
| 0.6 | 77.3 | 0.000191 | 0.00531 | 0.0502 | 0.379 | 3.67 | 63.6 | 0.00493 | 0.0588 | 0.521 | 6.52 | 0.0608 | 0.808 | 1.57 |
| 0.8 | 80.8 | 0.000255 | 0.00708 | 0.0669 | 0.505 | 4.92 | 62.6 | 0.00658 | 0.0783 | 0.694 | 8.72 | 0.0810 | 1.08 | 2.09 |
| 1.0 | 73.8 | 0.000319 | 0.00884 | 0.0836 | 0.630 | 6.15 | 51.0 | 0.00822 | 0.0980 | 0.866 | 10.9 | 0.101 | 1.34 | 2.61 |
| 1.2 | 67.8 | 0.000384 | 0.0106 | 0.100 | 0.753 | 7.29 | 40.7 | 0.00986 | 0.118 | 1.04 | 13.0 | 0.122 | 1.61 | 3.12 |
| 1.4 | 64.1 | 0.000448 | 0.0124 | 0.117 | 0.875 | 8.25 | 33.0 | 0.0115 | 0.137 | 1.21 | 14.9 | 0.142 | 1.87 | 3.61 |
| 1.6 | 61.8 | 0.000512 | 0.0141 | 0.133 | 0.994 | 8.91 | 27.3 | 0.0131 | 0.157 | 1.37 | 16.6 | 0.162 | 2.13 | 4.05 |
| 1.8 | 60.1 | 0.000576 | 0.0159 | 0.149 | 1.11 | 9.19 | 23.0 | 0.0148 | 0.176 | 1.54 | 18.0 | 0.182 | 2.38 | 4.44 |
| 2.0 | 58.4 | 0.000639 | 0.0176 | 0.165 | 1.22 | 9.12 | 19.7 | 0.0164 | 0.195 | 1.70 | 18.8 | 0.202 | 2.63 | 4.74 |
| 2.2 | 56.5 | 0.000703 | 0.0194 | 0.181 | 1.33 | 8.74 | 17.0 | 0.0180 | 0.214 | 1.85 | 19.1 | 0.222 | 2.88 | 4.96 |
| 2.4 | 54.4 | 0.000767 | 0.0211 | 0.197 | 1.43 | 8.26 | 14.9 | 0.0197 | 0.233 | 2.01 | 19.0 | 0.241 | 3.11 | 5.06 |
| 2.6 | 51.9 | 0.000831 | 0.0229 | 0.212 | 1.52 | 7.53 | 13.1 | 0.0213 | 0.252 | 2.15 | 18.4 | 0.261 | 3.34 | 5.06 |
| 2.8 | 49.8 | 0.000895 | 0.0246 | 0.228 | 1.61 | 7.30 | 11.7 | 0.0229 | 0.270 | 2.29 | 17.6 | 0.280 | 3.57 | 4.98 |
| 3.0 | 47.3 | 0.000958 | 0.0263 | 0.243 | 1.68 | 6.60 | 10.5 | 0.0246 | 0.289 | 2.43 | 16.6 | 0.300 | 3.78 | 4.83 |
| 3.2 | 45.2 | 0.00102 | 0.0280 | 0.257 | 1.75 | 6.07 | 9.44 | 0.0262 | 0.307 | 2.56 | 15.9 | 0.319 | 3.98 | 4.60 |
| 3.4 | 42.8 | 0.00109 | 0.0297 | 0.272 | 1.80 | 5.61 | 8.55 | 0.0278 | 0.325 | 2.68 | 14.6 | 0.338 | 4.17 | 4.46 |
| 3.6 | 40.5 | 0.00115 | 0.0314 | 0.286 | 1.84 | 5.18 | 7.82 | 0.0294 | 0.343 | 2.79 | 13.3 | 0.357 | 4.35 | 4.17 |
| 3.8 | 38.6 | 0.00121 | 0.0331 | 0.300 | 1.86 | 4.79 | 7.14 | 0.0310 | 0.360 | 2.89 | 12.4 | 0.375 | 4.51 | 3.86 |
| 4.0 | 36.9 | 0.00128 | 0.0348 | 0.313 | 1.88 | 4.46 | 6.59 | 0.0326 | 0.378 | 2.98 | 11.6 | 0.394 | 4.66 | 3.57 |
| 5 | 30.5 | 0.00159 | 0.0430 | 0.373 | 1.79 | 3.21 | 4.55 | 0.0405 | 0.460 | 3.26 | 8.52 | 0.483 | 5.14 | 2.64 |
| 6 | 26.0 | 0.00191 | 0.0508 | 0.420 | 1.58 | 2.43 | 3.35 | 0.0483 | 0.535 | 3.25 | 6.53 | 0.566 | 5.18 | 2.03 |
| 7 | 22.2 | 0.00222 | 0.0583 | 0.451 | 1.28 | 1.90 | 2.51 | 0.0559 | 0.600 | 3.01 | 5.17 | 0.642 | 4.86 | 1.62 |
| 8 | 19.2 | 0.00253 | 0.0653 | 0.466 | 1.06 | 1.54 | 1.98 | 0.0632 | 0.653 | 2.70 | 4.21 | 0.709 | 4.41 | 1.32 |
| 9 | 16.4 | 0.00284 | 0.0718 | 0.464 | 0.894 | 1.27 | 1.57 | 0.0704 | 0.693 | 2.27 | 3.48 | 0.766 | 3.74 | 1.10 |
| 10 | 14.3 | 0.00315 | 0.0778 | 0.449 | 0.766 | 1.07 | 1.30 | 0.0772 | 0.720 | 1.93 | 2.95 | 0.812 | 3.17 | 0.934 |
| 12 | 11.3 | 0.00375 | 0.0877 | 0.385 | 0.583 | 0.791 | 0.916 | 0.0900 | 0.733 | 1.49 | 2.19 | 0.870 | 2.46 | 0.696 |
| 14 | 9.25 | 0.00433 | 0.0947 | 0.309 | 0.460 | 0.612 | 0.688 | 0.101 | 0.697 | 1.19 | 1.70 | 0.880 | 1.97 | 0.542 |
| 16 | 7.73 | 0.00490 | 0.0988 | 0.250 | 0.372 | 0.490 | 0.558 | 0.111 | 0.620 | 0.972 | 1.36 | 0.847 | 1.61 | 0.435 |
| 18 | 6.52 | 0.00545 | 0.0997 | 0.212 | 0.308 | 0.398 | 0.434 | 0.120 | 0.534 | 0.815 | 1.12 | 0.776 | 1.34 | 0.357 |
| 20 | 5.58 | 0.00597 | 0.0976 | 0.184 | 0.260 | 0.333 | 0.359 | 0.126 | 0.457 | 0.691 | 0.936 | 0.689 | 1.14 | 0.300 |

Pr ( Z=59 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(3)

| Q/Rs | :---> | 34.76 | 10.16 | 4.310 | 1.948 | 0.7669 | 0.2358 | 10.92 | 4.301 | 1.844 | 0.6591 | 4.359 | 1.606 | 1.125 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 4f(3) |
| 0.2 | 22.5 | 0.591(-4) | 0.00168 | 0.0159 | 0.119 | 1.16 | 18.2 | 0.00155 | 0.0185 | 0.163 | 2.07 | 0.0190 | 0.251 | 0.496 |
| 0.4 | 49.7 | 0.000121 | 0.00336 | 0.0317 | 0.238 | 2.33 | 41.0 | 0.00312 | 0.0370 | 0.327 | 4.17 | 0.0381 | 0.502 | 0.995 |
| 0.6 | 75.3 | 0.000182 | 0.00505 | 0.0475 | 0.357 | 3.52 | 62.3 | 0.00469 | 0.0554 | 0.490 | 6.27 | 0.0571 | 0.754 | 1.49 |
| 0.8 | 79.4 | 0.000243 | 0.00673 | 0.0634 | 0.476 | 4.72 | 62.0 | 0.00626 | 0.0738 | 0.653 | 8.37 | 0.0761 | 1.00 | 1.99 |
| 1.0 | 72.4 | 0.000304 | 0.00840 | 0.0792 | 0.593 | 5.90 | 50.6 | 0.00782 | 0.0924 | 0.815 | 10.5 | 0.0950 | 1.25 | 2.48 |
| 1.2 | 66.3 | 0.000365 | 0.0101 | 0.0950 | 0.710 | 7.00 | 40.3 | 0.00938 | 0.111 | 0.975 | 12.5 | 0.114 | 1.50 | 2.97 |
| 1.4 | 62.6 | 0.000426 | 0.0118 | 0.111 | 0.824 | 7.93 | 32.7 | 0.0109 | 0.129 | 1.13 | 14.4 | 0.133 | 1.74 | 3.44 |
| 1.6 | 60.3 | 0.000487 | 0.0134 | 0.126 | 0.936 | 8.60 | 27.2 | 0.0125 | 0.147 | 1.29 | 16.0 | 0.152 | 1.98 | 3.88 |
| 1.8 | 58.6 | 0.000548 | 0.0151 | 0.142 | 1.05 | 8.92 | 22.8 | 0.0140 | 0.166 | 1.45 | 17.3 | 0.171 | 2.22 | 4.30 |
| 2.0 | 57.1 | 0.000608 | 0.0168 | 0.157 | 1.15 | 8.89 | 19.6 | 0.0156 | 0.184 | 1.60 | 18.2 | 0.190 | 2.46 | 4.67 |
| 2.2 | 55.4 | 0.000669 | 0.0184 | 0.172 | 1.25 | 8.56 | 17.0 | 0.0172 | 0.202 | 1.74 | 18.6 | 0.208 | 2.68 | 4.99 |
| 2.4 | 53.5 | 0.000730 | 0.0201 | 0.187 | 1.35 | 8.14 | 14.8 | 0.0187 | 0.220 | 1.89 | 18.5 | 0.227 | 2.91 | 5.24 |
| 2.6 | 51.3 | 0.000791 | 0.0217 | 0.201 | 1.44 | 7.43 | 13.1 | 0.0203 | 0.237 | 2.03 | 18.0 | 0.245 | 3.12 | 5.42 |
| 2.8 | 49.5 | 0.000851 | 0.0234 | 0.216 | 1.52 | 7.23 | 11.7 | 0.0218 | 0.255 | 2.16 | 17.3 | 0.263 | 3.33 | 5.51 |
| 3.0 | 47.0 | 0.000912 | 0.0250 | 0.230 | 1.59 | 6.51 | 10.4 | 0.0234 | 0.272 | 2.29 | 16.3 | 0.282 | 3.53 | 5.53 |
| 3.2 | 45.3 | 0.000972 | 0.0267 | 0.244 | 1.66 | 5.99 | 9.40 | 0.0249 | 0.289 | 2.41 | 15.7 | 0.300 | 3.72 | 5.48 |
| 3.4 | 43.0 | 0.00103 | 0.0283 | 0.258 | 1.71 | 5.54 | 8.53 | 0.0264 | 0.306 | 2.53 | 14.5 | 0.318 | 3.90 | 5.36 |
| 3.6 | 40.8 | 0.00109 | 0.0299 | 0.271 | 1.75 | 5.12 | 7.78 | 0.0280 | 0.323 | 2.63 | 13.2 | 0.335 | 4.07 | 5.19 |
| 3.8 | 39.0 | 0.00115 | 0.0315 | 0.284 | 1.78 | 4.74 | 7.13 | 0.0295 | 0.340 | 2.73 | 12.3 | 0.353 | 4.23 | 5.05 |
| 4.0 | 37.4 | 0.00121 | 0.0331 | 0.297 | 1.80 | 4.41 | 6.56 | 0.0310 | 0.356 | 2.82 | 11.5 | 0.370 | 4.37 | 4.83 |
| 5 | 31.1 | 0.00152 | 0.0409 | 0.355 | 1.74 | 3.18 | 4.52 | 0.0386 | 0.435 | 3.11 | 8.48 | 0.455 | 4.86 | 3.92 |
| 6 | 26.4 | 0.00182 | 0.0484 | 0.401 | 1.53 | 2.40 | 3.35 | 0.0460 | 0.506 | 3.13 | 6.47 | 0.533 | 4.95 | 3.04 |
| 7 | 22.6 | 0.00212 | 0.0555 | 0.432 | 1.27 | 1.89 | 2.52 | 0.0532 | 0.568 | 2.93 | 5.12 | 0.605 | 4.70 | 2.43 |
| 8 | 19.5 | 0.00241 | 0.0623 | 0.448 | 1.04 | 1.53 | 1.97 | 0.0602 | 0.620 | 2.65 | 4.17 | 0.669 | 4.31 | 1.98 |
| 9 | 16.7 | 0.00271 | 0.0685 | 0.448 | 0.882 | 1.26 | 1.57 | 0.0670 | 0.660 | 2.25 | 3.47 | 0.725 | 3.69 | 1.65 |
| 10 | 14.5 | 0.00300 | 0.0742 | 0.436 | 0.760 | 1.06 | 1.30 | 0.0736 | 0.687 | 1.90 | 2.93 | 0.770 | 3.13 | 1.40 |
| 12 | 11.5 | 0.00357 | 0.0839 | 0.379 | 0.575 | 0.787 | 0.918 | 0.0858 | 0.705 | 1.48 | 2.18 | 0.829 | 2.42 | 1.05 |
| 14 | 9.39 | 0.00413 | 0.0909 | 0.306 | 0.455 | 0.608 | 0.684 | 0.0968 | 0.677 | 1.18 | 1.69 | 0.844 | 1.93 | 0.814 |
| 16 | 7.84 | 0.00467 | 0.0950 | 0.248 | 0.369 | 0.484 | 0.548 | 0.106 | 0.608 | 0.966 | 1.36 | 0.819 | 1.58 | 0.652 |
| 18 | 6.62 | 0.00519 | 0.0963 | 0.210 | 0.306 | 0.399 | 0.433 | 0.114 | 0.527 | 0.804 | 1.11 | 0.757 | 1.32 | 0.537 |
| 20 | 5.66 | 0.00569 | 0.0948 | 0.181 | 0.257 | 0.329 | 0.363 | 0.121 | 0.453 | 0.683 | 0.931 | 0.678 | 1.12 | 0.448 |

Nd ( Z=60 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(4)

| Q/Rs | ----> | 35.31 | 10.34 | 4.402 | 1.991 | 0.7793 | 0.2381 | 11.12 | 4.395 | 1.887 | 0.6694 | 4.462 | 1.649 | 1.173 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 2p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 4f(3) |
| 0.2 | 21.9 | 0.566(-4) | 0.00160 | 0.0150 | 0.113 | 1.11 | 17.8 | 0.00148 | 0.0175 | 0.154 | 2.00 | 0.0179 | 0.235 | 0.471 |
| 0.4 | 48.3 | 0.000116 | 0.00321 | 0.0300 | 0.226 | 2.24 | 40.0 | 0.00297 | 0.0350 | 0.308 | 4.01 | 0.0358 | 0.469 | 0.946 |
| 0.6 | 73.5 | 0.000174 | 0.00481 | 0.0450 | 0.338 | 3.39 | 61.0 | 0.00446 | 0.0524 | 0.463 | 6.04 | 0.0537 | 0.705 | 1.42 |
| 0.8 | 78.1 | 0.000233 | 0.00642 | 0.0601 | 0.451 | 4.54 | 61.4 | 0.00595 | 0.0697 | 0.616 | 8.06 | 0.0716 | 0.939 | 1.89 |
| 1.0 | 71.0 | 0.000291 | 0.00801 | 0.0750 | 0.562 | 5.67 | 50.1 | 0.00744 | 0.0873 | 0.769 | 10.1 | 0.0893 | 1.17 | 2.36 |
| 1.2 | 64.9 | 0.000349 | 0.00960 | 0.0899 | 0.672 | 6.74 | 40.0 | 0.00893 | 0.105 | 0.920 | 12.0 | 0.107 | 1.40 | 2.82 |
| 1.4 | 61.1 | 0.000408 | 0.0112 | 0.105 | 0.780 | 7.65 | 32.5 | 0.0104 | 0.122 | 1.07 | 13.8 | 0.125 | 1.63 | 3.27 |
| 1.6 | 58.8 | 0.000466 | 0.0128 | 0.119 | 0.887 | 8.31 | 27.0 | 0.0119 | 0.139 | 1.22 | 15.5 | 0.143 | 1.86 | 3.70 |
| 1.8 | 57.2 | 0.000524 | 0.0144 | 0.134 | 0.991 | 8.66 | 22.8 | 0.0134 | 0.157 | 1.36 | 16.7 | 0.161 | 2.08 | 4.12 |
| 2.0 | 55.7 | 0.000583 | 0.0160 | 0.149 | 1.09 | 8.67 | 19.4 | 0.0148 | 0.174 | 1.51 | 17.6 | 0.178 | 2.30 | 4.50 |
| 2.2 | 54.1 | 0.000641 | 0.0176 | 0.163 | 1.19 | 8.40 | 16.8 | 0.0163 | 0.191 | 1.65 | 18.1 | 0.196 | 2.51 | 4.85 |
| 2.4 | 52.4 | 0.000699 | 0.0192 | 0.177 | 1.28 | 8.02 | 14.7 | 0.0178 | 0.208 | 1.78 | 18.1 | 0.213 | 2.72 | 5.16 |
| 2.6 | 50.3 | 0.000757 | 0.0207 | 0.191 | 1.37 | 7.34 | 13.0 | 0.0193 | 0.224 | 1.92 | 17.7 | 0.231 | 2.93 | 5.41 |
| 2.8 | 48.7 | 0.000815 | 0.0223 | 0.205 | 1.44 | 7.14 | 11.6 | 0.0208 | 0.241 | 2.04 | 17.0 | 0.248 | 3.12 | 5.61 |
| 3.0 | 46.4 | 0.000873 | 0.0239 | 0.218 | 1.52 | 6.44 | 10.4 | 0.0222 | 0.257 | 2.17 | 16.0 | 0.265 | 3.31 | 5.74 |
| 3.2 | 44.8 | 0.000931 | 0.0254 | 0.232 | 1.58 | 5.92 | 9.38 | 0.0237 | 0.274 | 2.28 | 15.6 | 0.282 | 3.49 | 5.81 |
| 3.4 | 42.7 | 0.000989 | 0.0270 | 0.245 | 1.63 | 5.47 | 8.51 | 0.0252 | 0.290 | 2.39 | 14.4 | 0.299 | 3.66 | 5.81 |
| 3.6 | 40.7 | 0.00105 | 0.0285 | 0.257 | 1.67 | 5.06 | 7.76 | 0.0266 | 0.306 | 2.50 | 13.2 | 0.316 | 3.83 | 5.77 |
| 3.8 | 38.9 | 0.00111 | 0.0300 | 0.270 | 1.71 | 4.68 | 7.11 | 0.0281 | 0.322 | 2.59 | 12.2 | 0.332 | 3.98 | 5.66 |
| 4.0 | 37.3 | 0.00116 | 0.0316 | 0.282 | 1.73 | 4.37 | 6.53 | 0.0295 | 0.337 | 2.68 | 11.4 | 0.349 | 4.12 | 5.53 |
| 5 | 31.2 | 0.00145 | 0.0390 | 0.338 | 1.69 | 3.15 | 4.52 | 0.0367 | 0.412 | 2.97 | 8.39 | 0.428 | 4.61 | 4.61 |
| 6 | 26.5 | 0.00174 | 0.0462 | 0.382 | 1.49 | 2.38 | 3.33 | 0.0438 | 0.480 | 3.02 | 6.44 | 0.503 | 4.74 | 3.69 |
| 7 | 22.7 | 0.00203 | 0.0530 | 0.413 | 1.26 | 1.88 | 2.52 | 0.0507 | 0.539 | 2.85 | 5.10 | 0.571 | 4.54 | 2.97 |
| 8 | 19.7 | 0.00231 | 0.0595 | 0.430 | 1.03 | 1.52 | 1.95 | 0.0574 | 0.589 | 2.61 | 4.14 | 0.633 | 4.20 | 2.45 |
| 9 | 16.9 | 0.00259 | 0.0655 | 0.432 | 0.869 | 1.25 | 1.58 | 0.0639 | 0.629 | 2.22 | 3.44 | 0.686 | 3.64 | 2.04 |
| 10 | 14.7 | 0.00287 | 0.0710 | 0.423 | 0.750 | 1.06 | 1.31 | 0.0702 | 0.657 | 1.89 | 2.92 | 0.730 | 3.10 | 1.74 |
| 12 | 11.6 | 0.00342 | 0.0804 | 0.372 | 0.572 | 0.782 | 0.916 | 0.0819 | 0.679 | 1.46 | 2.17 | 0.790 | 2.38 | 1.31 |
| 14 | 9.46 | 0.00395 | 0.0873 | 0.303 | 0.450 | 0.604 | 0.686 | 0.0925 | 0.657 | 1.16 | 1.68 | 0.810 | 1.90 | 1.02 |
| 16 | 7.91 | 0.00447 | 0.091o | 0.246 | 0.365 | 0.484 | 0.540 | 0.102 | 0.596 | 0.953 | 1.35 | 0.791 | 1.56 | 0.824 |
| 18 | 6.70 | 0.00498 | 0.0932 | 0.207 | 0.303 | 0.395 | 0.431 | 0.110 | 0.520 | 0.799 | 1.11 | 0.738 | 1.31 | 0.677 |
| 20 | 5.75 | 0.00546 | 0.0921 | 0.179 | 0.256 | 0.329 | 0.369 | 0.116 | 0.448 | 0.678 | 0.928 | 0.666 | 1.11 | 0.570 |

Pm ( Z=61 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(5)

| Q/Rs | ----> | 35.95 | 10.41 | 4.494 | 2.033 | 0.7916 | 0.2403 | 11.32 | 4.489 | 1.931 | 0.6793 | 4.565 | 1.692 | 1.215 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 4f(5) |
| 0.2 | 21.4 | 0.538(-4) | 0.00157 | 0.0142 | 0.107 | 1.07 | 17.4 | 0.00140 | 0.0165 | 0.145 | 1.93 | 0.0168 | 0.220 | 0.449 |
| 0.4 | 47.1 | 0.000110 | 0.00315 | 0.0285 | 0.214 | 2.16 | 39.1 | 0.00283 | 0.0331 | 0.290 | 3.87 | 0.0337 | 0.439 | 0.902 |
| 0.6 | 71.8 | 0.000166 | 0.00473 | 0.0427 | 0.321 | 3.26 | 59.8 | 0.00425 | 0.0496 | 0.436 | 5.82 | 0.0506 | 0.660 | 1.35 |
| 0.8 | 76.8 | 0.000221 | 0.00631 | 0.0569 | 0.428 | 4.37 | 60.8 | 0.00567 | 0.0660 | 0.581 | 7.78 | 0.0674 | 0.879 | 1.80 |
| 1.0 | 69.7 | 0.000277 | 0.00788 | 0.0711 | 0.533 | 5.46 | 49.6 | 0.00709 | 0.0826 | 0.725 | 9.72 | 0.0841 | 1.10 | 2.25 |
| 1.2 | 63.6 | 0.000333 | 0.00944 | 0.0853 | 0.638 | 6.49 | 39.7 | 0.00851 | 0.0991 | 0.868 | 11.6 | 0.101 | 1.31 | 2.68 |
| 1.4 | 59.9 | 0.000388 | 0.0110 | 0.0993 | 0.741 | 7.38 | 32.4 | 0.00992 | 0.116 | 1.01 | 13.4 | 0.118 | 1.53 | 3.12 |
| 1.6 | 57.5 | 0.000444 | 0.0126 | 0.113 | 0.842 | 8.04 | 26.8 | 0.0113 | 0.132 | 1.15 | 14.9 | 0.135 | 1.74 | 3.53 |
| 1.8 | 55.8 | 0.000499 | 0.0142 | 0.127 | 0.941 | 8.41 | 22.6 | 0.0127 | 0.148 | 1.29 | 16.2 | 0.151 | 1.95 | 3.94 |
| 2.0 | 54.4 | 0.000554 | 0.0157 | 0.141 | 1.04 | 8.46 | 19.4 | 0.0141 | 0.164 | 1.42 | 17.1 | 0.168 | 2.15 | 4.32 |
| 2.2 | 52.8 | 0.000610 | 0.0173 | 0.154 | 1.13 | 8.23 | 16.7 | 0.0156 | 0.180 | 1.56 | 17.6 | 0.184 | 2.36 | 4.68 |
| 2.4 | 51.2 | 0.000665 | 0.0188 | 0.168 | 1.22 | 7.88 | 14.7 | 0.0170 | 0.196 | 1.68 | 17.6 | 0.201 | 2.55 | 5.01 |
| 2.6 | 49.3 | 0.000721 | 0.0204 | 0.181 | 1.30 | 7.26 | 13.0 | 0.0184 | 0.212 | 1.81 | 17.3 | 0.217 | 2.74 | 5.30 |
| 2.8 | 47.8 | 0.000776 | 0.0219 | 0.194 | 1.38 | 7.05 | 11.5 | 0.0198 | 0.228 | 1.93 | 16.8 | 0.234 | 2.93 | 5.54 |
| 3.0 | 45.6 | 0.000831 | 0.0235 | 0.207 | 1.44 | 6.39 | 10.3 | 0.0212 | 0.244 | 2.05 | 15.8 | 0.250 | 3.11 | 5.74 |
| 3.2 | 44.1 | 0.000886 | 0.0250 | 0.220 | 1.51 | 5.84 | 9.33 | 0.0226 | 0.259 | 2.16 | 15.3 | 0.266 | 3.28 | 5.89 |
| 3.4 | 42.2 | 0.000941 | 0.0265 | 0.232 | 1.56 | 5.41 | 8.46 | 0.0240 | 0.274 | 2.27 | 14.2 | 0.282 | 3.45 | 5.98 |
| 3.6 | 40.3 | 0.000996 | 0.0280 | 0.244 | 1.60 | 5.01 | 7.72 | 0.0254 | 0.290 | 2.36 | 13.1 | 0.297 | 3.60 | 6.02 |
| 3.8 | 38.5 | 0.00105 | 0.0295 | 0.256 | 1.64 | 4.65 | 7.06 | 0.0268 | 0.305 | 2.46 | 12.1 | 0.313 | 3.75 | 6.01 |
| 4.0 | 37.1 | 0.00111 | 0.0310 | 0.268 | 1.66 | 4.32 | 6.50 | 0.0281 | 0.319 | 2.54 | 11.3 | 0.329 | 3.88 | 5.95 |
| 5 | 31.2 | 0.00138 | 0.0384 | 0.321 | 1.64 | 3.11 | 4.51 | 0.0350 | 0.390 | 2.84 | 8.31 | 0.404 | 4.37 | 5.17 |
| 6 | 26.7 | 0.00166 | 0.0454 | 0.364 | 1.46 | 2.37 | 3.31 | 0.0417 | 0.455 | 2.90 | 6.38 | 0.475 | 4.53 | 4.34 |
| 7 | 22.9 | 0.00193 | 0.0522 | 0.395 | 1.24 | 1.86 | 2.51 | 0.0483 | 0.512 | 2.77 | 5.06 | 0.540 | 4.39 | 3.48 |
| 8 | 19.8 | 0.00220 | 0.0585 | 0.413 | 1.02 | 1.50 | 1.94 | 0.0547 | 0.561 | 2.55 | 4.12 | 0.598 | 4.09 | 2.87 |
| 9 | 17.1 | 0.00247 | 0.0645 | 0.417 | 0.863 | 1.25 | 1.58 | 0.0609 | 0.600 | 2.20 | 3.43 | 0.650 | 3.59 | 2.41 |
| 10 | 14.9 | 0.00273 | 0.0699 | 0.410 | 0.741 | 1.05 | 1.31 | 0.0669 | 0.629 | 1.87 | 2.90 | 0.693 | 3.07 | 2.06 |
| 12 | 11.7 | 0.00326 | 0.0792 | 0.366 | 0.565 | 0.776 | 0.917 | 0.0782 | 0.653 | 1.43 | 2.15 | 0.753 | 2.34 | 1.56 |
| 14 | 9.54 | 0.00377 | 0.0861 | 0.300 | 0.447 | 0.602 | 0.687 | 0.0884 | 0.637 | 1.15 | 1.68 | 0.777 | 1.87 | 1.22 |
| 16 | 7.98 | 0.00426 | 0.0904 | 0.244 | 0.361 | 0.479 | 0.537 | 0.0974 | 0.584 | 0.947 | 1.34 | 0.764 | 1.55 | 0.983 |
| 18 | 6.76 | 0.00474 | 0.0921 | 0.205 | 0.300 | 0.394 | 0.430 | 0.105 | 0.513 | 0.789 | 1.10 | 0.719 | 1.29 | 0.812 |
| 20 | 5.81 | 0.00521 | 0.0912 | 0.176 | 0.253 | 0.329 | 0.369 | 0.111 | 0.443 | 0.670 | 0.922 | 0.653 | 1.10 | 0.685 |

Sm ( Z=62 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(6)

| B/Rs | ----> | 36.51 | 10.71 | 4.585 | 2.075 | 0.8031 | 0.2424 | 11.52 | 4.579 | 1.973 | 0.6884 | 4.667 | 1.734 | 1.258 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 4f(6) |
| 0.2 | 20.9 | 0.515(-4) | 0.00145 | 0.0135 | 0.102 | 1.04 | 17.1 | 0.00134 | 0.0157 | 0.138 | 1.87 | 0.0159 | 0.207 | 0.425 |
| 0.4 | 45.9 | 0.000105 | 0.00292 | 0.0270 | 0.204 | 2.09 | 38.2 | 0.00270 | 0.0314 | 0.275 | 3.75 | 0.0318 | 0.413 | 0.854 |
| 0.6 | 70.2 | 0.000159 | 0.00438 | 0.0405 | 0.305 | 3.15 | 58.6 | 0.00406 | 0.0471 | 0.413 | 5.64 | 0.0477 | 0.620 | 1.28 |
| 0.8 | 75.6 | 0.000212 | 0.00584 | 0.0541 | 0.406 | 4.22 | 60.2 | 0.00541 | 0.0627 | 0.550 | 7.53 | 0.0636 | 0.826 | 1.70 |
| 1.0 | 68.5 | 0.000265 | 0.00729 | 0.0676 | 0.507 | 5.27 | 49.2 | 0.00677 | 0.0784 | 0.687 | 9.40 | 0.0793 | 1.03 | 2.13 |
| 1.2 | 62.3 | 0.000319 | 0.00874 | 0.0810 | 0.606 | 6.27 | 39.4 | 0.00812 | 0.0941 | 0.822 | 11.2 | 0.0953 | 1.23 | 2.54 |
| 1.4 | 58.6 | 0.000372 | 0.0102 | 0.0943 | 0.704 | 7.13 | 32.1 | 0.00945 | 0.110 | 0.956 | 12.9 | 0.111 | 1.44 | 2.95 |
| 1.6 | 56.2 | 0.000425 | 0.0117 | 0.108 | 0.800 | 7.79 | 26.6 | 0.0108 | 0.125 | 1.09 | 14.5 | 0.127 | 1.64 | 3.35 |
| 1.8 | 54.5 | 0.000478 | 0.0131 | 0.121 | 0.894 | 8.18 | 22.5 | 0.0122 | 0.141 | 1.22 | 15.7 | 0.143 | 1.83 | 3.74 |
| 2.0 | 53.1 | 0.000532 | 0.0146 | 0.134 | 0.986 | 8.26 | 19.2 | 0.0135 | 0.156 | 1.35 | 16.7 | 0.158 | 2.03 | 4.11 |
| 2.2 | 51.7 | 0.000585 | 0.0160 | 0.147 | 1.07 | 8.08 | 16.7 | 0.0148 | 0.171 | 1.47 | 17.2 | 0.174 | 2.22 | 4.47 |
| 2.4 | 50.1 | 0.000638 | 0.0174 | 0.159 | 1.16 | 7.75 | 14.6 | 0.0162 | 0.187 | 1.60 | 17.3 | 0.190 | 2.40 | 4.80 |
| 2.6 | 48.3 | 0.000691 | 0.0189 | 0.172 | 1.24 | 7.19 | 12.9 | 0.0175 | 0.202 | 1.72 | 17.0 | 0.205 | 2.58 | 5.10 |
| 2.8 | 46.8 | 0.000744 | 0.0203 | 0.185 | 1.31 | 6.94 | 11.5 | 0.0189 | 0.217 | 1.81 | 16.5 | 0.220 | 2.76 | 5.37 |
| 3.0 | 44.8 | 0.000797 | 0.0217 | 0.197 | 1.38 | 6.34 | 10.3 | 0.0202 | 0.231 | 1.94 | 15.6 | 0.236 | 2.93 | 5.60 |
| 3.2 | 43.3 | 0.000850 | 0.0232 | 0.209 | 1.44 | 5.77 | 9.28 | 0.0216 | 0.246 | 2.05 | 15.1 | 0.251 | 3.09 | 5.80 |
| 3.4 | 41.5 | 0.000902 | 0.0246 | 0.221 | 1.49 | 5.35 | 8.42 | 0.0229 | 0.261 | 2.15 | 14.1 | 0.266 | 3.25 | 5.95 |
| 3.6 | 39.7 | 0.000955 | 0.0260 | 0.232 | 1.53 | 4.95 | 7.68 | 0.0242 | 0.275 | 2.25 | 13.0 | 0.281 | 3.40 | 6.05 |
| 3.8 | 38.0 | 0.00101 | 0.0274 | 0.244 | 1.57 | 4.60 | 7.25 | 0.0256 | 0.289 | 2.34 | 12.0 | 0.296 | 3.54 | 6.11 |
| 4.0 | 36.7 | 0.00106 | 0.0288 | 0.255 | 1.59 | 4.27 | 6.47 | 0.0269 | 0.304 | 2.42 | 11.2 | 0.310 | 3.67 | 6.12 |
| 5 | 31.1 | 0.00132 | 0.0356 | 0.306 | 1.59 | 3.10 | 4.49 | 0.0334 | 0.371 | 2.72 | 8.23 | 0.382 | 4.15 | 5.69 |
| 6 | 26.8 | 0.00159 | 0.0421 | 0.348 | 1.42 | 2.35 | 3.30 | 0.0399 | 0.433 | 2.80 | 6.33 | 0.449 | 4.34 | 4.96 |
| 7 | 22.9 | 0.00185 | 0.0484 | 0.379 | 1.23 | 1.85 | 2.49 | 0.0462 | 0.488 | 2.69 | 5.02 | 0.511 | 4.24 | 3.92 |
| 8 | 19.9 | 0.00211 | 0.0544 | 0.397 | 1.00 | 1.50 | 1.95 | 0.0523 | 0.356 | 2.50 | 4.09 | 0.567 | 3.97 | 3.27 |
| 9 | 17.3 | 0.00237 | 0.0599 | 0.403 | 0.851 | 1.24 | 1.58 | 0.0582 | 0.574 | 2.17 | 3.40 | 0.617 | 3.54 | 2.76 |
| 10 | 15.0 | 0.00262 | 0.0651 | 0.398 | 0.731 | 1.04 | 1.30 | 0.0640 | 0.603 | 1.85 | 2.88 | 0.659 | 3.03 | 2.36 |
| 12 | 11.8 | 0.00312 | 0.0740 | 0.359 | 0.558 | 0.773 | 0.921 | 0.0749 | 0.630 | 1.42 | 2.15 | 0.719 | 2.30 | 1.79 |
| 14 | 9.63 | 0.00361 | 0.0807 | 0.297 | 0.442 | 0.598 | 0.688 | 0.0847 | 0.618 | 1.14 | 1.67 | 0.745 | 1.86 | 1.41 |
| 16 | 8.04 | 0.00409 | 0.0852 | 0.243 | 0.360 | 0.479 | 0.534 | 0.0934 | 0.572 | 0.934 | 1.34 | 0.738 | 1.53 | 1.14 |
| 18 | 6.81 | 0.00455 | 0.0872 | 0.202 | 0.298 | 0.392 | 0.430 | 0.101 | 0.505 | 0.779 | 1.10 | 0.700 | 1.27 | 0.943 |
| 20 | 5.85 | 0.00500 | 0.0869 | 0.175 | 0.252 | 0.326 | 0.366 | 0.107 | 0.439 | 0.662 | 0.919 | 0.640 | 1.08 | 0.792 |

Eu ( Z=63 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(7)

| Q/Rs | ----> | 37.15 | 10.90 | 4.667 | 2.118 | 0.8144 | 0.2429 | 11.72 | 4.673 | 2.014 | 0.6975 | 4.769 | 1.776 | 1.301 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 4f(7) |
| 0.2 | 20.7 | 0.491(-4) | 0.00139 | 0.0129 | 0.0965 | 1.00 | 17.0 | 0.00128 | 0.0149 | 0.131 | 1.81 | 0.0150 | 0.195 | 0.402 |
| 0.4 | 45.4 | 0.000100 | 0.00279 | 0.0258 | 0.193 | 2.02 | 38.0 | 0.00258 | 0.0298 | 0.261 | 3.63 | 0.0301 | 0.388 | 0.806 |
| 0.6 | 69.5 | 0.000151 | 0.00418 | 0.0387 | 0.290 | 3.04 | 58.4 | 0.00387 | 0.0446 | 0.392 | 5.46 | 0.0451 | 0.584 | 1.21 |
| 0.8 | 74.8 | 0.000202 | 0.00558 | 0.0516 | 0.386 | 4.08 | 60.0 | 0.00517 | 0.0594 | 0.522 | 7.29 | 0.0601 | 0.778 | 1.61 |
| 1.0 | 67.7 | 0.000253 | 0.00696 | 0.0645 | 0.481 | 5.09 | 49.1 | 0.00646 | 0.0743 | 0.652 | 9.11 | 0.0750 | 0.970 | 2.01 |
| 1.2 | 61.4 | 0.000304 | 0.00835 | 0.0773 | 0.576 | 6.06 | 39.3 | 0.00775 | 0.0892 | 0.780 | 10.9 | 0.0900 | 1.16 | 2.40 |
| 1.4 | 57.6 | 0.000355 | 0.00973 | 0.0901 | 0.669 | 6.91 | 32.1 | 0.00904 | 0.104 | 0.908 | 12.5 | 0.105 | 1.35 | 2.79 |
| 1.6 | 55.1 | 0.000406 | 0.0111 | 0.103 | 0.760 | 7.56 | 26.6 | 0.0103 | 0.119 | 1.03 | 14.0 | 0.120 | 1.54 | 3.17 |
| 1.8 | 53.4 | 0.000456 | 0.0125 | 0.115 | 0.850 | 7.96 | 22.5 | 0.0116 | 0.133 | 1.16 | 15.3 | 0.135 | 1.72 | 3.54 |
| 2.0 | 52.0 | 0.000507 | 0.0139 | 0.128 | 0.937 | 8.07 | 19.2 | 0.0129 | 0.148 | 1.28 | 16.2 | 0.150 | 1.91 | 3.90 |
| 2.2 | 50.6 | 0.000558 | 0.0153 | 0.140 | 1.02 | 7.93 | 16.7 | 0.0142 | 0.163 | 1.40 | 16.7 | 0.164 | 2.09 | 4.24 |
| 2.4 | 49.1 | 0.000608 | 0.0167 | 0.152 | 1.10 | 7.62 | 14.6 | 0.0155 | 0.177 | 1.52 | 16.9 | 0.179 | 2.26 | 4.56 |
| 2.6 | 47.4 | 0.000659 | 0.0180 | 0.164 | 1.18 | 7.11 | 12.9 | 0.0168 | 0.191 | 1.63 | 16.7 | 0.194 | 2.43 | 4.87 |
| 2.8 | 45.8 | 0.000709 | 0.0194 | 0.176 | 1.25 | 6.78 | 11.5 | 0.0180 | 0.205 | 1.74 | 16.2 | 0.208 | 2.60 | 5.15 |
| 3.0 | 44.0 | 0.000760 | 0.0208 | 0.188 | 1.31 | 6.30 | 10.3 | 0.0193 | 0.220 | 1.85 | 15.4 | 0.223 | 2.76 | 5.40 |
| 3.2 | 42.4 | 0.000810 | 0.0221 | 0.200 | 1.37 | 5.74 | 9.28 | 0.0206 | 0.234 | 1.95 | 14.8 | 0.237 | 2.92 | 5.62 |
| 3.4 | 40.8 | 0.000861 | 0.0235 | 0.211 | 1.42 | 5.29 | 8.42 | 0.0219 | 0.247 | 2.05 | 14.0 | 0.251 | 3.06 | 5.80 |
| 3.6 | 39.1 | 0.000911 | 0.0248 | 0.222 | 1.47 | 4.90 | 7.68 | 0.0231 | 0.261 | 2.14 | 12.9 | 0.265 | 3.21 | 5.95 |
| 3.8 | 37.4 | 0.000962 | 0.0261 | 0.233 | 1.50 | 4.55 | 7.03 | 0.0244 | 0.275 | 2.23 | 11.9 | 0.279 | 3.34 | 6.06 |
| 4.0 | 36.1 | 0.00101 | 0.0275 | 0.244 | 1.53 | 4.25 | 6.47 | 0.0257 | 0.288 | 2.31 | 11.1 | 0.293 | 3.47 | 6.13 |
| 5 | 30.9 | 0.00126 | 0.0340 | 0.293 | 1.54 | 3.07 | 4.48 | 0.0319 | 0.353 | 2.60 | 8.20 | 0.361 | 3.95 | 5.97 |
| 6 | 26.7 | 0.00151 | 0.0403 | 0.334 | 1.40 | 2.33 | 3.30 | 0.0381 | 0.412 | 2.70 | 6.30 | 0.425 | 4.16 | 5.27 |
| 7 | 23.1 | 0.00176 | 0.0463 | 0.364 | 1.22 | 1.84 | 2.49 | 0.0441 | 0.465 | 2.62 | 5.00 | 0.484 | 4.10 | 4.41 |
| 8 | 20.0 | 0.00201 | 0.0520 | 0.383 | 0.990 | 1.49 | 1.95 | 0.0500 | 0.511 | 2.44 | 4.08 | 0.538 | 3.85 | 3.62 |
| 9 | 17.4 | 0.00226 | 0.0574 | 0.390 | 0.839 | 1.23 | 1.58 | 0.0557 | 0.548 | 2.15 | 3.39 | 0.586 | 3.48 | 3.07 |
| 10 | 15.1 | 0.00250 | 0.0623 | 0.387 | 0.726 | 1.04 | 1.30 | 0.0612 | 0.577 | 1.84 | 2.87 | 0.627 | 3.00 | 2.63 |
| 12 | 11.9 | 0.00298 | 0.0710 | 0.353 | 0.555 | 0.769 | 0.922 | 0.0716 | 0.606 | 1.40 | 2.13 | 0.687 | 2.28 | 2.01 |
| 14 | 9.69 | 0.00345 | 0.0776 | 0.294 | 0.437 | 0.594 | 0.689 | 0.0811 | 0.599 | 1.12 | 1.66 | 0.715 | 1.83 | 1.59 |
| 16 | 8.09 | 0.00391 | 0.0821 | 0.241 | 0.356 | 0.475 | 0.535 | 0.0895 | 0.559 | 0.921 | 1.33 | 0.713 | 1.50 | 1.28 |
| 18 | 6.87 | 0.00435 | 0.0843 | 0.201 | 0.295 | 0.390 | 0.429 | 0.0968 | 0.498 | 0.774 | 1.09 | 0.681 | 1.27 | 1.06 |
| 20 | 5.92 | 0.00478 | 0.0844 | 0.173 | 0.250 | 0.326 | 0.365 | 0.103 | 0.434 | 0.658 | 0.917 | 0.627 | 1.08 | 0.897 |

Gd ( Z=64 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(1) 4f(7)

| Q/Rs | ----> | 37.74 | 11.01 | 4.769 | 2.170 | 0.8537 | 0.2586 | 11.93 | 4.791 | 2.068 | 0.7372 | 4.882 | 1.824 | 0.4537 | 1.399 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 5d(1) | 4f(7) |
| 0.2 | 21.3 | 0.470(-4) | 0.00135 | 0.0122 | 0.0908 | 0.895 | 14.7 | 0.00122 | 0.0139 | 0.122 | 1.58 | 0.0141 | 0.182 | 3.40 | 0.335 |
| 0.4 | 46.2 | 0.962(-4) | 0.00271 | 0.0244 | 0.182 | 1.80 | 32.5 | 0.00246 | 0.0279 | 0.244 | 3.18 | 0.0283 | 0.363 | 7.16 | 0.672 |
| 0.6 | 71.7 | 0.000145 | 0.00407 | 0.0366 | 0.273 | 2.71 | 50.6 | 0.00369 | 0.0418 | 0.367 | 4.77 | 0.0424 | 0.545 | 11.3 | 1.01 |
| 0.8 | 82.9 | 0.000194 | 0.00543 | 0.0488 | 0.363 | 3.63 | 55.0 | 0.00493 | 0.0557 | 0.489 | 6.37 | 0.0565 | 0.727 | 14.8 | 1.34 |
| 1.0 | 78.7 | 0.000242 | 0.00678 | 0.0610 | 0.453 | 4.54 | 46.3 | 0.00616 | 0.0696 | 0.610 | 7.95 | 0.0705 | 0.907 | 16.0 | 1.67 |
| 1.2 | 71.6 | 0.000291 | 0.00813 | 0.0731 | 0.542 | 5.40 | 37.3 | 0.00739 | 0.0835 | 0.730 | 9.49 | 0.0846 | 1.09 | 14.7 | 2.00 |
| 1.4 | 65.8 | 0.000340 | 0.00947 | 0.0852 | 0.630 | 6.18 | 30.6 | 0.00862 | 0.0974 | 0.849 | 11.0 | 0.0987 | 1.26 | 12.6 | 2.32 |
| 1.6 | 61.5 | 0.000388 | 0.0108 | 0.0972 | 0.716 | 6.82 | 25.5 | 0.00984 | 0.111 | 0.967 | 12.3 | 0.113 | 1.44 | 10.8 | 2.64 |
| 1.8 | 58.4 | 0.000437 | 0.0122 | 0.109 | 0.800 | 7.25 | 21.6 | 0.0111 | 0.125 | 1.08 | 13.5 | 0.127 | 1.61 | 9.23 | 2.95 |
| 2.0 | 56.0 | 0.000486 | 0.0135 | 0.121 | 0.883 | 7.44 | 18.5 | 0.0123 | 0.139 | 1.20 | 14.4 | 0.141 | 1.78 | 8.03 | 3.26 |
| 2.2 | 53.8 | 0.000534 | 0.0149 | 0.133 | 0.962 | 7.40 | 16.1 | 0.0135 | 0.152 | 1.31 | 15.0 | 0.155 | 1.95 | 7.01 | 3.55 |
| 2.4 | 51.7 | 0.000583 | 0.0162 | 0.144 | 1.04 | 7.17 | 14.1 | 0.0147 | 0.166 | 1.42 | 15.3 | 0.168 | 2.12 | 6.20 | 3.83 |
| 2.6 | 49.7 | 0.000631 | 0.0176 | 0.156 | 1.11 | 6.84 | 12.5 | 0.0160 | 0.179 | 1.53 | 15.3 | 0.182 | 2.28 | 5.51 | 4.09 |
| 2.8 | 47.6 | 0.000679 | 0.0189 | 0.167 | 1.18 | 6.34 | 11.1 | 0.0172 | 0.193 | 1.63 | 15.1 | 0.196 | 2.43 | 4.94 | 4.34 |
| 3.0 | 45.9 | 0.000728 | 0.0202 | 0.178 | 1.24 | 6.13 | 9.98 | 0.0184 | 0.206 | 1.73 | 14.6 | 0.209 | 2.59 | 4.46 | 4.57 |
| 3.2 | 43.8 | 0.000776 | 0.0215 | 0.189 | 1.30 | 5.57 | 9.01 | 0.0196 | 0.219 | 1.83 | 13.9 | 0.223 | 2.73 | 4.03 | 4.77 |
| 3.4 | 42.2 | 0.000825 | 0.0228 | 0.200 | 1.35 | 5.10 | 8.19 | 0.0208 | 0.232 | 1.92 | 13.5 | 0.236 | 2.87 | 3.68 | 4.95 |
| 3.6 | 40.4 | 0.000873 | 0.0242 | 0.210 | 1.39 | 4.76 | 7.47 | 0.0221 | 0.245 | 2.01 | 12.6 | 0.250 | 3.01 | 3.37 | 5.10 |
| 3.8 | 38.6 | 0.000921 | 0.0255 | 0.221 | 1.43 | 4.40 | 6.84 | 0.0233 | 0.258 | 2.09 | 11.6 | 0.263 | 3.14 | 3.09 | 5.23 |
| 4.0 | 37.0 | 0.000969 | 0.0267 | 0.231 | 1.46 | 4.12 | 6.31 | 0.0245 | 0.270 | 2.17 | 10.7 | 0.276 | 3.26 | 2.85 | 5.33 |
| 5 | 31.4 | 0.00121 | 0.0331 | 0.278 | 1.49 | 3.00 | 4.38 | 0.0304 | 0.331 | 2.46 | 7.93 | 0.340 | 3.73 | 1.99 | 5.38 |
| 6 | 27.1 | 0.00145 | 0.0392 | 0.317 | 1.36 | 2.28 | 3.24 | 0.0363 | 0.387 | 2.58 | 6.11 | 0.400 | 3.95 | 1.48 | 4.87 |
| 7 | 23.5 | 0.00169 | 0.0451 | 0.347 | 1.20 | 1.80 | 2.47 | 0.0421 | 0.438 | 2.52 | 4.88 | 0.456 | 3.93 | 1.15 | 4.26 |
| 8 | 20.3 | 0.00193 | 0.0507 | 0.367 | 0.981 | 1.45 | 1.93 | 0.0477 | 0.481 | 2.37 | 3.97 | 0.508 | 3.73 | 0.920 | 3.46 |
| 9 | 17.7 | 0.00216 | 0.0559 | 0.375 | 0.826 | 1.21 | 1.56 | 0.0531 | 0.518 | 2.11 | 3.31 | 0.554 | 3.41 | 0.753 | 2.93 |
| 10 | 15.4 | 0.00240 | 0.0608 | 0.374 | 0.715 | 1.02 | 1.28 | 0.0584 | 0.547 | 1.82 | 2.81 | 0.593 | 2.96 | 0.622 | 2.54 |
| 12 | 12.0 | 0.00286 | 0.0693 | 0.345 | 0.547 | 0.755 | 0.907 | 0.0684 | 0.578 | 1.38 | 2.10 | 0.653 | 2.24 | 0.446 | 1.94 |
| 14 | 9.80 | 0.00331 | 0.0759 | 0.290 | 0.434 | 0.586 | 0.680 | 0.0776 | 0.576 | 1.11 | 1.63 | 0.684 | 1.80 | 0.333 | 1.53 |
| 16 | 8.20 | 0.00375 | 0.0804 | 0.239 | 0.351 | 0.469 | 0.540 | 0.0857 | 0.543 | 0.914 | 1.31 | 0.685 | 1.48 | 0.260 | 1.24 |
| 18 | 6.96 | 0.00417 | 0.0827 | 0.198 | 0.293 | 0.384 | 0.435 | 0.0928 | 0.488 | 0.763 | 1.08 | 0.660 | 1.25 | 0.209 | 1.03 |
| 20 | 5.97 | 0.00458 | 0.0829 | 0.171 | 0.247 | 0.321 | 0.348 | 0.0987 | 0.428 | 0.649 | 0.901 | 0.613 | 1.06 | 0.171 | 0.873 |

Tb ( Z=65 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(9)

| θ/Rs | ----> | 38.40 | 11.29 | 4.858 | 2.203 | 0.8381 | 0.2487 | 12.14 | 4.868 | 2.099 | 0.7165 | 4.973 | 1.860 | 1.363 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 4f(9) |
| 0.2 | 19.5 | 0.448(-4) | 0.00126 | 0.0116 | 0.0874 | 0.936 | 16.1 | 0.00116 | 0.0134 | 0.118 | 1.70 | 0.0134 | 0.173 | 0.373 |
| 0.4 | 42.7 | 0.917(-4) | 0.00254 | 0.0233 | 0.175 | 1.88 | 35.8 | 0.00235 | 0.0268 | 0.235 | 3.40 | 0.0269 | 0.345 | 0.747 |
| 0.6 | 65.7 | 0.138(-3) | 0.00381 | 0.0349 | 0.263 | 2.84 | 55.4 | 0.00352 | 0.0401 | 0.353 | 5.11 | 0.0404 | 0.519 | 1.12 |
| 0.8 | 71.9 | 0.185(-3) | 0.00508 | 0.0465 | 0.350 | 3.80 | 58.1 | 0.00470 | 0.0534 | 0.470 | 6.83 | 0.0538 | 0.691 | 1.49 |
| 1.0 | 65.1 | 0.231(-3) | 0.00634 | 0.0582 | 0.436 | 4.75 | 47.9 | 0.00588 | 0.0667 | 0.587 | 8.52 | 0.0671 | 0.863 | 1.86 |
| 1.2 | 59.1 | 0.278(-3) | 0.00760 | 0.0697 | 0.522 | 5.65 | 38.6 | 0.00705 | 0.0801 | 0.703 | 10.2 | 0.0806 | 1.03 | 2.23 |
| 1.4 | 55.2 | 0.324(-3) | 0.00886 | 0.0812 | 0.606 | 6.46 | 31.5 | 0.00822 | 0.0934 | 0.817 | 11.8 | 0.0940 | 1.20 | 2.59 |
| 1.6 | 52.7 | 0.370(-3) | 0.0101 | 0.0927 | 0.689 | 7.10 | 26.2 | 0.00939 | 0.107 | 0.931 | 13.2 | 0.107 | 1.37 | 2.94 |
| 1.8 | 51.0 | 0.417(-3) | 0.0114 | 0.104 | 0.771 | 7.52 | 22.1 | 0.0106 | 0.120 | 1.04 | 14.4 | 0.121 | 1.53 | 3.29 |
| 2.0 | 49.7 | 0.463(-3) | 0.0127 | 0.115 | 0.850 | 7.69 | 19.0 | 0.0117 | 0.133 | 1.15 | 15.3 | 0.134 | 1.70 | 3.63 |
| 2.2 | 48.4 | 0.509(-3) | 0.0139 | 0.126 | 0.927 | 7.61 | 16.4 | 0.0129 | 0.146 | 1.26 | 15.9 | 0.147 | 1.86 | 3.96 |
| 2.4 | 47.0 | 0.556(-3) | 0.0152 | 0.138 | 1.00 | 7.34 | 14.4 | 0.0141 | 0.159 | 1.37 | 16.1 | 0.160 | 2.01 | 4.28 |
| 2.6 | 45.5 | 0.602(-3) | 0.0164 | 0.148 | 1.07 | 6.95 | 12.7 | 0.0152 | 0.172 | 1.47 | 16.0 | 0.174 | 2.17 | 4.58 |
| 2.8 | 43.9 | 0.648(-3) | 0.0177 | 0.159 | 1.14 | 6.48 | 11.3 | 0.0164 | 0.185 | 1.57 | 15.7 | 0.187 | 2.32 | 4.86 |
| 3.0 | 42.4 | 0.694(-3) | 0.0189 | 0.170 | 1.20 | 6.20 | 10.2 | 0.0176 | 0.197 | 1.67 | 15.0 | 0.200 | 2.46 | 5.13 |
| 3.2 | 40.7 | 0.740(-3) | 0.0201 | 0.180 | 1.25 | 5.62 | 9.18 | 0.0187 | 0.210 | 1.76 | 14.3 | 0.212 | 2.60 | 5.37 |
| 3.4 | 39.5 | 0.786(-3) | 0.0214 | 0.191 | 1.30 | 5.17 | 8.33 | 0.0199 | 0.223 | 1.85 | 13.8 | 0.225 | 2.74 | 5.59 |
| 3.6 | 37.8 | 0.832(-3) | 0.0226 | 0.201 | 1.35 | 4.82 | 7.59 | 0.0210 | 0.235 | 1.94 | 12.7 | 0.238 | 2.87 | 5.78 |
| 3.8 | 36.3 | 0.878(-3) | 0.0238 | 0.211 | 1.39 | 4.46 | 6.96 | 0.0222 | 0.247 | 2.02 | 11.8 | 0.251 | 2.99 | 5.95 |
| 4.0 | 34.9 | 0.924(-3) | 0.0250 | 0.221 | 1.41 | 4.16 | 6.40 | 0.0234 | 0.259 | 2.10 | 10.9 | 0.263 | 3.11 | 6.09 |
| 5 | 30.2 | 0.00115 | 0.0310 | 0.266 | 1.45 | 3.03 | 4.44 | 0.0291 | 0.318 | 2.39 | 8.09 | 0.324 | 3.57 | 6.31 |
| 6 | 26.5 | 0.00138 | 0.0368 | 0.304 | 1.34 | 2.30 | 3.28 | 0.0347 | 0.372 | 2.51 | 6.22 | 0.382 | 3.81 | 5.89 |
| 7 | 23.3 | 0.00161 | 0.0423 | 0.333 | 1.19 | 1.81 | 2.49 | 0.0402 | 0.421 | 2.47 | 4.94 | 0.436 | 3.82 | 5.29 |
| 8 | 20.1 | 0.00184 | 0.0476 | 0.353 | 0.975 | 1.47 | 1.95 | 0.0455 | 0.464 | 2.32 | 4.03 | 0.485 | 3.64 | 4.35 |
| 9 | 17.5 | 0.00206 | 0.0525 | 0.363 | 0.822 | 1.22 | 1.56 | 0.0508 | 0.499 | 2.09 | 3.36 | 0.530 | 3.36 | 3.64 |
| 10 | 15.3 | 0.00229 | 0.0571 | 0.362 | 0.707 | 1.03 | 1.28 | 0.0558 | 0.528 | 1.80 | 2.84 | 0.568 | 2.93 | 3.16 |
| 12 | 12.0 | 0.00273 | 0.0652 | 0.338 | 0.545 | 0.761 | 0.927 | 0.0654 | 0.650 | 1.37 | 2.12 | 0.627 | 2.21 | 2.42 |
| 14 | 9.83 | 0.00316 | 0.0716 | 0.287 | 0.430 | 0.589 | 0.697 | 0.0742 | 0.561 | 1.10 | 1.65 | 0.659 | 1.79 | 1.92 |
| 16 | 8.20 | 0.00358 | 0.0762 | 0.237 | 0.350 | 0.471 | 0.534 | 0.0821 | 0.533 | 0.903 | 1.32 | 0.664 | 1.47 | 1.56 |
| 18 | 6.98 | 0.00398 | 0.0787 | 0.197 | 0.290 | 0.386 | 0.428 | 0.0890 | 0.481 | 0.760 | 1.08 | 0.643 | 1.24 | 1.30 |
| 20 | 6.00 | 0.00438 | 0.0793 | 0.168 | 0.246 | 0.323 | 0.354 | 0.0948 | 0.424 | 0.646 | 0.909 | 0.601 | 1.06 | 1.09 |

Dy ( Z=66 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(10)

| Q/Rs | ----> | 38.99 | 11.47 | 4.947 | 2.245 | 0.8492 | 0.2509 | 12.33 | 4.952 | 2.140 | 0.7257 | 5.075 | 1.901 | 1.398 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 4f(10) |
| 0.2 | 19.0 | 0.429(-4) | 0.00121 | 0.0111 | 0.0834 | 0.907 | 15.7 | 0.00112 | 0.0128 | 0.112 | 1.64 | 0.0127 | 0.164 | 0.356 |
| 0.4 | 41.7 | 0.879(-4) | 0.00243 | 0.0222 | 0.167 | 1.82 | 35.1 | 0.00225 | 0.0256 | 0.224 | 3.30 | 0.0255 | 0.326 | 0.713 |
| 0.6 | 64.2 | 0.133(-3) | 0.00365 | 0.0333 | 0.251 | 2.75 | 54.3 | 0.00338 | 0.0384 | 0.336 | 4.96 | 0.0383 | 0.491 | 1.07 |
| 0.8 | 70.7 | 0.177(-3) | 0.00487 | 0.0444 | 0.334 | 3.68 | 57.4 | 0.00451 | 0.0511 | 0.448 | 6.62 | 0.0510 | 0.654 | 1.42 |
| 1.0 | 64.1 | 0.222(-3) | 0.00608 | 0.0555 | 0.416 | 4.60 | 47.5 | 0.00564 | 0.0638 | 0.559 | 8.26 | 0.0637 | 0.816 | 1.78 |
| 1.2 | 58.1 | 0.266(-3) | 0.00729 | 0.0665 | 0.498 | 5.47 | 38.3 | 0.00676 | 0.0766 | 0.669 | 9.87 | 0.0764 | 0.977 | 2.13 |
| 1.4 | 54.2 | 0.311(-3) | 0.00850 | 0.0775 | 0.578 | 6.26 | 31.3 | 0.00789 | 0.0893 | 0.778 | 11.4 | 0.0891 | 1.14 | 2.47 |
| 1.6 | 51.7 | 0.355(-3) | 0.00971 | 0.0884 | 0.658 | 6.90 | 26.0 | 0.00901 | 0.102 | 0.886 | 12.8 | 0.102 | 1.30 | 2.81 |
| 1.8 | 50.0 | 0.340(-3) | 0.0109 | 0.0992 | 0.735 | 7.33 | 22.0 | 0.0101 | 0.115 | 0.993 | 14.0 | 0.115 | 1.45 | 3.14 |
| 2.0 | 48.6 | 0.444(-3) | 0.0121 | 0.110 | 0.811 | 7.51 | 18.8 | 0.0113 | 0.127 | 1.10 | 14.9 | 0.127 | 1.61 | 3.47 |
| 2.2 | 47.4 | 0.488(-3) | 0.0133 | 0.121 | 0.885 | 7.46 | 16.3 | 0.0124 | 0.140 | 1.20 | 15.5 | 0.140 | 1.76 | 3.79 |
| 2.4 | 46.1 | 0.533(-3) | 0.0146 | 0.131 | 0.956 | 7.22 | 14.3 | 0.0135 | 0.152 | 1.30 | 15.8 | 0.152 | 1.91 | 4.10 |
| 2.6 | 44.6 | 0.577(-3) | 0.0157 | 0.142 | 1.02 | 6.87 | 12.7 | 0.0146 | 0.164 | 1.40 | 15.7 | 0.165 | 2.05 | 4.39 |
| 2.8 | 43.0 | 0.621(-3) | 0.0169 | 0.152 | 1.09 | 6.38 | 11.3 | 0.0157 | 0.177 | 1.50 | 15.4 | 0.177 | 2.20 | 4.67 |
| 3.0 | 41.7 | 0.666(-3) | 0.0181 | 0.162 | 1.15 | 6.15 | 10.1 | 0.0169 | 0.189 | 1.59 | 14.8 | 0.189 | 2.33 | 4.94 |
| 3.2 | 40.0 | 0.710(-3) | 0.0193 | 0.172 | 1.20 | 5.58 | 9.14 | 0.0180 | 0.201 | 1.68 | 14.1 | 0.201 | 2.47 | 5.18 |
| 3.4 | 38.8 | 0.754(-3) | 0.0205 | 0.182 | 1.25 | 5.14 | 8.29 | 0.0191 | 0.213 | 1.77 | 13.6 | 0.214 | 2.60 | 5.41 |
| 3.6 | 37.2 | 0.798(-3) | 0.0217 | 0.192 | 1.29 | 4.77 | 7.57 | 0.0202 | 0.225 | 1.85 | 12.7 | 0.226 | 2.72 | 5.61 |
| 3.8 | 35.7 | 0.842(-3) | 0.0228 | 0.201 | 1.33 | 4.44 | 6.93 | 0.0213 | 0.237 | 1.93 | 11.7 | 0.238 | 2.84 | 5.79 |
| 4.0 | 34.4 | 0.887(-3) | 0.0240 | 0.211 | 1.36 | 4.12 | 6.39 | 0.0224 | 0.248 | 2.00 | 10.8 | 0.250 | 2.95 | 5.95 |
| 5 | 29.8 | 0.00111 | 0.0297 | 0.254 | 1.41 | 3.00 | 4.43 | 0.0279 | 0.304 | 2.29 | 8.01 | 0.308 | 3.41 | 6.32 |
| 6 | 26.3 | 0.00133 | 0.0353 | 0.291 | 1.31 | 2.28 | 3.26 | 0.0333 | 0.356 | 2.42 | 6.17 | 0.363 | 3.65 | 6.08 |
| 7 | 23.3 | 0.00155 | 0.0406 | 0.320 | 1.18 | 1.80 | 2.49 | 0.0385 | 0.403 | 2.40 | 4.90 | 0.414 | 3.68 | 5.55 |
| 8 | 20.3 | 0.00176 | 0.0457 | 0.340 | 0.968 | 1.46 | 1.94 | 0.0437 | 0.445 | 2.27 | 4.00 | 0.461 | 3.53 | 4.71 |
| 9 | 17.6 | 0.00198 | 0.0505 | 0.350 | 0.810 | 1.21 | 1.55 | 0.0487 | 0.480 | 2.06 | 3.33 | 0.504 | 3.29 | 3.91 |
| 10 | 15.4 | 0.00219 | 0.0549 | 0.352 | 0.703 | 1.02 | 1.28 | 0.0536 | 0.508 | 1.79 | 2.82 | 0.542 | 2.90 | 3.39 |
| 12 | 12.1 | 0.00262 | 0.0628 | 0.330 | 0.538 | 0.758 | 0.918 | 0.0629 | 0.542 | 1.35 | 2.11 | 0.600 | 2.19 | 2.60 |
| 14 | 9.88 | 0.00303 | 0.0691 | 0.283 | 0.427 | 0.586 | 0.697 | 0.0714 | 0.545 | 1.08 | 1.64 | 0.633 | 1.76 | 2.07 |
| 16 | 8.26 | 0.00343 | 0.0736 | 0.235 | 0.348 | 0.469 | 0.533 | 0.0790 | 0.521 | 0.898 | 1.32 | 0.641 | 1.45 | 1.69 |
| 18 | 7.02 | 0.00383 | 0.0763 | 0.195 | 0.289 | 0.384 | 0.429 | 0.0857 | 0.474 | 0.750 | 1.08 | 0.625 | 1.22 | 1.41 |
| 20 | 6.04 | 0.00421 | 0.0771 | 0.167 | 0.243 | 0.322 | 0.353 | 0.0914 | 0.419 | 0.639 | 0.904 | 0.587 | 1.04 | 1.19 |

Ho ( Z=67 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(11)

| Q/Rs | ----> | 39.57 | 11.65 | 5.045 | 2.287 | 0.8604 | 0.2529 | 12.55 | 5.069 | 2.179 | 0.7334 | 5.176 | 1.942 | 1.433 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 4f(11) |
| 0.2 | 18.6 | 0.412(-4) | 0.00116 | 0.0106 | 0.0796 | 0.879 | 15.5 | 0.00106 | 0.0120 | 0.107 | 1.60 | 0.0121 | 0.155 | 0.340 |
| 0.4 | 40.8 | 0.844(-4) | 0.00233 | 0.0211 | 0.159 | 1.77 | 34.4 | 0.00214 | 0.0241 | 0.213 | 3.22 | 0.0242 | 0.309 | 0.680 |
| 0.6 | 62.9 | 0.127(-3) | 0.00350 | 0.0316 | 0.239 | 2.66 | 53.3 | 0.00322 | 0.0361 | 0.321 | 4.83 | 0.0363 | 0.465 | 1.02 |
| 0.8 | 69.6 | 0.170(-3) | 0.00467 | 0.0422 | 0.318 | 3.56 | 56.7 | 0.00430 | 0.0480 | 0.428 | 6.45 | 0.0484 | 0.619 | 1.36 |
| 1.0 | 63.3 | 0.213(-3) | 0.00584 | 0.0527 | 0.397 | 4.45 | 47.2 | 0.00537 | 0.0600 | 0.534 | 8.05 | 0.0604 | 0.773 | 1.70 |
| 1.2 | 57.2 | 0.256(-3) | 0.00700 | 0.0632 | 0.475 | 5.30 | 38.0 | 0.00645 | 0.0720 | 0.639 | 9.61 | 0.0725 | 0.926 | 2.03 |
| 1.4 | 53.3 | 0.298(-3) | 0.00815 | 0.0737 | 0.552 | 6.07 | 31.1 | 0.00752 | 0.0840 | 0.743 | 11.1 | 0.0846 | 1.08 | 2.36 |
| 1.6 | 50.7 | 0.341(-3) | 0.00932 | 0.0840 | 0.628 | 6.70 | 25.9 | 0.00859 | 0.0959 | 0.847 | 12.5 | 0.0966 | 1.23 | 2.68 |
| 1.8 | 49.0 | 0.384(-3) | 0.0105 | 0.0943 | 0.702 | 7.13 | 21.9 | 0.00966 | 0.108 | 0.949 | 13.6 | 0.109 | 1.38 | 3.00 |
| 2.0 | 47.7 | 0.426(-3) | 0.0116 | 0.105 | 0.775 | 7.34 | 18.8 | 0.0107 | 0.120 | 1.05 | 14.6 | 0.121 | 1.52 | 3.32 |
| 2.2 | 46.4 | 0.469(-3) | 0.0128 | 0.115 | 0.845 | 7.31 | 16.3 | 0.0118 | 0.131 | 1.15 | 15.2 | 0.133 | 1.67 | 3.62 |
| 2.4 | 45.1 | 0.512(-3) | 0.0140 | 0.125 | 0.913 | 7.10 | 14.3 | 0.0129 | 0.143 | 1.25 | 15.5 | 0.144 | 1.81 | 3.92 |
| 2.6 | 43.8 | 0.554(-3) | 0.0151 | 0.135 | 0.978 | 6.79 | 12.6 | 0.0139 | 0.155 | 1.34 | 15.5 | 0.156 | 1.95 | 4.21 |
| 2.8 | 42.2 | 0.597(-3) | 0.0163 | 0.145 | 1.04 | 6.30 | 11.2 | 0.0150 | 0.166 | 1.43 | 15.2 | 0.168 | 2.08 | 4.48 |
| 3.0 | 41.0 | 0.639(-3) | 0.0174 | 0.154 | 1.10 | 6.10 | 10.1 | 0.0161 | 0.178 | 1.52 | 14.7 | 0.180 | 2.21 | 4.74 |
| 3.2 | 39.3 | 0.682(-3) | 0.0185 | 0.164 | 1.15 | 5.55 | 9.11 | 0.0171 | 0.189 | 1.61 | 13.9 | 0.191 | 2.34 | 4.99 |
| 3.4 | 38.0 | 0.724(-3) | 0.0197 | 0.173 | 1.20 | 5.08 | 8.26 | 0.0182 | 0.200 | 1.69 | 13.5 | 0.203 | 2.46 | 5.22 |
| 3.6 | 36.5 | 0.767(-3) | 0.0208 | 0.183 | 1.24 | 4.72 | 7.54 | 0.0193 | 0.212 | 1.77 | 12.6 | 0.124 | 2.58 | 5.43 |
| 3.8 | 35.1 | 0.809(-3) | 0.0219 | 0.192 | 1.28 | 4.39 | 6.92 | 0.0203 | 0.223 | 1.85 | 11.6 | 0.226 | 2.70 | 5.62 |
| 4.0 | 33.8 | 0.851(-3) | 0.0230 | 0.201 | 1.31 | 4.10 | 6.36 | 0.0214 | 0.234 | 1.92 | 10.8 | 0.237 | 2.81 | 5.79 |
| 5 | 29.3 | 0.00106 | 0.0285 | 0.242 | 1.37 | 2.98 | 4.41 | 0.0266 | 0.287 | 2.20 | 7.94 | 0.292 | 3.25 | 6.28 |
| 6 | 26.0 | 0.00127 | 0.0339 | 0.278 | 1.29 | 2.27 | 3.25 | 0.0317 | 0.336 | 2.34 | 6.15 | 0.345 | 3.50 | 6.19 |
| 7 | 23.1 | 0.00148 | 0.0390 | 0.306 | 1.16 | 1.79 | 2.48 | 0.0368 | 0.381 | 2.33 | 4.89 | 0.394 | 3.55 | 5.70 |
| 8 | 20.3 | 0.00169 | 0.0439 | 0.326 | 0.960 | 1.45 | 1.93 | 0.0417 | 0.421 | 2.22 | 3.99 | 0.439 | 3.43 | 5.03 |
| 9 | 17.7 | 0.00190 | 0.0485 | 0.337 | 0.805 | 1.20 | 1.56 | 0.0465 | 0.455 | 2.03 | 3.32 | 0.481 | 3.22 | 4.21 |
| 10 | 15.5 | 0.00211 | 0.0528 | 0.340 | 0.693 | 1.02 | 1.28 | 0.0512 | 0.482 | 1.77 | 2.81 | 0.517 | 2.86 | 3.60 |
| 12 | 12.1 | 0.00251 | 0.0605 | 0.322 | 0.532 | 0.753 | 0.912 | 0.0601 | 0.517 | 1.33 | 2.10 | 0.574 | 2.17 | 2.77 |
| 14 | 9.90 | 0.00291 | 0.0666 | 0.279 | 0.423 | 0.585 | 0.692 | 0.0683 | 0.524 | 1.08 | 1.63 | 0.608 | 1.73 | 2.21 |
| 16 | 8.29 | 0.00330 | 0.0712 | 0.232 | 0.344 | 0.467 | 0.534 | 0.0756 | 0.505 | 0.886 | 1.31 | 0.619 | 1.44 | 1.81 |
| 18 | 7.07 | 0.00368 | 0.0739 | 0.194 | 0.286 | 0.383 | 0.432 | 0.0821 | 0.463 | 0.746 | 1.08 | 0.606 | 1.21 | 1.51 |
| 20 | 6.08 | 0.00404 | 0.0749 | 0.164 | 0.242 | 0.320 | 0.351 | 0.0877 | 0.412 | 0.635 | 0.903 | 0.574 | 1.04 | 1.28 |

E r ( Z=68 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(12)

| Q/Rs | ----> | 39.91 | 11.84 | 5.128 | 2.328 | 0.8657 | 0.2549 | 12.75 | 5.162 | 2.221 | 0.7420 | 5.277 | 1.982 | 1.465 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 4f(12) |
| 0.2 | 18.3 | 0.402(-4) | 0.00111 | 0.0101 | 0.0761 | 0.866 | 15.2 | 0.00102 | 0.0114 | 0.102 | 1.56 | 0.0115 | 0.147 | 0.326 |
| 0.4 | 39.9 | 0.824(-4) | 0.00224 | 0.0202 | 0.152 | 1.74 | 33.7 | 0.00205 | 0.0229 | 0.203 | 3.13 | 0.0230 | 0.294 | 0.652 |
| 0.6 | 61.7 | 0.124(-3) | 0.00336 | 0.0303 | 0.229 | 2.62 | 52.3 | 0.00309 | 0.0344 | 0.306 | 4.70 | 0.0345 | 0.441 | 0.978 |
| 0.8 | 68.6 | 0.166(-3) | 0.00447 | 0.0404 | 0.305 | 3.51 | 56.1 | 0.00412 | 0.0458 | 0.407 | 6.27 | 0.0460 | 0.588 | 1.30 |
| 1.0 | 62.5 | 0.208(-3) | 0.00559 | 0.0506 | 0.380 | 4.39 | 46.8 | 0.00515 | 0.0572 | 0.508 | 7.82 | 0.0574 | 0.734 | 1.63 |
| 1.2 | 56.5 | 0.250(-3) | 0.00670 | 0.0606 | 0.454 | 5.22 | 37.9 | 0.00618 | 0.0687 | 0.609 | 9.34 | 0.0689 | 0.879 | 1.95 |
| 1.4 | 52.5 | 0.291(-3) | 0.00781 | 0.0706 | 0.528 | 5.98 | 30.9 | 0.00721 | 0.0801 | 0.708 | 10.8 | 0.0804 | 1.02 | 2.26 |
| 1.6 | 50.0 | 0.333(-3) | 0.00892 | 0.0806 | 0.601 | 6.61 | 25.8 | 0.00823 | 0.0915 | 0.807 | 12.1 | 0.0918 | 1.17 | 2.58 |
| 1.8 | 48.2 | 0.375(-3) | 0.0100 | 0.0904 | 0.672 | 7.04 | 21.8 | 0.00926 | 0.103 | 0.904 | 13.3 | 0.103 | 1.31 | 2.88 |
| 2.0 | 46.9 | 0.417(-3) | 0.0112 | 0.100 | 0.741 | 7.26 | 18.7 | 0.0103 | 0.114 | 1.00 | 14.2 | 0.115 | 1.45 | 3.18 |
| 2.2 | 45.6 | 0.458(-3) | 0.0123 | 0.110 | 0.809 | 7.24 | 16.2 | 0.0113 | 0.125 | 1.09 | 14.8 | 0.126 | 1.58 | 3.48 |
| 2.4 | 44.4 | 0.500(-3) | 0.0134 | 0.120 | 0.874 | 7.04 | 14.2 | 0.0123 | 0.136 | 1.19 | 15.2 | 0.137 | 1.72 | 3.77 |
| 2.6 | 43.0 | 0.541(-3) | 0.0145 | 0.129 | 0.937 | 6.75 | 12.6 | 0.0134 | 0.148 | 1.28 | 15.2 | 0.149 | 1.85 | 4.05 |
| 2.8 | 41.5 | 0.583(-3) | 0.0156 | 0.139 | 0.996 | 6.27 | 11.2 | 0.0144 | 0.159 | 1.37 | 14.9 | 0.160 | 1.98 | 4.31 |
| 3.0 | 40.3 | 0.625(-3) | 0.0167 | 0.148 | 1.05 | 6.07 | 10.1 | 0.0154 | 0.170 | 1.45 | 14.5 | 0.171 | 2.10 | 4.57 |
| 3.2 | 38.6 | 0.666(-3) | 0.0178 | 0.157 | 1.10 | 5.53 | 9.07 | 0.0164 | 0.180 | 1.54 | 13.8 | 0.182 | 2.23 | 4.81 |
| 3.4 | 37.4 | 0.707(-3) | 0.0188 | 0.166 | 1.15 | 5.07 | 8.24 | 0.0174 | 0.191 | 1.62 | 13.4 | 0.193 | 2.34 | 5.04 |
| 3.6 | 36.0 | 0.749(-3) | 0.0199 | 0.175 | 1.19 | 4.70 | 7.52 | 0.0185 | 0.202 | 1.69 | 12.5 | 0.204 | 2.46 | 5.26 |
| 3.8 | 34.5 | 0.790(-3) | 0.0210 | 0.184 | 1.23 | 4.38 | 6.89 | 0.0195 | 0.212 | 1.77 | 11.6 | 0.215 | 2.57 | 5.45 |
| 4.0 | 33.2 | 0.832(-3) | 0.0221 | 0.193 | 1.26 | 4.07 | 6.35 | 0.0205 | 0.223 | 1.83 | 10.7 | 0.225 | 2.67 | 5.63 |
| 5 | 28.9 | 0.00104 | 0.0274 | 0.233 | 1.32 | 2.97 | 4.40 | 0.0255 | 0.274 | 2.11 | 7.91 | 0.278 | 3.10 | 6.21 |
| 6 | 25.7 | 0.00124 | 0.0325 | 0.267 | 1.26 | 2.27 | 3.25 | 0.0304 | 0.321 | 2.26 | 6.10 | 0.328 | 3.36 | 6.25 |
| 7 | 22.9 | 0.00145 | 0.0374 | 0.295 | 1.14 | 1.78 | 2.47 | 0.0353 | 0.364 | 2.26 | 4.85 | 0.375 | 3.43 | 5.85 |
| 8 | 20.3 | 0.00165 | 0.0421 | 0.315 | 0.953 | 1.45 | 1.93 | 0.0400 | 0.403 | 2.16 | 3.96 | 0.419 | 3.34 | 5.31 |
| 9 | 17.8 | 0.00186 | 0.0466 | 0.327 | 0.793 | 1.20 | 1.56 | 0.0446 | 0.436 | 2.00 | 3.30 | 0.458 | 3.15 | 4.49 |
| 10 | 15.6 | 0.00206 | 0.0507 | 0.330 | 0.684 | 1.01 | 1.29 | 0.0491 | 0.463 | 1.75 | 2.80 | 0.494 | 2.82 | 3.80 |
| 12 | 12.2 | 0.00246 | 0.0582 | 0.316 | 0.529 | 0.752 | 0.907 | 0.0577 | 0.498 | 1.32 | 2.09 | 0.550 | 2.16 | 2.95 |
| 14 | 9.96 | 0.00284 | 0.0642 | 0.276 | 0.420 | 0.582 | 0.687 | 0.0656 | 0.508 | 1.06 | 1.63 | 0.585 | 1.72 | 2.36 |
| 16 | 8.35 | 0.00322 | 0.0687 | 0.231 | 0.343 | 0.466 | 0.535 | 0.0727 | 0.492 | 0.881 | 1.31 | 0.597 | 1.42 | 1.93 |
| 18 | 7.10 | 0.00359 | 0.0715 | 0.193 | 0.285 | 0.382 | 0.434 | 0.0791 | 0.455 | 0.736 | 1.07 | 0.589 | 1.20 | 1.68 |
| 20 | 6.12 | 0.00395 | 0.0727 | 0.163 | 0.241 | 0.319 | 0.350 | 0.0845 | 0.407 | 0.627 | 0.900 | 0.560 | 1.02 | 1.37 |

Tm ( Z=69 ) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(13)

| Q/Rs | ----> | 40.78 | 12.03 | 5.218 | 2.369 | 0.8820 | 0.2568 | 12.96 | 5.259 | 2.259 | 0.7496 | 5.379 | 2.022 | 1.498 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 4f(13) |
| 0.2 | 17.9 | 0.378(-4) | 0.00107 | 0.00967 | 0.0729 | 0.828 | 14.9 | 9.74(-4) | 0.0109 | 0.0976 | 1.52 | 0.0109 | 0.140 | 0.312 |
| 0.4 | 39.1 | 0.777(-4) | 0.00214 | 0.0194 | 0.146 | 1.66 | 33.1 | 0.00197 | 0.0218 | 0.195 | 3.05 | 0.0219 | 0.279 | 0.623 |
| 0.6 | 60.5 | 0.117(-3) | 0.00322 | 0.0290 | 0.219 | 2.51 | 51.4 | 0.00295 | 0.0327 | 0.293 | 4.58 | 0.0328 | 0.419 | 0.936 |
| 0.8 | 67.6 | 0.157(-3) | 0.00429 | 0.0387 | 0.291 | 3.35 | 55.5 | 0.00394 | 0.0436 | 0.390 | 6.11 | 0.0437 | 0.559 | 1.25 |
| 1.0 | 61.6 | 0.196(-3) | 0.00536 | 0.0483 | 0.364 | 4.19 | 46.5 | 0.00493 | 0.0544 | 0.487 | 7.63 | 0.0546 | 0.697 | 1.56 |
| 1.2 | 55.6 | 0.235(-3) | 0.00642 | 0.0579 | 0.435 | 4.99 | 37.6 | 0.00591 | 0.0654 | 0.583 | 9.11 | 0.0655 | 0.835 | 1.86 |
| 1.4 | 51.6 | 0.275(-3) | 0.00749 | 0.0675 | 0.505 | 5.72 | 30.8 | 0.00690 | 0.0763 | 0.678 | 10.5 | 0.0764 | 0.972 | 2.17 |
| 1.6 | 49.0 | 0.314(-3) | 0.00855 | 0.0770 | 0.575 | 6.34 | 25.6 | 0.00788 | 0.0871 | 0.773 | 11.8 | 0.0873 | 1.11 | 2.47 |
| 1.8 | 47.2 | 0.353(-3) | 0.00962 | 0.0865 | 0.643 | 6.78 | 21.7 | 0.00886 | 0.0979 | 0.866 | 13.0 | 0.0982 | 1.24 | 2.76 |
| 2.0 | 45.9 | 0.393(-3) | 0.0107 | 0.0959 | 0.710 | 7.01 | 18.6 | 0.00934 | 0.109 | 0.958 | 13.9 | 0.109 | 1.37 | 3.05 |
| 2.2 | 44.7 | 0.432(-3) | 0.0118 | 0.105 | 0.775 | 7.03 | 16.1 | 0.0108 | 0.119 | 1.05 | 14.5 | 0.120 | 1.50 | 3.34 |
| 2.4 | 43.5 | 0.471(-3) | 0.0128 | 0.114 | 0.838 | 6.87 | 14.1 | 0.0118 | 0.130 | 1.14 | 14.9 | 0.131 | 1.63 | 3.61 |
| 2.6 | 42.2 | 0.510(-3) | 0.0139 | 0.124 | 0.898 | 6.61 | 12.5 | 0.0128 | 0.141 | 1.23 | 14.9 | 0.141 | 1.76 | 3.88 |
| 2.8 | 40.8 | 0.550(-3) | 0.0149 | 0.133 | 0.955 | 6.17 | 11.2 | 0.0138 | 0.151 | 1.31 | 14.7 | 0.152 | 1.88 | 4.15 |
| 3.0 | 39.6 | 0.589(-3) | 0.0160 | 0.142 | 1.01 | 5.98 | 10.0 | 0.0147 | 0.161 | 1.39 | 14.3 | 0.162 | 2.00 | 4.40 |
| 3.2 | 38.0 | 0.628(-3) | 0.0170 | 0.150 | 1.06 | 5.48 | 9.03 | 0.0157 | 0.172 | 1.47 | 13.6 | 0.173 | 2.12 | 4.64 |
| 3.4 | 36.7 | 0.667(-3) | 0.0181 | 0.159 | 1.10 | 5.00 | 8.20 | 0.0167 | 0.182 | 1.55 | 13.2 | 0.183 | 2.23 | 4.86 |
| 3.6 | 35.3 | 0.706(-3) | 0.0191 | 0.168 | 1.15 | 4.64 | 7.49 | 0.0177 | 0.192 | 1.62 | 12.4 | 0.194 | 2.34 | 5.08 |
| 3.8 | 33.9 | 0.745(-3) | 0.0201 | 0.176 | 1.18 | 4.33 | 6.87 | 0.0186 | 0.202 | 1.69 | 11.5 | 0.204 | 2.45 | 5.28 |
| 4.0 | 32.6 | 0.784(-3) | 0.0212 | 0.184 | 1.21 | 4.02 | 6.32 | 0.0196 | 0.212 | 1.76 | 10.7 | 0.214 | 2.55 | 5.46 |
| 5 | 28.4 | 0.978(-3) | 0.0262 | 0.223 | 1.29 | 2.94 | 4.39 | 0.0244 | 0.261 | 2.03 | 7.85 | 0.265 | 2.97 | 6.10 |
| 6 | 25.4 | 0.00117 | 0.0311 | 0.257 | 1.23 | 2.24 | 3.24 | 0.0291 | 0.306 | 2.18 | 6.08 | 0.312 | 3.23 | 6.25 |
| 7 | 22.7 | 0.00137 | 0.0359 | 0.284 | 1.12 | 1.77 | 2.47 | 0.0338 | 0.348 | 2.20 | 4.84 | 0.357 | 3.32 | 5.97 |
| 8 | 20.3 | 0.00156 | 0.0404 | 0.304 | 0.945 | 1.44 | 1.93 | 0.0383 | 0.385 | 2.11 | 3.95 | 0.399 | 3.24 | 5.51 |
| 9 | 17.9 | 0.00175 | 0.0447 | 0.316 | 0.785 | 1.19 | 1.56 | 0.0427 | 0.417 | 1.97 | 3.29 | 0.437 | 3.07 | 4.75 |
| 10 | 15.7 | 0.00194 | 0.0487 | 0.320 | 0.680 | 1.01 | 1.28 | 0.0471 | 0.444 | 1.74 | 2.78 | 0.472 | 2.78 | 4.04 |
| 12 | 12.2 | 0.00232 | 0.0560 | 0.308 | 0.522 | 0.746 | 0.906 | 0.0553 | 0.480 | 1.31 | 2.08 | 0.527 | 2.14 | 3.10 |
| 14 | 9.98 | 0.00268 | 0.0619 | 0.272 | 0.416 | 0.580 | 0.683 | 0.0629 | 0.491 | 1.06 | 1.62 | 0.562 | 1.69 | 2.48 |
| 16 | 8.38 | 0.00304 | 0.0663 | 0.229 | 0.339 | 0.463 | 0.537 | 0.0698 | 0.479 | 0.869 | 1.30 | 0.576 | 1.41 | 2.03 |
| 18 | 7.14 | 0.00339 | 0.0692 | 0.191 | 0.282 | 0.380 | 0.436 | 0.0760 | 0.446 | 0.733 | 1.07 | 0.571 | 1.18 | 1.71 |
| 20 | 6.16 | 0.00373 | 0.0705 | 0.163 | 0.239 | 0.318 | 0.349 | 0.0813 | 0.401 | 0.624 | 0.896 | 0.547 | 1.02 | 1.45 |

Yb ( Z=70 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 4f(14)

| Q/Rs | ----> | 41.38 | 12.21 | 5.311 | 2.407 | 0.8918 | 0.2585 | 13.16 | 5.353 | 2.298 | 0.7573 | 5.479 | 2.062 | 1.533 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 4f(14) |
| 0.2 | 17.6 | 0.363(-4) | 0.00102 | 0.00923 | 0.0700 | 0.806 | 14.7 | 9.34(-4) | 0.0104 | 0.0934 | 1.48 | 0.0104 | 0.133 | 0.298 |
| 0.4 | 38.4 | 0.746(-4) | 0.00206 | 0.0185 | 0.140 | 1.62 | 32.5 | 0.00189 | 0.0208 | 0.186 | 2.97 | 0.0208 | 0.265 | 0.594 |
| 0.6 | 59.4 | 0.113(-3) | 0.00309 | 0.0277 | 0.210 | 2.44 | 50.7 | 0.00283 | 0.0313 | 0.280 | 4.47 | 0.0316 | 0.399 | 0.893 |
| 0.8 | 66.8 | 0.150(-3) | 0.00412 | 0.0369 | 0.280 | 3.26 | 55.0 | 0.00378 | 0.0416 | 0.373 | 5.96 | 0.0417 | 0.531 | 1.19 |
| 1.0 | 61.0 | 0.188(-3) | 0.00515 | 0.0462 | 0.349 | 4.08 | 46.3 | 0.00473 | 0.0520 | 0.466 | 7.44 | 0.0520 | 0.663 | 1.49 |
| 1.2 | 54.8 | 0.226(-3) | 0.00617 | 0.0553 | 0.418 | 4.86 | 37.3 | 0.00567 | 0.0624 | 0.558 | 8.89 | 0.0623 | 0.794 | 1.78 |
| 1.4 | 50.8 | 0.264(-3) | 0.00720 | 0.0645 | 0.486 | 5.58 | 30.6 | 0.00662 | 0.0728 | 0.650 | 10.3 | 0.0728 | 0.925 | 2.07 |
| 1.6 | 48.3 | 0.302(-3) | 0.00822 | 0.0736 | 0.553 | 6.18 | 25.6 | 0.00756 | 0.0831 | 0.740 | 11.6 | 0.0831 | 1.05 | 2.35 |
| 1.8 | 46.4 | 0.339(-3) | 0.00925 | 0.0826 | 0.618 | 6.62 | 21.6 | 0.00850 | 0.0934 | 0.829 | 12.7 | 0.0935 | 1.18 | 2.64 |
| 2.0 | 45.1 | 0.377(-3) | 0.0103 | 0.0916 | 0.682 | 6.87 | 18.5 | 0.00944 | 0.104 | 0.917 | 13.6 | 0.104 | 1.31 | 2.92 |
| 2.2 | 43.9 | 0.415(-3) | 0.0113 | 0.101 | 0.745 | 6.91 | 16.1 | 0.0104 | 0.114 | 1.00 | 14.2 | 0.114 | 1.43 | 3.19 |
| 2.4 | 42.7 | 0.456(-3) | 0.0123 | 0.109 | 0.805 | 6.77 | 14.1 | 0.0113 | 0.124 | 1.09 | 14.6 | 0.124 | 1.55 | 3.46 |
| 2.6 | 41.5 | 0.490(-3) | 0.0133 | 0.118 | 0.863 | 6.53 | 12.5 | 0.0123 | 0.134 | 1.17 | 14.7 | 0.135 | 1.67 | 3.72 |
| 2.8 | 40.1 | 0.528(-3) | 0.0144 | 0.127 | 0.919 | 6.11 | 11.1 | 0.0132 | 0.144 | 1.26 | 14.5 | 0.145 | 1.79 | 3.97 |
| 3.0 | 38.9 | 0.566(-3) | 0.0154 | 0.135 | 0.971 | 5.91 | 9.99 | 0.0141 | 0.154 | 1.33 | 14.1 | 0.155 | 1.91 | 4.21 |
| 3.2 | 37.4 | 0.603(-3) | 0.0164 | 0.144 | 1.02 | 5.45 | 9.01 | 0.0151 | 0.164 | 1.41 | 13.5 | 0.165 | 2.02 | 4.45 |
| 3.4 | 36.1 | 0.641(-3) | 0.0174 | 0.152 | 1.07 | 4.96 | 8.19 | 0.0160 | 0.174 | 1.49 | 13.0 | 0.175 | 2.13 | 4.67 |
| 3.6 | 34.8 | 0.678(-3) | 0.0184 | 0.160 | 1.11 | 4.60 | 7.48 | 0.0169 | 0.184 | 1.56 | 12.4 | 0.185 | 2.23 | 4.88 |
| 3.8 | 33.4 | 0.716(-3) | 0.0194 | 0.168 | 1.14 | 4.29 | 6.85 | 0.0179 | 0.193 | 1.63 | 11.5 | 0.195 | 2.33 | 5.08 |
| 4.0 | 32.1 | 0.753(-3) | 0.0204 | 0.176 | 1.17 | 4.01 | 6.31 | 0.0188 | 0.203 | 1.69 | 10.6 | 0.204 | 2.43 | 5.26 |
| 5 | 27.9 | 0.940(-3) | 0.0252 | 0.214 | 1.25 | 2.93 | 4.38 | 0.0234 | 0.249 | 1.96 | 7.82 | 0.252 | 2.84 | 5.95 |
| 6 | 25.0 | 0.00113 | 0.0300 | 0.246 | 1.21 | 2.23 | 3.24 | 0.0280 | 0.293 | 2.11 | 6.04 | 0.298 | 3.10 | 6.20 |
| 7 | 22.5 | 0.00131 | 0.0345 | 0.273 | 1.10 | 1.76 | 2.47 | 0.0324 | 0.333 | 2.14 | 4.80 | 0.341 | 3.20 | 6.03 |
| 8 | 20.2 | 0.00150 | 0.0389 | 0.292 | 0.938 | 1.43 | 1.93 | 0.0368 | 0.369 | 2.07 | 3.92 | 0.381 | 3.15 | 5.63 |
| 9 | 17.9 | 0.00168 | 0.0430 | 0.305 | 0.780 | 1.18 | 1.56 | 0.0411 | 0.400 | 1.93 | 3.27 | 0.418 | 3.00 | 4.98 |
| 10 | 15.7 | 0.00187 | 0.0470 | 0.310 | 0.671 | 1.00 | 1.28 | 0.0452 | 0.427 | 1.72 | 2.78 | 0.451 | 2.74 | 4.27 |
| 12 | 12.3 | 0.00223 | 0.0540 | 0.301 | 0.520 | 0.744 | 0.907 | 0.0531 | 0.463 | 1.31 | 2.08 | 0.505 | 2.12 | 3.26 |
| 14 | 10.0 | 0.00258 | 0.0597 | 0.268 | 0.414 | 0.576 | 0.680 | 0.0605 | 0.456 | 1.04 | 1.61 | 0.540 | 1.68 | 2.61 |
| 16 | 8.42 | 0.00293 | 0.0641 | 0.226 | 0.338 | 0.461 | 0.539 | 0.0672 | 0.466 | 0.865 | 1.30 | 0.557 | 1.39 | 2.14 |
| 18 | 7.19 | 0.00326 | 0.0671 | 0.190 | 0.281 | 0.378 | 0.435 | 0.0732 | 0.437 | 0.729 | 1.07 | 0.554 | 1.17 | 1.80 |
| 20 | 6.19 | 0.00359 | 0.0686 | 0.161 | 0.238 | 0.316 | 0.348 | 0.0784 | 0.396 | 0.622 | 0.894 | 0.533 | 1.00 | 1.53 |

Lu ( Z=71 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(1) 4f(14)

| Q/Rs | ----> | 41.99 | 12.42 | 5.399 | 2.467 | 0.9367 | 0.2770 | 13.38 | 5.447 | 2.350 | 0.8014 | 5.594 | 2.111 | 0.4444 | 1.624 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 5d(1) | 4f(14) |
| 0.2 | 18.7 | 3.49(-5) | 0.000978 | 0.00885 | 0.0658 | 0.716 | 12.5 | 0.000893 | 0.00993 | 0.0882 | 1.29 | 0.00982 | 0.125 | 3.57 | 0.257 |
| 0.4 | 40.0 | 7.16(-5) | 0.00197 | 0.0177 | 0.132 | 1.44 | 27.3 | 0.00180 | 0.0199 | 0.176 | 2.59 | 0.0197 | 0.250 | 7.53 | 0.513 |
| 0.6 | 62.6 | 0.000108 | 0.00295 | 0.0265 | 0.198 | 2.17 | 43.0 | 0.00271 | 0.0299 | 0.265 | 3.89 | 0.0296 | 0.375 | 11.9 | 0.771 |
| 0.8 | 75.5 | 0.000145 | 0.00394 | 0.0354 | 0.263 | 2.89 | 49.7 | 0.00362 | 0.0398 | 0.353 | 5.19 | 0.0394 | 0.500 | 15.5 | 1.03 |
| 1.0 | 73.8 | 0.000181 | 0.00492 | 0.0442 | 0.328 | 3.62 | 44.4 | 0.00452 | 0.0496 | 0.440 | 6.47 | 0.0492 | 0.625 | 16.6 | 1.28 |
| 1.2 | 65.9 | 0.000217 | 0.00590 | 0.0530 | 0.393 | 4.31 | 35.4 | 0.00542 | 0.0596 | 0.527 | 7.74 | 0.0590 | 0.748 | 15.0 | 1.54 |
| 1.4 | 59.9 | 0.000254 | 0.00688 | 0.0618 | 0.457 | 4.96 | 29.2 | 0.00633 | 0.0696 | 0.614 | 8.95 | 0.0689 | 0.871 | 12.9 | 1.79 |
| 1.6 | 55.5 | 0.000290 | 0.00785 | 0.0705 | 0.519 | 5.52 | 24.5 | 0.00723 | 0.0794 | 0.699 | 10.1 | 0.0787 | 0.992 | 10.9 | 2.03 |
| 1.8 | 52.2 | 0.000326 | 0.00884 | 0.0792 | 0.581 | 5.96 | 20.7 | 0.00813 | 0.0893 | 0.784 | 11.1 | 0.0885 | 1.11 | 9.38 | 2.28 |
| 2.0 | 49.8 | 0.000362 | 0.00982 | 0.0878 | 0.642 | 6.25 | 17.9 | 0.00903 | 0.0991 | 0.867 | 12.0 | 0.0983 | 1.23 | 8.13 | 2.52 |
| 2.2 | 47.7 | 0.000399 | 0.0108 | 0.0963 | 0.701 | 6.36 | 15.5 | 0.00992 | 0.109 | 0.949 | 12.6 | 0.108 | 1.35 | 7.11 | 2.76 |
| 2.4 | 45.9 | 0.000435 | 0.0118 | 0.105 | 0.758 | 6.31 | 13.6 | 0.0108 | 0.119 | 1.03 | 13.1 | 0.118 | 1.46 | 6.28 | 2.99 |
| 2.6 | 44.2 | 0.000471 | 0.0127 | 0.113 | 0.813 | 6.13 | 12.1 | 0.0117 | 0.128 | 1.11 | 13.3 | 0.127 | 1.58 | 5.58 | 3.22 |
| 2.8 | 42.5 | 0.000507 | 0.0137 | 0.121 | 0.866 | 5.86 | 10.8 | 0.0126 | 0.138 | 1.19 | 13.3 | 0.137 | 1.69 | 4.99 | 3.44 |
| 3.0 | 40.8 | 0.000543 | 0.0147 | 0.130 | 0.915 | 5.52 | 9.68 | 0.0135 | 0.147 | 1.26 | 13.1 | 0.147 | 1.80 | 4.50 | 3.65 |
| 3.2 | 39.4 | 0.000579 | 0.0156 | 0.138 | 0.962 | 5.30 | 8.74 | 0.0144 | 0.157 | 1.34 | 12.7 | 0.156 | 1.90 | 4.08 | 3.86 |
| 3.4 | 37.7 | 0.000616 | 0.0166 | 0.146 | 1.01 | 4.86 | 7.94 | 0.0153 | 0.166 | 1.41 | 12.2 | 0.165 | 2.08 | 3.71 | 4.06 |
| 3.6 | 36.3 | 0.000652 | 0.0176 | 0.154 | 1.05 | 4.44 | 7.26 | 0.0162 | 0.176 | 1.48 | 11.8 | 0.175 | 2.11 | 3.40 | 4.25 |
| 3.8 | 34.8 | 0.000688 | 0.0185 | 0.161 | 1.08 | 4.14 | 6.66 | 0.0171 | 0.185 | 1.54 | 11.1 | 0.184 | 2.20 | 3.12 | 4.43 |
| 4.0 | 33.4 | 0.000724 | 0.0195 | 0.169 | 1.11 | 3.87 | 6.13 | 0.0180 | 0.194 | 1.60 | 10.3 | 0.194 | 2.30 | 2.88 | 4.60 |
| 5 | 28.4 | 0.000903 | 0.0241 | 0.205 | 1.20 | 2.84 | 4.27 | 0.0224 | 0.238 | 1.86 | 7.58 | 0.239 | 2.69 | 2.01 | 5.26 |
| 6 | 25.3 | 0.00108 | 0.0286 | 0.236 | 1.17 | 2.18 | 3.16 | 0.0267 | 0.280 | 2.02 | 5.90 | 0.282 | 2.95 | 1.50 | 5.58 |
| 7 | 22.7 | 0.00126 | 0.0330 | 0.262 | 1.07 | 1.72 | 2.43 | 0.0310 | 0.319 | 2.06 | 4.70 | 0.324 | 3.07 | 1.16 | 5.54 |
| 8 | 20.4 | 0.00144 | 0.0372 | 0.282 | 0.927 | 1.40 | 1.91 | 0.0352 | 0.354 | 2.00 | 3.85 | 0.362 | 3.04 | 0.928 | 5.24 |
| 9 | 18.2 | 0.00162 | 0.0412 | 0.295 | 0.773 | 1.16 | 1.53 | 0.0393 | 0.384 | 1.89 | 3.21 | 0.397 | 2.91 | 0.759 | 4.79 |
| 10 | 16.0 | 0.00179 | 0.0450 | 0.301 | 0.660 | 0.983 | 1.26 | 0.0433 | 0.410 | 1.69 | 2.73 | 0.429 | 2.69 | 0.625 | 4.15 |
| 12 | 12.5 | 0.00214 | 0.0518 | 0.294 | 0.512 | 0.731 | 0.899 | 0.0509 | 0.446 | 1.29 | 2.04 | 0.482 | 2.10 | 0.445 | 3.13 |
| 14 | 10.1 | 0.00248 | 0.0574 | 0.264 | 0.408 | 0.566 | 0.679 | 0.0580 | 0.461 | 1.03 | 1.59 | 0.517 | 1.65 | 0.345 | 2.52 |
| 16 | 8.52 | 0.00281 | 0.0617 | 0.224 | 0.333 | 0.454 | 0.527 | 0.0645 | 0.454 | 0.852 | 1.27 | 0.535 | 1.38 | 0.264 | 2.09 |
| 18 | 7.24 | 0.00314 | 0.0647 | 0.189 | 0.277 | 0.373 | 0.423 | 0.0703 | 0.428 | 0.719 | 1.05 | 0.535 | 1.16 | 0.209 | 1.75 |
| 20 | 6.26 | 0.00345 | 0.0663 | 0.160 | 0.235 | 0.312 | 0.352 | 0.0753 | 0.390 | 0.613 | 0.880 | 0.518 | 0.995 | 0.171 | 1.49 |

Hf ( Z=72 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(2) 4f(14)

| Q/Rs | ----> | 42.61 | 12.65 | 5.489 | 2.518 | 0.9746 | 0.2889 | 13.58 | 5.540 | 2.403 | 0.8409 | 5.697 | 2.169 | 0.4900 | 1.712 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5P(6) | 3d(10) | 4d(10) | 5d(2) | 4f(14) |
| 0.2 | 17.0 | 0.335(-4) | 0.000931 | 0.00847 | 0.0625 | 0.651 | 11.3 | 0.000858 | 0.00949 | 0.0833 | 1.15 | 0.00936 | 0.117 | 3.33 | 0.225 |
| 0.4 | 36.1 | 0.688(-4) | 0.00187 | 0.0170 | 0.125 | 1.31 | 24.6 | 0.00173 | 0.0190 | 0.166 | 2.30 | 0.0188 | 0.233 | 6.81 | 0.448 |
| 0.6 | 56.3 | 0.000104 | 0.00281 | 0.0254 | 0.188 | 1.97 | 38.8 | 0.00260 | 0.0286 | 0.250 | 3.46 | 0.0282 | 0.350 | 10.5 | 0.674 |
| 0.8 | 69.7 | 0.000139 | 0.00375 | 0.0339 | 0.250 | 2.63 | 46.3 | 0.00347 | 0.0380 | 0.333 | 4.61 | 0.0376 | 0.467 | 14.2 | 0.898 |
| 1.0 | 71.8 | 0.000174 | 0.00469 | 0.0424 | 0.312 | 3.28 | 43.0 | 0.00434 | 0.0475 | 0.416 | 5.75 | 0.0469 | 0.583 | 17.3 | 1.12 |
| 1.2 | 67.1 | 0.000209 | 0.00562 | 0.0508 | 0.373 | 3.92 | 34.3 | 0.00521 | 0.0570 | 0.498 | 6.87 | 0.0562 | 0.698 | 18.5 | 1.34 |
| 1.4 | 63.3 | 0.000243 | 0.00655 | 0.0592 | 0.434 | 4.51 | 28.4 | 0.00608 | 0.0665 | 0.580 | 7.96 | 0.0655 | 0.813 | 18.8 | 1.56 |
| 1.6 | 59.4 | 0.000278 | 0.00748 | 0.0676 | 0.494 | 5.04 | 23.8 | 0.00694 | 0.0760 | 0.660 | 8.98 | 0.0750 | 0.926 | 17.4 | 1.78 |
| 1.8 | 56.3 | 0.000313 | 0.00841 | 0.0759 | 0.552 | 5.47 | 20.3 | 0.00781 | 0.0854 | 0.740 | 9.92 | 0.0843 | 1.04 | 16.1 | 1.99 |
| 2.0 | 52.9 | 0.000348 | 0.00935 | 0.0841 | 0.610 | 5.77 | 17.5 | 0.00867 | 0.0948 | 0.819 | 10.7 | 0.0936 | 1.15 | 13.9 | 2.21 |
| 2.2 | 50.4 | 0.000383 | 0.0103 | 0.0923 | 0.666 | 5.92 | 15.2 | 0.00953 | 0.104 | 0.897 | 11.4 | 0.103 | 1.26 | 12.3 | 2.42 |
| 2.4 | 48.2 | 0.000418 | 0.0112 | 0.100 | 0.721 | 5.93 | 13.4 | 0.0104 | 0.113 | 0.974 | 11.9 | 0.112 | 1.37 | 11.0 | 2.62 |
| 2.6 | 46.1 | 0.000452 | 0.0121 | 0.108 | 0.773 | 5.81 | 11.8 | 0.0113 | 0.123 | 1.05 | 12.2 | 0.121 | 1.47 | 9.80 | 2.82 |
| 2.8 | 44.2 | 0.000487 | 0.0131 | 0.116 | 0.824 | 5.62 | 10.6 | 0.0121 | 0.132 | 1.12 | 12.3 | 0.131 | 1.58 | 8.83 | 3.02 |
| 3.0 | 42.4 | 0.000522 | 0.0140 | 0.124 | 0.872 | 5.30 | 9.51 | 0.0130 | 0.141 | 1.19 | 12.2 | 0.140 | 1.68 | 8.01 | 3.21 |
| 3.2 | 40.8 | 0.000557 | 0.0149 | 0.132 | 0.917 | 5.14 | 8.61 | 0.0139 | 0.150 | 1.26 | 11.9 | 0.149 | 1.78 | 7.28 | 3.39 |
| 3.4 | 39.0 | 0.000591 | 0.0158 | 0.140 | 0.958 | 4.76 | 7.83 | 0.0147 | 0.159 | 1.33 | 11.5 | 0.158 | 1.88 | 6.66 | 3.57 |
| 3.6 | 37.4 | 0.000626 | 0.0167 | 0.147 | 0.997 | 4.37 | 7.14 | 0.0156 | 0.168 | 1.40 | 11.2 | 0.167 | 1.97 | 6.11 | 3.74 |
| 3.8 | 35.9 | 0.000661 | 0.0176 | 0.155 | 1.03 | 4.02 | 6.56 | 0.0164 | 0.177 | 1.46 | 10.7 | 0.176 | 2.06 | 5.63 | 3.90 |
| 4.0 | 34.4 | 0.000695 | 0.0185 | 0.162 | 1.06 | 3.77 | 6.05 | 0.0173 | 0.186 | 1.52 | 10.1 | 0.184 | 2.15 | 5.20 | 4.06 |
| 5 | 29.1 | 0.000868 | 0.0230 | 0.197 | 1.15 | 2.78 | 4.21 | 0.0215 | 0.228 | 1.77 | 7.58 | 0.228 | 2.58 | 3.68 | 4.69 |
| 6 | 25.6 | 0.00104 | 0.0273 | 0.227 | 1.13 | 2.13 | 3.11 | 0.0257 | 0.268 | 1.93 | 5.87 | 0.269 | 2.79 | 2.75 | 5.04 |
| 7 | 22.9 | 0.00121 | 0.0315 | 0.253 | 1.04 | 1.69 | 2.41 | 0.0298 | 0.306 | 1.98 | 4.67 | 0.309 | 2.92 | 2.14 | 5.09 |
| 8 | 20.6 | 0.00138 | 0.0355 | 0.272 | 0.916 | 1.38 | 1.90 | 0.0338 | 0.339 | 1.94 | 3.86 | 0.346 | 2.91 | 1.72 | 4.90 |
| 9 | 18.4 | 0.00155 | 0.0393 | 0.285 | 0.767 | 1.14 | 1.53 | 0.0378 | 0.369 | 1.84 | 3.21 | 0.380 | 2.81 | 1.41 | 4.57 |
| 10 | 16.3 | 0.00172 | 0.0429 | 0.292 | 0.655 | 0.966 | 1.26 | 0.0416 | 0.394 | 1.67 | 2.71 | 0.411 | 2.62 | 1.19 | 4.04 |
| 12 | 12.7 | 0.00206 | 0.0495 | 0.287 | 0.505 | 0.721 | 0.898 | 0.0490 | 0.430 | 1.28 | 2.04 | 0.462 | 2.07 | 0.873 | 3.06 |
| 14 | 10.? | 0.00238 | 0.0550 | 0.260 | 0.403 | 0.559 | 0.675 | 0.0558 | 0.446 | 1.02 | 1.59 | 0.497 | 1.63 | 0.662 | 2.46 |
| 16 | 8.62 | 0.00270 | 0.0592 | 0.222 | 0.329 | 0.448 | 0.528 | 0.0621 | 0.442 | 0.846 | 1.27 | 0.516 | 1.35 | 0.512 | 2.03 |
| 18 | 7.35 | 0.00302 | 0.0623 | 0.187 | 0.276 | 0.368 | 0.424 | 0.0678 | 0.420 | 0.708 | 1.05 | 0.518 | 1.15 | 0.413 | 1.71 |
| 20 | 6.34 | 0.00332 | 0.0640 | 0.159 | 0.234 | 0.309 | 0.346 | 0.0727 | 0.384 | 0.609 | 0.875 | 0.505 | 0.979 | 0.342 | 1.46 |

Ta ( Z=73 ) 1s(2)2(2)3s(2)4s(2)5s(2)6s(2)2p(6)3p(6)4p(6)5p(6)3d(10)4d(10)5d(3)4f(14)

| θ/Rs | ----> | 43.22 | 12.80 | 5.578 | 2.570 | 1.010 | 0.2987 | 13.79 | 5.634 | 2.458 | 0.8781 | 5.800 | 2.227 | 0.5329 | 1.798 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 3p(6) | 5p(6) | 3d(10) | 4d(10) | 5d(3) | 4f(14) |
| 0.2 | 15.6 | 0.321(-4) | 0.000902 | 0.00813 | 0.0594 | 0.597 | 10.5 | 0.000823 | 0.00908 | 0.0786 | 1.03 | 0.00892 | 0.109 | 2.98 | 0.198 |
| 0.4 | 32.9 | 0.661(-4) | 0.00181 | 0.0163 | 0.119 | 1.20 | 22.7 | 0.00166 | 0.0182 | 0.157 | 2.07 | 0.0179 | 0.218 | 6.05 | 0.396 |
| 0.6 | 51.3 | 0.998(-4) | 0.00273 | 0.0244 | 0.178 | 1.80 | 35.8 | 0.00250 | 0.0273 | 0.236 | 3.11 | 0.0269 | 0.327 | 9.21 | 0.595 |
| 0.8 | 64.4 | 0.000133 | 0.00363 | 0.0325 | 0.237 | 2.41 | 43.6 | 0.00333 | 0.0364 | 0.314 | 4.14 | 0.0358 | 0.436 | 12.4 | 0.793 |
| 1.0 | 67.5 | 0.000167 | 0.00454 | 0.0406 | 0.296 | 3.01 | 41.5 | 0.00417 | 0.0454 | 0.393 | 5.17 | 0.0447 | 0.545 | 15.5 | 0.990 |
| 1.2 | 64.0 | 0.000201 | 0.00544 | 0.0487 | 0.354 | 3.59 | 33.5 | 0.00500 | 0.0545 | 0.470 | 6.18 | 0.0536 | 0.653 | 18.0 | 1.19 |
| 1.4 | 61.9 | 0.000234 | 0.00635 | 0.0568 | 0.412 | 4.14 | 27.9 | 0.00583 | 0.0636 | 0.547 | 7.16 | 0.0626 | 0.760 | 19.5 | 1.38 |
| 1.6 | 59.7 | 0.000268 | 0.00724 | 0.0648 | 0.469 | 4.63 | 23.5 | 0.00666 | 0.0727 | 0.624 | 8.09 | 0.0715 | 0.866 | 19.7 | 1.57 |
| 1.8 | 57.2 | 0.000301 | 0.00815 | 0.0728 | 0.525 | 5.05 | 20.0 | 0.00749 | 0.0817 | 0.699 | 8.95 | 0.0804 | 0.971 | 19.0 | 1.76 |
| 2.0 | 54.8 | 0.000335 | 0.00906 | 0.0807 | 0.580 | 5.36 | 17.3 | 0.00832 | 0.0907 | 0.774 | 9.72 | 0.0893 | 1.08 | 17.8 | 1.95 |
| 2.2 | 51.9 | 0.000368 | 0.00996 | 0.0885 | 0.633 | 5.54 | 15.0 | 0.00915 | 0.0996 | 0.847 | 10.4 | 0.0981 | 1.18 | 15.9 | 2.13 |
| 2.4 | 49.2 | 0.000402 | 0.0109 | 0.0963 | 0.685 | 5.59 | 13.2 | 0.00997 | 0.109 | 0.920 | 10.9 | 0.107 | 1.28 | 14.0 | 2.32 |
| 2.6 | 47.1 | 0.000435 | 0.0118 | 0.104 | 0.735 | 5.53 | 11.7 | 0.0108 | 0.117 | 0.991 | 11.2 | 0.116 | 1.38 | 12.7 | 2.49 |
| 2.8 | 45.1 | 0.000469 | 0.0127 | 0.112 | 0.784 | 5.38 | 10.5 | 0.0116 | 0.126 | 1.06 | 11.4 | 0.125 | 1.48 | 11.5 | 2.67 |
| 3.0 | 43.2 | 0.000502 | 0.0135 | 0.119 | 0.830 | 5.12 | 9.40 | 0.0125 | 0.135 | 1.13 | 11.4 | 0.133 | 1.57 | 10.5 | 2.84 |
| 3.2 | 41.5 | 0.000535 | 0.0144 | 0.127 | 0.873 | 4.91 | 8.53 | 0.0133 | 0.144 | 1.20 | 11.2 | 0.142 | 1.67 | 9.63 | 3.01 |
| 3.4 | 39.8 | 0.000569 | 0.0153 | 0.134 | 0.914 | 4.66 | 7.73 | 0.0141 | 0.152 | 1.26 | 11.0 | 0.150 | 1.76 | 8.85 | 3.17 |
| 3.6 | 38.1 | 0.000602 | 0.0162 | 0.141 | 0.951 | 4.30 | 7.08 | 0.0149 | 0.161 | 1.32 | 10.6 | 0.159 | 1.85 | 8.16 | 3.32 |
| 3.8 | 36.6 | 0.000635 | 0.0171 | 0.149 | 0.985 | 3.96 | 6.49 | 0.0158 | 0.169 | 1.38 | 10.3 | 0.168 | 1.93 | 7.54 | 3.47 |
| 4.0 | 35.1 | 0.000669 | 0.0180 | 0.156 | 1.02 | 3.68 | 6.00 | 0.0166 | 0.178 | 1.44 | 9.79 | 0.176 | 2.02 | 6.99 | 3.61 |
| 5 | 29.9 | 0.000835 | 0.0223 | 0.189 | 1.11 | 2.73 | 4.17 | 0.0206 | 0.219 | 1.68 | 7.94 | 0.217 | 2.38 | 4.99 | 4.20 |
| 6 | 26.0 | 0.00100 | 0.0265 | 0.219 | 1.10 | 2.10 | 3.09 | 0.0247 | 0.257 | 1.84 | 6.14 | 0.257 | 2.64 | 3.77 | 4.57 |
| 7 | 23.2 | 0.00117 | 0.0305 | 0.243 | 1.02 | 1.67 | 2.39 | 0.0286 | 0.293 | 1.90 | 4.88 | 0.295 | 2.77 | 2.95 | 4.69 |
| 8 | 20.8 | 0.00133 | 0.0344 | 0.263 | 0.905 | 1.36 | 1.89 | 0.0325 | 0.326 | 1.88 | 4.00 | 0.330 | 2.79 | 2.38 | 4.57 |
| 9 | 18.6 | 0.00149 | 0.0382 | 0.276 | 0.760 | 1.13 | 1.52 | 0.0363 | 0.354 | 1.76 | 3.33 | 0.363 | 2.71 | 1.96 | 4.33 |
| 10 | 16.6 | 0.00166 | 0.0417 | 0.283 | 0.645 | 0.954 | 1.26 | 0.0400 | 0.379 | 1.64 | 2.82 | 0.393 | 2.55 | 1.65 | 3.91 |
| 12 | 13.0 | 0.00198 | 0.0481 | 0.280 | 0.502 | 0.710 | 0.893 | 0.0471 | 0.415 | 1.27 | 2.10 | 0.443 | 2.05 | 1.22 | 3.00 |
| 14 | 10.5 | 0.00229 | 0.0534 | 0.256 | 0.400 | 0.553 | 0.672 | 0.0537 | 0.432 | 0.997 | 1.63 | 0.478 | 1.61 | 0.941 | 2.37 |
| 16 | 8.76 | 0.00260 | 0.0577 | 0.220 | 0.327 | 0.443 | 0.522 | 0.0598 | 0.430 | 0.832 | 1.32 | 0.498 | 1.33 | 0.745 | 1.98 |
| 18 | 7.46 | 0.00290 | 0.0607 | 0.186 | 0.272 | 0.364 | 0.420 | 0.0652 | 0.411 | 0.703 | 1.08 | 0.502 | 1.13 | 0.600 | 1.67 |
| 20 | 6.43 | 0.00320 | 0.0625 | 0.158 | 0.231 | 0.305 | 0.346 | 0.0701 | 0.378 | 0.600 | 0.901 | 0.492 | 0.964 | 0.493 | 1.42 |

W ( Z=74 )  1s(2)2s(2)3s(2)4s(2)5s(2)2p(6)3p(6)4p(6)5p(6)3d(10)4d(10)4f(14)  [5d(4)6s(2)/free(6)]

| Q/Rs | ----> | 43.84 | 12.98 | 5.665 | 2.623 | 1.045 | 0.3070 | 14.00 | 5.728 | 2.512 | 0.9141 | 5.902 | 2.287 | 0.5927 | 1.880 | 1.620 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 5d(4) | 4f(14) | free(6) |
| 0.2 | 14.2 / 4.91 | 3.09(-5) | 0.000869 | 0.00780 | 0.0564 | 0.550 | 9.85 | 0.000790 | 0.00869 | 0.0744 | 0.936 | 0.00852 | 0.102 | 2.47 | 0.177 | 3.03 |
| 0.4 | 30.0 / 9.95 | 6.36(-5) | 0.00175 | 0.0156 | 0.113 | 1.10 | 21.2 | 0.00159 | 0.0174 | 0.149 | 1.88 | 0.0171 | 0.204 | 4.97 | 0.353 | 6.12 |
| 0.6 | 46.7 / 15.1 | 9.60(-5) | 0.00263 | 0.0234 | 0.169 | 1.66 | 33.4 | 0.00240 | 0.0262 | 0.223 | 2.82 | 0.0257 | 0.305 | 7.51 | 0.530 | 9.26 |
| 0.8 | 59.2 / 20.2 | 0.000128 | 0.00350 | 0.0312 | 0.225 | 2.21 | 41.4 | 0.00320 | 0.0348 | 0.297 | 3.75 | 0.0342 | 0.407 | 10.1 | 0.707 | 12.5 |
| 1.0 | 62.2 / 25.3 | 0.000161 | 0.00437 | 0.0390 | 0.281 | 2.76 | 40.0 | 0.00400 | 0.0435 | 0.371 | 4.68 | 0.0427 | 0.509 | 12.6 | 0.883 | 15.7 |
| 1.2 | 60.5 / 30.5 | 0.000193 | 0.00525 | 0.0468 | 0.337 | 3.30 | 34.1 | 0.00480 | 0.0522 | 0.445 | 5.60 | 0.0512 | 0.610 | 14.9 | 1.06 | 19.0 |
| 1.4 | 58.4 / 35.5 | 0.000225 | 0.00611 | 0.0545 | 0.391 | 3.81 | 28.3 | 0.00560 | 0.0609 | 0.518 | 6.49 | 0.0597 | 0.710 | 16.9 | 1.23 | 22.3 |
| 1.6 | 56.8 / 42.7 | 0.000257 | 0.00698 | 0.0622 | 0.445 | 4.28 | 23.6 | 0.00640 | 0.0696 | 0.590 | 7.34 | 0.0683 | 0.809 | 18.2 | 1.40 | 27.7 |
| 1.8 | 55.7 / 45.8 | 0.000290 | 0.00785 | 0.0699 | 0.499 | 4.67 | 20.3 | 0.00719 | 0.0782 | 0.661 | 8.13 | 0.0768 | 0.907 | 18.7 | 1.57 | 29.1 |
| 2.0 | 54.1 / 45.9 | 0.000322 | 0.00873 | 0.0775 | 0.551 | 4.98 | 17.5 | 0.00799 | 0.0868 | 0.732 | 8.85 | 0.0853 | 1.00 | 18.5 | 1.74 | 27.8 |
| 2.2 | 52.2 / 45.3 | 0.000354 | 0.00960 | 0.0850 | 0.602 | 5.18 | 15.1 | 0.00878 | 0.0954 | 0.802 | 9.47 | 0.0937 | 1.10 | 17.7 | 1.91 | 25.9 |
| 2.4 | 50.3 / 44.1 | 0.000386 | 0.0105 | 0.0925 | 0.651 | 5.27 | 13.3 | 0.00957 | 0.104 | 0.871 | 9.97 | 0.102 | 1.20 | 16.7 | 2.07 | 23.8 |
| 2.6 | 48.0 / 42.9 | 0.000418 | 0.0113 | 0.100 | 0.699 | 5.25 | 11.8 | 0.0104 | 0.112 | 0.938 | 10.3 | 0.111 | 1.29 | 15.2 | 2.23 | 21.9 |
| 2.8 | 46.9 / 41.7 | 0.000451 | 0.0122 | 0.107 | 0.746 | 5.14 | 10.6 | 0.0112 | 0.121 | 1.00 | 10.6 | 0.119 | 1.38 | 14.7 | 2.39 | 20.1 |
| 3.0 | 44.7 / 40.3 | 0.000483 | 0.0131 | 0.115 | 0.790 | 4.95 | 9.57 | 0.0120 | 0.129 | 1.07 | 10.6 | 0.127 | 1.47 | 13.3 | 2.54 | 18.5 |
| 3.2 | 42.7 / 38.9 | 0.000515 | 0.0139 | 0.122 | 0.831 | 4.71 | 8.52 | 0.0128 | 0.138 | 1.13 | 10.6 | 0.135 | 1.56 | 12.3 | 2.69 | 17.0 |
| 3.4 | 41.0 / 36.5 | 0.000547 | 0.0148 | 0.129 | 0.871 | 4.55 | 7.78 | 0.0136 | 0.146 | 1.19 | 10.4 | 0.144 | 1.65 | 11.3 | 2.84 | 15.7 |
| 3.6 | 39.3 / 36.2 | 0.000579 | 0.0156 | 0.136 | 0.907 | 4.22 | 7.21 | 0.0143 | 0.154 | 1.25 | 10.1 | 0.152 | 1.73 | 10.4 | 2.98 | 14.5 |
| 3.8 | 37.7 / 34.9 | 0.000611 | 0.0165 | 0.143 | 0.940 | 3.90 | 6.61 | 0.0151 | 0.162 | 1.31 | 9.80 | 0.160 | 1.81 | 9.66 | 3.11 | 13.5 |
| 4.0 | 36.0 / 33.6 | 0.000643 | 0.0173 | 0.150 | 0.970 | 3.60 | 6.02 | 0.0159 | 0.170 | 1.37 | 9.47 | 0.168 | 1.89 | 8.96 | 3.24 | 12.6 |
| 5 | 30.4 / 28.8 | 0.000803 | 0.0215 | 0.182 | 1.07 | 2.67 | 4.20 | 0.0198 | 0.210 | 1.60 | 7.73 | 0.208 | 2.24 | 6.44 | 3.80 | 9.08 |
| 6 | 26.3 / 25.2 | 0.000962 | 0.0255 | 0.211 | 1.07 | 2.06 | 3.17 | 0.0237 | 0.247 | 1.76 | 5.99 | 0.246 | 2.49 | 4.87 | 4.17 | 6.89 |
| 7 | 23.3 / 22.5 | 0.00112 | 0.0294 | 0.235 | 0.992 | 1.64 | 2.38 | 0.0275 | 0.281 | 1.83 | 4.78 | 0.282 | 2.63 | 3.83 | 4.33 | 5.42 |
| 8 | 20.8 / 20.2 | 0.00128 | 0.0332 | 0.254 | 0.894 | 1.33 | 1.89 | 0.0312 | 0.313 | 1.81 | 3.91 | 0.316 | 2.67 | 3.09 | 4.28 | 4.37 |
| 9 | 18.7 / 18.2 | 0.00144 | 0.0368 | 0.267 | 0.753 | 1.11 | 1.58 | 0.0349 | 0.341 | 1.74 | 3.25 | 0.348 | 2.61 | 2.55 | 4.09 | 3.61 |
| 10 | 16.7 / 16.3 | 0.00159 | 0.0402 | 0.275 | 0.637 | 0.943 | 1.28 | 0.0384 | 0.365 | 1.61 | 2.76 | 0.377 | 2.48 | 2.15 | 3.78 | 3.04 |
| 12 | 13.2 / 13.0 | 0.00190 | 0.0464 | 0.273 | 0.495 | 0.702 | 0.898 | 0.0452 | 0.401 | 1.26 | 2.07 | 0.425 | 2.02 | 1.59 | 2.94 | 2.24 |
| 14 | 10.6 / 10.4 | 0.00221 | 0.0517 | 0.252 | 0.395 | 0.547 | 0.675 | 0.0516 | 0.419 | 0.900 | 1.61 | 0.461 | 1.60 | 1.23 | 2.32 | 1.73 |
| 16 | 8.85 / 8.73 | 0.00250 | 0.0559 | 0.218 | 0.323 | 0.439 | 0.529 | 0.0575 | 0.419 | 0.819 | 1.29 | 0.481 | 1.31 | 0.978 | 1.93 | 1.39 |
| 18 | 7.57 / 7.45 | 0.00280 | 0.0589 | 0.184 | 0.271 | 0.360 | 0.450 | 0.0628 | 0.402 | 0.693 | 1.06 | 0.487 | 1.11 | 0.804 | 1.62 | 1.13 |
| 20 | 6.53 / 6.44 | 0.00308 | 0.0608 | 0.157 | 0.228 | 0.302 | 0.362 | 0.0676 | 0.372 | 0.592 | 0.890 | 0.479 | 0.956 | 0.665 | 1.40 | 0.936 |

Re ( Z=75 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(5) 4f(14)

| Q/Rs | ----> | 44.46 | 13.17 | 5.760 | 2.675 | 1.079 | 0.3143 | 14.21 | 5.822 | 2.568 | 0.9492 | 6.005 | 2.350 | 0.6339 | 1.961 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 5d(5) | 4f(14) |
| 0.2 | 13.3 | 0.297(-4) | 0.000863 | 0.00747 | 0.0537 | 0.509 | 9.33 | 0.000758 | 0.00833 | 0.0703 | 0.853 | 0.00813 | 0.0950 | 2.20 | 0.159 |
| 0.4 | 27.9 | 0.612(-4) | 0.00168 | 0.0150 | 0.107 | 1.02 | 20.0 | 0.00153 | 0.0167 | 0.140 | 1.71 | 0.0163 | 0.190 | 4.42 | 0.317 |
| 0.6 | 43.5 | 0.923(-4) | 0.00253 | 0.0224 | 0.161 | 1.53 | 31.6 | 0.00230 | 0.0251 | 0.211 | 2.57 | 0.0245 | 0.285 | 6.66 | 0.476 |
| 0.8 | 55.5 | 0.000123 | 0.00337 | 0.0299 | 0.214 | 2.05 | 39.5 | 0.00307 | 0.0334 | 0.281 | 3.42 | 0.0327 | 0.380 | 8.91 | 0.635 |
| 1.0 | 58.7 | 0.000155 | 0.00421 | 0.0374 | 0.268 | 2.56 | 38.7 | 0.00384 | 0.0417 | 0.351 | 4.27 | 0.0408 | 0.475 | 11.1 | 0.793 |
| 1.2 | 58.2 | 0.000186 | 0.00505 | 0.0448 | 0.320 | 3.05 | 34.4 | 0.00461 | 0.0500 | 0.420 | 5.10 | 0.0489 | 0.569 | 13.3 | 0.949 |
| 1.4 | 55.9 | 0.000217 | 0.00588 | 0.0522 | 0.372 | 3.53 | 28.5 | 0.00538 | 0.0583 | 0.489 | 5.91 | 0.0570 | 0.662 | 15.2 | 1.11 |
| 1.6 | 54.5 | 0.000248 | 0.00671 | 0.0596 | 0.424 | 3.96 | 23.8 | 0.00614 | 0.0666 | 0.558 | 6.69 | 0.0652 | 0.755 | 16.8 | 1.26 |
| 1.8 | 53.5 | 0.000279 | 0.00755 | 0.0669 | 0.475 | 4.34 | 20.3 | 0.00691 | 0.0749 | 0.625 | 7.43 | 0.0733 | 0.846 | 17.8 | 1.41 |
| 2.0 | 52.6 | 0.000310 | 0.00839 | 0.0742 | 0.524 | 4.65 | 17.6 | 0.00767 | 0.0832 | 0.692 | 8.10 | 0.0814 | 0.937 | 18.3 | 1.56 |
| 2.2 | 51.5 | 0.000341 | 0.00923 | 0.0815 | 0.573 | 4.86 | 15.3 | 0.00844 | 0.0914 | 0.758 | 8.69 | 0.0895 | 1.03 | 18.3 | 1.71 |
| 2.4 | 50.0 | 0.000372 | 0.0101 | 0.0886 | 0.620 | 4.98 | 13.4 | 0.00920 | 0.0995 | 0.823 | 9.18 | 0.0976 | 1.12 | 17.8 | 1.86 |
| 2.6 | 48.5 | 0.000403 | 0.0109 | 0.0958 | 0.666 | 4.99 | 11.9 | 0.00996 | 0.108 | 0.887 | 9.56 | 0.106 | 1.20 | 17.0 | 2.01 |
| 2.8 | 46.6 | 0.000433 | 0.0117 | 0.103 | 0.711 | 4.91 | 10.6 | 0.0107 | 0.116 | 0.950 | 9.81 | 0.114 | 1.29 | 15.8 | 2.15 |
| 3.0 | 45.3 | 0.000464 | 0.0126 | 0.110 | 0.753 | 4.77 | 9.54 | 0.0115 | 0.124 | 1.01 | 9.94 | 0.122 | 1.37 | 15.3 | 2.29 |
| 3.2 | 43.2 | 0.000495 | 0.0134 | 0.117 | 0.793 | 4.55 | 8.64 | 0.0123 | 0.132 | 1.07 | 9.95 | 0.129 | 1.46 | 13.9 | 2.42 |
| 3.4 | 41.3 | 0.000526 | 0.0142 | 0.124 | 0.831 | 4.41 | 7.87 | 0.0130 | 0.140 | 1.13 | 9.84 | 0.137 | 1.54 | 12.7 | 2.55 |
| 3.6 | 39.6 | 0.000557 | 0.0150 | 0.130 | 0.866 | 4.15 | 7.18 | 0.0138 | 0.148 | 1.19 | 9.63 | 0.145 | 1.62 | 11.8 | 2.68 |
| 3.8 | 37.9 | 0.000588 | 0.0158 | 0.137 | 0.899 | 3.84 | 6.60 | 0.0145 | 0.155 | 1.24 | 9.36 | 0.153 | 1.69 | 11.0 | 2.81 |
| 4.0 | 36.4 | 0.000617 | 0.0167 | 0.143 | 0.928 | 3.56 | 6.05 | 0.0153 | 0.163 | 1.29 | 9.11 | 0.161 | 1.77 | 10.3 | 2.93 |
| 5 | 30.6 | 0.000772 | 0.0207 | 0.175 | 1.03 | 2.62 | 4.23 | 0.0190 | 0.201 | 1.52 | 7.58 | 0.199 | 2.10 | 7.44 | 3.45 |
| 6 | 26.2 | 0.000926 | 0.0246 | 0.202 | 1.03 | 2.03 | 3.13 | 0.0228 | 0.237 | 1.68 | 5.82 | 0.235 | 2.34 | 5.68 | 3.81 |
| 7 | 23.2 | 0.00108 | 0.0283 | 0.226 | 0.970 | 1.61 | 2.42 | 0.0264 | 0.270 | 1.76 | 4.66 | 0.270 | 2.50 | 4.48 | 4.00 |
| 8 | 20.8 | 0.00123 | 0.0320 | 0.244 | 0.881 | 1.32 | 1.92 | 0.0300 | 0.300 | 1.75 | 3.83 | 0.303 | 2.54 | 3.63 | 4.00 |
| 9 | 18.6 | 0.00138 | 0.0355 | 0.258 | 0.747 | 1.10 | 1.53 | 0.0335 | 0.328 | 1.69 | 3.19 | 0.333 | 2.50 | 3.01 | 3.87 |
| 10 | 16.7 | 0.00153 | 0.0388 | 0.266 | 0.632 | 0.928 | 1.27 | 0.0369 | 0.351 | 1.58 | 2.71 | 0.361 | 2.40 | 2.54 | 3.63 |
| 12 | 13.3 | 0.00183 | 0.0448 | 0.266 | 0.488 | 0.695 | 0.917 | 0.0435 | 0.387 | 1.24 | 2.03 | 0.409 | 1.99 | 1.88 | 2.89 |
| 14 | 10.7 | 0.00212 | 0.0499 | 0.247 | 0.393 | 0.541 | 0.683 | 0.0497 | 0.405 | 0.977 | 1.58 | 0.443 | 1.58 | 1.46 | 2.27 |
| 16 | 8.91 | 0.00241 | 0.0540 | 0.215 | 0.321 | 0.434 | 0.523 | 0.0554 | 0.407 | 0.813 | 1.27 | 0.465 | 1.29 | 1.17 | 1.89 |
| 18 | 7.60 | 0.00270 | 0.0571 | 0.183 | 0.268 | 0.357 | 0.429 | 0.0606 | 0.393 | 0.688 | 1.05 | 0.472 | 1.10 | 0.958 | 1.59 |
| 20 | 6.56 | 0.00297 | 0.0590 | 0.156 | 0.227 | 0.299 | 0.348 | 0.0652 | 0.365 | 0.588 | 0.879 | 0.466 | 0.940 | 0.801 | 1.37 |

Os ( Z=76 ) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(6) 4f(14)

| Q/Rs | ----> | 45.02 | 13.35 | 5.846 | 2.726 | 1.113 | 0.3225 | 14.42 | 5.923 | 2.622 | 0.9836 | 6.107 | 2.406 | 0.6621 | 2.041 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 5d(6) | 4f(14) |
| 0.2 | 12.5 | 0.287(-4) | 0.000806 | 0.00719 | 0.0512 | 0.472 | 8.79 | 0.000729 | 0.00795 | 0.0666 | 0.714 | 0.00778 | 0.0894 | 2.05 | 0.143 |
| 0.4 | 26.1 | 0.591(-4) | 0.00162 | 0.0144 | 0.102 | 0.947 | 18.8 | 0.00147 | 0.0160 | 0.133 | 1.57 | 0.0156 | 0.179 | 4.12 | 0.286 |
| 0.6 | 40.7 | 0.892(-4) | 0.00243 | 0.0216 | 0.154 | 1.42 | 29.6 | 0.00221 | 0.0239 | 0.200 | 2.35 | 0.0234 | 0.268 | 6.20 | 0.429 |
| 0.8 | 52.3 | 0.000119 | 0.00325 | 0.0287 | 0.205 | 1.90 | 37.5 | 0.00295 | 0.0319 | 0.267 | 3.13 | 0.0312 | 0.358 | 8.28 | 0.573 |
| 1.0 | 56.0 | 0.000149 | 0.00406 | 0.0359 | 0.255 | 2.37 | 37.5 | 0.00369 | 0.0398 | 0.333 | 3.91 | 0.0390 | 0.447 | 10.4 | 0.715 |
| 1.2 | 56.1 | 0.000179 | 0.00486 | 0.0431 | 0.305 | 2.83 | 34.0 | 0.00443 | 0.0478 | 0.399 | 4.67 | 0.0468 | 0.535 | 12.3 | 0.857 |
| 1.4 | 53.4 | 0.000209 | 0.00567 | 0.0503 | 0.355 | 3.27 | 27.9 | 0.00517 | 0.0557 | 0.464 | 5.42 | 0.0545 | 0.623 | 14.2 | 0.998 |
| 1.6 | 52.1 | 0.000239 | 0.00647 | 0.0574 | 0.404 | 3.68 | 23.5 | 0.00591 | 0.0637 | 0.529 | 6.14 | 0.0623 | 0.710 | 15.8 | 1.14 |
| 1.8 | 51.4 | 0.000269 | 0.00728 | 0.0644 | 0.453 | 4.04 | 20.0 | 0.00664 | 0.0716 | 0.593 | 6.82 | 0.0701 | 0.797 | 17.2 | 1.28 |
| 2.0 | 50.8 | 0.000299 | 0.00809 | 0.0714 | 0.500 | 4.34 | 17.3 | 0.00737 | 0.0795 | 0.657 | 7.44 | 0.0779 | 0.883 | 18.0 | 1.41 |
| 2.2 | 50.1 | 0.000329 | 0.00890 | 0.0784 | 0.547 | 4.56 | 15.0 | 0.00811 | 0.0873 | 0.719 | 8.01 | 0.0856 | 0.967 | 18.4 | 1.55 |
| 2.4 | 49.2 | 0.000359 | 0.00970 | 0.0853 | 0.592 | 4.69 | 13.2 | 0.00884 | 0.0951 | 0.781 | 8.48 | 0.0933 | 1.05 | 18.4 | 1.68 |
| 2.6 | 48.0 | 0.000389 | 0.0105 | 0.0922 | 0.636 | 4.74 | 11.8 | 0.00957 | 0.103 | 0.842 | 8.87 | 0.101 | 1.13 | 17.9 | 1.81 |
| 2.8 | 46.6 | 0.000419 | 0.0113 | 0.0990 | 0.678 | 4.69 | 10.5 | 0.0103 | 0.111 | 0.902 | 9.15 | 0.107 | 1.22 | 17.2 | 1.94 |
| 3.0 | 44.9 | 0.000449 | 0.0121 | 0.106 | 0.719 | 4.59 | 9.43 | 0.0110 | 0.118 | 0.960 | 9.31 | 0.116 | 1.29 | 16.2 | 2.07 |
| 3.2 | 43.7 | 0.000479 | 0.0129 | 0.112 | 0.758 | 4.41 | 8.53 | 0.0118 | 0.126 | 1.02 | 9.37 | 0.124 | 1.37 | 15.7 | 2.19 |
| 3.4 | 41.8 | 0.000508 | 0.0137 | 0.119 | 0.795 | 4.24 | 7.77 | 0.0125 | 0.134 | 1.07 | 9.32 | 0.131 | 1.45 | 14.4 | 2.31 |
| 3.6 | 39.9 | 0.000538 | 0.0145 | 0.125 | 0.829 | 4.06 | 7.08 | 0.0132 | 0.141 | 1.13 | 9.18 | 0.139 | 1.52 | 13.2 | 2.43 |
| 3.8 | 38.1 | 0.000568 | 0.0153 | 0.132 | 0.861 | 3.78 | 6.51 | 0.0140 | 0.149 | 1.18 | 8.96 | 0.146 | 1.60 | 12.2 | 2.54 |
| 4.0 | 36.6 | 0.000598 | 0.0161 | 0.138 | 0.889 | 3.51 | 6.00 | 0.0147 | 0.156 | 1.23 | 8.73 | 0.154 | 1.67 | 11.5 | 2.65 |
| 5 | 30.7 | 0.000746 | 0.0199 | 0.168 | 0.987 | 2.58 | 4.18 | 0.0183 | 0.192 | 1.45 | 7.38 | 0.190 | 1.98 | 8.42 | 3.14 |
| 6 | 26.3 | 0.000894 | 0.0237 | 0.195 | 1.00 | 1.99 | 3.09 | 0.0219 | 0.226 | 1.61 | 5.70 | 0.225 | 2.23 | 6.46 | 3.50 |
| 7 | 23.2 | 0.00104 | 0.0273 | 0.218 | 0.948 | 1.59 | 2.41 | 0.0254 | 0.258 | 1.69 | 4.57 | 0.259 | 2.38 | 5.12 | 3.70 |
| 8 | 20.8 | 0.00119 | 0.0309 | 0.236 | 0.868 | 1.30 | 1.91 | 0.0288 | 0.288 | 1.69 | 3.74 | 0.290 | 2.44 | 4.17 | 3.75 |
| 9 | 18.6 | 0.00134 | 0.0342 | 0.250 | 0.740 | 1.09 | 1.55 | 0.0322 | 0.314 | 1.64 | 3.14 | 0.319 | 2.41 | 3.46 | 3.66 |
| 10 | 16.8 | 0.00148 | 0.0374 | 0.258 | 0.628 | 0.918 | 1.28 | 0.0355 | 0.337 | 1.54 | 2.67 | 0.347 | 2.32 | 2.93 | 3.47 |
| 12 | 13.4 | 0.00177 | 0.0433 | 0.260 | 0.485 | 0.688 | 0.908 | 0.0419 | 0.373 | 1.23 | 2.00 | 0.393 | 1.96 | 2.17 | 2.83 |
| 14 | 10.8 | 0.00205 | 0.0483 | 0.243 | 0.388 | 0.536 | 0.692 | 0.0479 | 0.392 | 0.970 | 1.56 | 0.427 | 1.56 | 1.69 | 2.24 |
| 16 | 8.96 | 0.00233 | 0.0524 | 0.213 | 0.317 | 0.430 | 0.537 | 0.0534 | 0.395 | 0.800 | 1.25 | 0.449 | 1.27 | 1.36 | 1.83 |
| 18 | 7.63 | 0.00260 | 0.0554 | 0.182 | 0.266 | 0.354 | 0.419 | 0.0584 | 0.383 | 0.678 | 1.03 | 0.457 | 1.08 | 1.11 | 1.55 |
| 20 | 6.60 | 0.00287 | 0.0574 | 0.155 | 0.226 | 0.296 | 0.343 | 0.0629 | 0.359 | 0.579 | 0.867 | 0.453 | 0.925 | 0.930 | 1.34 |

Ir ( Z=77 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(7) 4f(14)

| Q/Rs | ----> | 45.62 | 13.54 | 5.937 | 2.778 | 1.147 | 0.3296 | 14.63 | 6.010 | 2.677 | 1.018 | 6.211 | 2.464 | 0.6935 | 2.118 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 5d(7) | 4f(14) |
| 0.2 | 11.8 | 0.276(-4) | 0.000776 | 0.00691 | 0.0488 | 0.439 | 8.35 | 0.000700 | 0.00765 | 0.0632 | 0.718 | 0.00743 | 0.0841 | 1.89 | 0.130 |
| 0.4 | 24.6 | 0.570(-4) | 0.00156 | 0.0138 | 0.0974 | 0.880 | 17.8 | 0.00142 | 0.0154 | 0.126 | 1.44 | 0.0149 | 0.168 | 3.79 | 0.260 |
| 0.6 | 38.3 | 0.860(-4) | 0.00234 | 0.0207 | 0.146 | 1.32 | 28.0 | 0.00213 | 0.0230 | 0.189 | 2.16 | 0.0224 | 0.252 | 5.70 | 0.390 |
| 0.8 | 49.5 | 0.000115 | 0.00313 | 0.0276 | 0.195 | 1.76 | 35.9 | 0.00284 | 0.0307 | 0.253 | 2.83 | 0.0299 | 0.336 | 7.61 | 0.521 |
| 1.0 | 53.6 | 0.000144 | 0.00391 | 0.0345 | 0.243 | 2.20 | 36.5 | 0.00355 | 0.0383 | 0.316 | 3.59 | 0.0373 | 0.422 | 9.50 | 0.650 |
| 1.2 | 53.6 | 0.000173 | 0.00469 | 0.0414 | 0.291 | 2.63 | 33.2 | 0.00426 | 0.0460 | 0.380 | 4.29 | 0.0447 | 0.503 | 11.3 | 0.779 |
| 1.4 | 50.9 | 0.00202 | 0.00546 | 0.0483 | 0.339 | 3.04 | 27.3 | 0.00497 | 0.0536 | 0.440 | 1.98 | 0.0521 | 0.586 | 13.1 | 0.907 |
| 1.6 | 49.6 | 0.000231 | 0.00624 | 0.0551 | 0.385 | 3.42 | 23.1 | 0.00568 | 0.0613 | 0.502 | 5.64 | 0.0596 | 0.668 | 14.7 | 1.03 |
| 1.8 | 48.9 | 0.000260 | 0.00701 | 0.0619 | 0.432 | 3.77 | 19.9 | 0.00689 | 0.0689 | 0.562 | 6.27 | 0.0670 | 0.750 | 16.1 | 1.16 |
| 2.0 | 48.5 | 0.000290 | 0.00779 | 0.0686 | 0.477 | 4.06 | 17.0 | 0.00709 | 0.0765 | 0.623 | 6.86 | 0.0745 | 0.830 | 17.2 | 1.29 |
| 2.2 | 48.2 | 0.000317 | 0.00857 | 0.0753 | 0.521 | 4.28 | 14.9 | 0.00780 | 0.0840 | 0.682 | 7.39 | 0.0819 | 0.910 | 17.9 | 1.41 |
| 2.4 | 47.6 | 0.000346 | 0.00935 | 0.0820 | 0.565 | 4.43 | 13.1 | 0.00850 | 0.0915 | 0.741 | 7.85 | 0.0892 | 0.989 | 18.2 | 1.53 |
| 2.6 | 46.9 | 0.000375 | 0.0101 | 0.0886 | 0.607 | 4.49 | 11.6 | 0.00920 | 0.0990 | 0.799 | 8.24 | 0.0966 | 1.06 | 18.2 | 1.65 |
| 2.8 | 45.9 | 0.000404 | 0.0109 | 0.0951 | 0.648 | 4.48 | 10.4 | 0.00991 | 0.107 | 0.856 | 8.53 | 0.104 | 1.14 | 17.8 | 1.77 |
| 3.0 | 44.7 | 0.000433 | 0.0117 | 0.102 | 0.687 | 4.40 | 9.31 | 0.0106 | 0.114 | 0.911 | 8.72 | 0.111 | 1.22 | 17.2 | 1.88 |
| 3.2 | 43.2 | 0.000461 | 0.0124 | 0.108 | 0.724 | 4.27 | 8.44 | 0.0113 | 0.121 | 0.966 | 8.82 | 0.118 | 1.29 | 16.3 | 2.00 |
| 3.4 | 42.1 | 0.000490 | 0.0132 | 0.114 | 0.760 | 4.09 | 7.68 | 0.0120 | 0.129 | 1.02 | 8.82 | 0.126 | 1.37 | 15.8 | 2.11 |
| 3.6 | 40.4 | 0.000519 | 0.0140 | 0.121 | 0.793 | 3.97 | 7.02 | 0.0127 | 0.136 | 1.07 | 8.73 | 0.133 | 1.44 | 14.7 | 2.22 |
| 3.8 | 38.5 | 0.000548 | 0.0147 | 0.127 | 0.824 | 3.72 | 6.44 | 0.0134 | 0.143 | 1.12 | 8.57 | 0.140 | 1.51 | 13.6 | 2.32 |
| 4.0 | 36.8 | 0.000576 | 0.0155 | 0.133 | 0.852 | 3.46 | 5.93 | 0.0141 | 0.150 | 1.17 | 8.36 | 0.147 | 1.57 | 12.6 | 2.42 |
| 5 | 30.7 | 0.000720 | 0.0192 | 0.162 | 0.950 | 2.54 | 4.15 | 0.0176 | 0.185 | 1.38 | 7.01 | 0.182 | 1.87 | 9.33 | 2.88 |
| 6 | 26.3 | 0.000862 | 0.0228 | 0.188 | 0.972 | 1.97 | 3.08 | 0.0210 | 0.218 | 1.54 | 5.55 | 0.215 | 2.11 | 7.18 | 3.22 |
| 7 | 23.1 | 0.00101 | 0.0264 | 0.210 | 0.926 | 1.57 | 2.37 | 0.0244 | 0.249 | 1.62 | 4.47 | 0.248 | 2.27 | 5.71 | 3.44 |
| 8 | 20.7 | 0.00115 | 0.0298 | 0.228 | 0.853 | 1.28 | 1.90 | 0.0278 | 0.278 | 1.64 | 3.68 | 0.278 | 2.34 | 4.66 | 3.51 |
| 9 | 18.6 | 0.00129 | 0.0330 | 0.242 | 0.733 | 0.904 | 1.07 | 0.0310 | 0.303 | 1.59 | 2.75 | 0.306 | 2.32 | 3.22 | 3.46 |
| 10 | 16.7 | 0.00143 | 0.0361 | 0.250 | 0.624 | 0.909 | 1.26 | 0.0342 | 0.326 | 1.51 | 2.62 | 0.332 | 2.25 | 3.28 | 3.32 |
| 12 | 13.5 | 0.00171 | 0.0418 | 0.253 | 0.478 | 0.681 | 0.897 | 0.0403 | 0.361 | 1.22 | 1.97 | 0.377 | 1.93 | 2.45 | 2.77 |
| 14 | 10.9 | 0.00198 | 0.0467 | 0.239 | 0.386 | 0.531 | 0.676 | 0.0461 | 0.381 | 0.962 | 1.54 | 0.411 | 1.55 | 1.90 | 2.20 |
| 16 | 9.01 | 0.00225 | 0.0507 | 0.210 | 0.316 | 0.426 | 0.533 | 0.0515 | 0.385 | 0.794 | 1.24 | 0.433 | 1.25 | 1.53 | 1.79 |
| 18 | 7.68 | 0.00251 | 0.0537 | 0.180 | 0.263 | 0.351 | 0.421 | 0.0563 | 0.375 | 0.673 | 1.02 | 0.443 | 1.06 | 1.26 | 1.52 |
| 20 | 6.65 | 0.00277 | 0.0557 | 0.154 | 0.224 | 0.294 | 0.347 | 0.0607 | 0.353 | 0.576 | 0.856 | 0.441 | 0.918 | 1.05 | 1.31 |

Pt ( Z=78 ) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(10) 4f(14)

| Q/Rs | ----> | 46.37 | 13.73 | 6.027 | 2.829 | 1.163 | 14.83 | 6.106 | 2.729 | 1.026 | 6.316 | 2.526 | 0.6460 | 2.195 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 5d(10) | 4f(14) |
| 0.2 | 3.86 | 2.64(-5) | 0.000747 | 0.00664 | 0.0466 | 0.424 | 0.000675 | 0.00724 | 0.0601 | 0.704 | 0.00711 | 0.0789 | 2.40 | 0.119 |
| 0.4 | 7.74 | 5.44(-5) | 0.00150 | 0.0133 | 0.0930 | 0.851 | 0.00136 | 0.0147 | 0.124 | 1.41 | 0.0143 | 0.158 | 4.12 | 0.237 |
| 0.6 | 11.6 | 8.22(-5) | 0.00226 | 0.0199 | 0.140 | 1.28 | 0.00205 | 0.0221 | 0.180 | 2.12 | 0.0214 | 0.236 | 7.24 | 0.356 |
| 0.8 | 15.5 | 0.000110 | 0.00301 | 0.0265 | 0.186 | 1.70 | 0.00274 | 0.0294 | 0.240 | 2.82 | 0.0286 | 0.315 | 9.66 | 0.475 |
| 1.0 | 19.3 | 0.000138 | 0.00376 | 0.0332 | 0.232 | 2.13 | 0.00342 | 0.0367 | 0.300 | 3.52 | 0.0357 | 0.394 | 12.1 | 0.593 |
| 1.2 | 23.1 | 0.000165 | 0.00451 | 0.0398 | 0.278 | 2.54 | 0.00411 | 0.0441 | 0.360 | 4.21 | 0.0428 | 0.472 | 14.4 | 0.710 |
| 1.4 | 26.8 | 0.000193 | 0.00526 | 0.0464 | 0.323 | 2.94 | 0.00479 | 0.0514 | 0.419 | 4.88 | 0.0499 | 0.550 | 16.7 | 0.828 |
| 1.6 | 30.2 | 0.000221 | 0.00601 | 0.0530 | 0.368 | 3.31 | 0.00547 | 0.0588 | 0.477 | 5.53 | 0.0570 | 0.627 | 18.7 | 0.944 |
| 1.8 | 33.3 | 0.000248 | 0.00676 | 0.0595 | 0.412 | 3.65 | 0.00616 | 0.0661 | 0.536 | 6.15 | 0.0641 | 0.703 | 20.6 | 1.06 |
| 2.0 | 36.0 | 0.000276 | 0.00751 | 0.0660 | 0.456 | 3.94 | 0.00684 | 0.0733 | 0.593 | 6.73 | 0.0712 | 0.780 | 22.1 | 1.17 |
| 2.2 | 38.8 | 0.000303 | 0.00826 | 0.0724 | 0.498 | 4.16 | 0.00752 | 0.0806 | 0.650 | 7.26 | 0.0783 | 0.854 | 23.2 | 1.29 |
| 2.4 | 39.7 | 0.000331 | 0.00900 | 0.0788 | 0.540 | 4.31 | 0.00819 | 0.0878 | 0.706 | 7.72 | 0.0853 | 0.928 | 23.8 | 1.40 |
| 2.6 | 40.6 | 0.000359 | 0.00975 | 0.0852 | 0.580 | 4.38 | 0.00871 | 0.0950 | 0.761 | 8.10 | 0.0924 | 1.00 | 24.0 | 1.51 |
| 2.8 | 40.9 | 0.000386 | 0.0105 | 0.0915 | 0.619 | 4.38 | 0.00955 | 0.102 | 0.815 | 8.39 | 0.0994 | 1.07 | 23.7 | 1.62 |
| 3.0 | 40.8 | 0.000414 | 0.0112 | 0.0977 | 0.657 | 4.32 | 0.0102 | 0.109 | 0.868 | 8.59 | 0.106 | 1.14 | 23.2 | 1.72 |
| 3.2 | 40.2 | 0.000441 | 0.0120 | 0.104 | 0.693 | 4.20 | 0.0109 | 0.116 | 0.920 | 8.69 | 0.113 | 1.21 | 24.2 | 1.83 |
| 3.4 | 39.4 | 0.000469 | 0.0127 | 0.110 | 0.727 | 4.03 | 0.0116 | 0.123 | 0.971 | 8.70 | 0.120 | 1.28 | 21.4 | 1.93 |
| 3.6 | 38.5 | 0.000496 | 0.0134 | 0.116 | 0.759 | 3.91 | 0.0123 | 0.130 | 1.02 | 8.63 | 0.127 | 1.35 | 20.4 | 2.03 |
| 3.8 | 37.0 | 0.000524 | 0.0142 | 0.122 | 0.789 | 3.68 | 0.0130 | 0.137 | 1.07 | 8.48 | 0.134 | 1.42 | 19.0 | 2.13 |
| 4.0 | 35.4 | 0.000551 | 0.0149 | 0.128 | 0.817 | 3.43 | 0.0136 | 0.144 | 1.12 | 8.28 | 0.141 | 1.48 | 17.6 | 2.22 |
| 5 | 29.5 | 0.000688 | 0.0185 | 0.156 | 0.916 | 2.52 | 0.0170 | 0.178 | 1.32 | 6.89 | 0.174 | 1.77 | 12.9 | 2.65 |
| 6 | 25.5 | 0.000825 | 0.0220 | 0.181 | 0.942 | 1.95 | 0.0203 | 0.210 | 1.47 | 5.53 | 0.206 | 1.99 | 10.0 | 2.98 |
| 7 | 22.5 | 0.000961 | 0.0254 | 0.203 | 0.904 | 1.57 | 0.0236 | 0.239 | 1.56 | 4.45 | 0.237 | 2.15 | 7.98 | 3.19 |
| 8 | 20.2 | 0.00110 | 0.0287 | 0.221 | 0.838 | 1.28 | 0.0268 | 0.267 | 1.58 | 3.67 | 0.266 | 2.23 | 6.52 | 3.29 |
| 9 | 18.2 | 0.00123 | 0.0317 | 0.234 | 0.727 | 1.07 | 0.0299 | 0.292 | 1.58 | 3.06 | 0.294 | 2.23 | 5.44 | 3.27 |
| 10 | 16.5 | 0.00137 | 0.0349 | 0.243 | 0.619 | 0.908 | 0.0330 | 0.314 | 1.47 | 2.61 | 0.319 | 2.17 | 4.62 | 3.16 |
| 12 | 13.4 | 0.00163 | 0.0404 | 0.247 | 0.475 | 0.677 | 0.0390 | 0.348 | 1.21 | 1.96 | 0.363 | 1.89 | 3.44 | 2.70 |
| 14 | 10.9 | 0.00190 | 0.0452 | 0.234 | 0.380 | 0.528 | 0.0445 | 0.369 | 0.955 | 1.53 | 0.396 | 1.53 | 2.68 | 2.17 |
| 16 | 9.01 | 0.00215 | 0.0491 | 0.208 | 0.312 | 0.425 | 0.0497 | 0.375 | 0.781 | 1.24 | 0.419 | 1.24 | 2.16 | 1.75 |
| 18 | 7.68 | 0.00240 | 0.0521 | 0.179 | 0.262 | 0.350 | 0.0545 | 0.367 | 0.663 | 1.02 | 0.429 | 1.05 | 1.77 | 1.49 |
| 20 | 6.66 | 0.00265 | 0.0541 | 0.153 | 0.222 | 0.294 | 0.0587 | 0.346 | 0.567 | 0.854 | 0.429 | 0.902 | 1.49 | 1.29 |

Au ( Z=79 ) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(10) 4f(14) [6s(1)/free(1) ]

| Q/Rs | ----> | 46.84 | 13.92 | 6.119 | 2.886 | 1.199 | 0.3111 | 15.04 | 6.206 | 2.787 | 1.070 | 6.417 | 2.588 | 0.7206 | 2.270 | 3.010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| v | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(1) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 5d(10) | 4f(14) | free(1) |
| 0.2 | 11.3 / 5.18 | 2.56(-5) | 0.000720 | 0.00638 | 0.0443 | 0.394 | 8.17 | 0.000650 | 0.00703 | 0.0570 | 0.635 | 0.00681 | 0.0741 | 1.84 | 0.109 | 2.05 |
| 0.4 | 24.6 / 10.6 | 5.29(-5) | 0.00145 | 0.0128 | 0.0884 | 0.790 | 18.3 | 0.00131 | 0.0141 | 0.114 | 1.28 | 0.0137 | 0.148 | 3.69 | 0.218 | 4.31 |
| 0.6 | 37.7 / 16.4 | 8.00(-5) | 0.00218 | 0.0192 | 0.133 | 1.19 | 28.1 | 0.00197 | 0.0212 | 0.171 | 1.91 | 0.0206 | 0.222 | 5.54 | 0.326 | 6.78 |
| 0.8 | 42.1 / 22.3 | 0.000107 | 0.00290 | 0.0255 | 0.117 | 1.58 | 29.3 | 0.00263 | 0.0282 | 0.228 | 2.55 | 0.0274 | 0.296 | 7.39 | 0.436 | 9.50 |
| 1.0 | 40.0 / 30.0 | 0.000134 | 0.00363 | 0.0319 | 0.221 | 1.97 | 24.1 | 0.00329 | 0.0352 | 0.285 | 3.17 | 0.0342 | 0.370 | 9.22 | 0.544 | 14.1 |
| 1.2 | 38.4 / 32.1 | 0.000161 | 0.00435 | 0.0383 | 0.264 | 2.36 | 19.4 | 0.00395 | 0.0422 | 0.341 | 3.80 | 0.0410 | 0.444 | 11.0 | 0.652 | 13.1 |
| 1.4 | 37.9 / 33.5 | 0.000188 | 0.00507 | 0.0446 | 0.308 | 2.73 | 15.8 | 0.00461 | 0.0493 | 0.397 | 4.40 | 0.0478 | 0.517 | 12.7 | 0.759 | 11.4 |
| 1.6 | 38.1 / 34.9 | 0.000215 | 0.00579 | 0.0509 | 0.350 | 3.08 | 13.1 | 0.00527 | 0.0563 | 0.452 | 4.99 | 0.0546 | 0.589 | 14.4 | 0.866 | 9.87 |
| 1.8 | 38.7 / 36.2 | 0.000421 | 0.00651 | 0.0572 | 0.392 | 3.40 | 11.1 | 0.00593 | 0.0633 | 0.507 | 5.56 | 0.0615 | 0.661 | 15.9 | 0.972 | 8.56 |
| 2.0 | 39.6 / 37.5 | 0.000268 | 0.00724 | 0.0634 | 0.433 | 3.67 | 9.53 | 0.00658 | 0.0703 | 0.562 | 6.09 | 0.0683 | 0.732 | 17.3 | 1.08 | 7.47 |
| 2.2 | 40.4 / 38.7 | 0.000295 | 0.00796 | 0.0696 | 0.474 | 3.90 | 8.24 | 0.00724 | 0.0772 | 0.616 | 6.58 | 0.0751 | 0.803 | 18.4 | 1.18 | 6.56 |
| 2.4 | 41.1 / 39.7 | 0.000322 | 0.00868 | 0.0758 | 0.514 | 4.06 | 7.22 | 0.00789 | 0.0841 | 0.669 | 7.01 | 0.0818 | 0.873 | 19.2 | 1.28 | 5.81 |
| 2.6 | 41.5 / 40.3 | 0.000349 | 0.00940 | 0.0819 | 0.552 | 4.15 | 6.39 | 0.00854 | 0.0910 | 0.721 | 7.38 | 0.0886 | 0.942 | 19.7 | 1.38 | 5.18 |
| 2.8 | 41.6 / 40.6 | 0.000376 | 0.0101 | 0.0880 | 0.590 | 4.17 | 5.68 | 0.00919 | 0.0979 | 0.773 | 7.68 | 0.0953 | 1.01 | 19.9 | 1.48 | 4.65 |
| 3.0 | 41.4 / 40.5 | 0.000402 | 0.0108 | 0.0940 | 0.626 | 4.13 | 5.10 | 0.00985 | 0.105 | 0.824 | 7.90 | 0.102 | 1.08 | 19.8 | 1.58 | 4.20 |
| 3.2 | 40.8 / 40.0 | 0.000429 | 0.0115 | 0.0999 | 0.660 | 4.04 | 4.60 | 0.0105 | 0.111 | 0.873 | 8.04 | 0.109 | 1.14 | 19.5 | 1.68 | 3.81 |
| 3.4 | 40.0 / 39.6 | 0.000456 | 0.0123 | 0.106 | 0.693 | 3.89 | 4.18 | 0.0112 | 0.118 | 0.922 | 8.10 | 0.115 | 1.21 | 18.9 | 1.77 | 3.47 |
| 3.6 | 39.1 / 38.5 | 0.000483 | 0.0130 | 0.112 | 0.724 | 3.77 | 3.81 | 0.0118 | 0.125 | 0.969 | 8.08 | 0.122 | 1.27 | 18.2 | 1.86 | 3.18 |
| 3.8 | 38.2 / 37.6 | 0.000509 | 0.0137 | 0.117 | 0.753 | 3.61 | 3.49 | 0.0125 | 0.132 | 1.02 | 7.99 | 0.128 | 1.33 | 17.6 | 1.95 | 2.93 |
| 4.0 | 36.7 / 36.2 | 0.000536 | 0.0144 | 0.123 | 0.780 | 3.38 | 3.22 | 0.0131 | 0.138 | 1.06 | 7.84 | 0.135 | 1.39 | 16.6 | 2.04 | 2.71 |
| 5 | 31.0 / 30.7 | 0.000669 | 0.0178 | 0.150 | 0.879 | 2.50 | 2.23 | 0.0164 | 0.170 | 1.26 | 6.54 | 0.167 | 1.67 | 12.9 | 2.44 | 1.89 |
| 6 | 26.6 / 26.4 | 0.000802 | 0.0212 | 0.174 | 0.910 | 1.95 | 1.65 | 0.0195 | 0.201 | 1.41 | 5.37 | 0.198 | 1.89 | 10.1 | 2.76 | 1.41 |
| 7 | 23.2 / 23.1 | 0.000935 | 0.0245 | 0.196 | 0.881 | 1.56 | 1.24 | 0.0227 | 0.230 | 1.50 | 4.33 | 0.228 | 2.04 | 7.94 | 2.98 | 1.09 |
| 8 | 20.7 / 20.6 | 0.00107 | 0.0277 | 0.213 | 0.820 | 1.28 | 0.978 | 0.0258 | 0.256 | 1.53 | 3.58 | 0.256 | 2.13 | 6.52 | 3.09 | 0.870 |
| 9 | 18.6 / 18.5 | 0.00120 | 0.0308 | 0.227 | 0.719 | 1.06 | 0.780 | 0.0288 | 0.281 | 1.50 | 3.01 | 0.282 | 2.14 | 5.40 | 3.10 | 0.715 |
| 10 | 16.8 / 16.8 | 0.00133 | 0.0337 | 0.236 | 0.614 | 0.907 | 0.641 | 0.0318 | 0.302 | 1.44 | 2.56 | 0.307 | 2.10 | 4.60 | 3.02 | 0.597 |
| 12 | 13.7 / 13.7 | 0.00159 | 0.0390 | 0.241 | 0.468 | 0.677 | 0.465 | 0.0375 | 0.336 | 1.19 | 1.92 | 0.349 | 1.85 | 3.50 | 2.64 | 0.433 |
| 14 | 11.1 / 11.1 | 0.00184 | 0.0437 | 0.230 | 0.375 | 0.527 | 0.347 | 0.0429 | 0.357 | 0.947 | 1.51 | 0.382 | 1.51 | 2.64 | 2.14 | 0.337 |
| 16 | 9.15 / 9.15 | 0.00209 | 0.0475 | 0.205 | 0.310 | 0.423 | 0.267 | 0.0480 | 0.364 | 0.776 | 1.21 | 0.405 | 1.23 | 2.13 | 1.73 | 0.264 |
| 18 | 7.82 / 7.82 | 0.00234 | 0.0505 | 0.177 | 0.259 | 0.349 | 0.214 | 0.0526 | 0.358 | 0.659 | 1.00 | 0.416 | 1.03 | 1.78 | 1.47 | 0.212 |
| 20 | 6.74 / 6.74 | 0.00258 | 0.0526 | 0.152 | 0.220 | 0.294 | 0.179 | 0.0567 | 0.340 | 0.564 | 0.842 | 0.417 | 0.895 | 1.46 | 1.26 | 0.183 |

Hg ( Z=80 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 3d(10) 4d(10) 5d(10) 4f(14)

| Q/Rs | ----> | 47.41 | 14.09 | 6.183 | 2.939 | 1.242 | 0.3500 | 15.25 | 6.294 | 2.845 | 1.116 | 6.521 | 2.650 | 0.7876 | 2.345 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 3d(10) | 4d(10) | 4d(10) | 4f(14) |
| 0.2 | 9.97 | 0.248(-4) | 0.000697 | 0.00621 | 0.0423 | 0.361 | 7.27 | 0.000625 | 0.00677 | 0.0540 | 0.572 | 0.00653 | 0.0697 | 1.48 | 0.100 |
| 0.4 | 20.8 | 0.512(-4) | 0.00140 | 0.0124 | 0.0844 | 0.725 | 15.4 | 0.00126 | 0.0136 | 0.108 | 1.15 | 0.0131 | 0.139 | 2.97 | 0.200 |
| 0.6 | 32.3 | 0.773(-4) | 0.00211 | 0.0186 | 0.127 | 1.09 | 24.2 | 0.00190 | 0.0204 | 0.162 | 1.72 | 0.0197 | 0.209 | 4.46 | 0.300 |
| 0.8 | 42.3 | 0.000103 | 0.00281 | 0.0248 | 0.169 | 1.45 | 31.5 | 0.00254 | 0.0272 | 0.216 | 2.29 | 0.0262 | 0.279 | 5.94 | 0.401 |
| 1.0 | 47.0 | 0.000129 | 0.00351 | 0.0310 | 0.211 | 1.81 | 33.5 | 0.00317 | 0.0340 | 0.270 | 2.86 | 0.0328 | 0.348 | 7.41 | 0.500 |
| 1.2 | 46.5 | 0.000156 | 0.00421 | 0.0373 | 0.253 | 2.16 | 30.3 | 0.00381 | 0.0407 | 0.323 | 3.42 | 0.0393 | 0.417 | 8.85 | 0.600 |
| 1.4 | 44.6 | 0.000182 | 0.00491 | 0.0434 | 0.294 | 2.50 | 25.9 | 0.00444 | 0.0475 | 0.376 | 3.97 | 0.0458 | 0.486 | 10.3 | 0.698 |
| 1.6 | 43.2 | 0.000208 | 0.00561 | 0.0496 | 0.334 | 2.83 | 22.0 | 0.00508 | 0.0542 | 0.429 | 4.50 | 0.0524 | 0.554 | 11.6 | 0.796 |
| 1.8 | 42.5 | 0.000234 | 0.00630 | 0.0557 | 0.375 | 3.13 | 18.9 | 0.00571 | 0.0610 | 0.481 | 5.02 | 0.0589 | 0.622 | 12.9 | 0.894 |
| 2.0 | 42.1 | 0.000260 | 0.00700 | 0.0617 | 0.414 | 3.39 | 16.4 | 0.00634 | 0.0677 | 0.533 | 5.50 | 0.0654 | 0.689 | 14.0 | 0.990 |
| 2.2 | 42.0 | 0.000285 | 0.00770 | 0.0678 | 0.453 | 3.61 | 14.3 | 0.00697 | 0.0744 | 0.584 | 5.95 | 0.0719 | 0.756 | 15.0 | 1.09 |
| 2.4 | 42.0 | 0.000311 | 0.00840 | 0.0738 | 0.491 | 3.77 | 12.6 | 0.00760 | 0.0811 | 0.635 | 6.36 | 0.0784 | 0.821 | 15.9 | 1.18 |
| 2.6 | 41.9 | 0.000337 | 0.00910 | 0.0797 | 0.528 | 3.88 | 11.2 | 0.00823 | 0.0877 | 0.685 | 6.72 | 0.0849 | 0.886 | 16.5 | 1.27 |
| 2.8 | 41.7 | 0.000363 | 0.00979 | 0.0856 | 0.564 | 3.92 | 10.0 | 0.00886 | 0.0943 | 0.734 | 7.02 | 0.0913 | 0.950 | 16.9 | 1.37 |
| 3.0 | 41.4 | 0.000389 | 0.0105 | 0.0915 | 0.598 | 3.91 | 9.02 | 0.00949 | 0.101 | 0.782 | 7.25 | 0.0977 | 1.01 | 17.1 | 1.46 |
| 3.2 | 40.9 | 0.000415 | 0.0112 | 0.0973 | 0.632 | 3.85 | 8.18 | 0.0101 | 0.107 | 0.829 | 7.41 | 0.104 | 1.08 | 17.0 | 1.55 |
| 3.4 | 40.2 | 0.000441 | 0.0119 | 0.103 | 0.663 | 3.74 | 7.44 | 0.0108 | 0.114 | 0.875 | 7.51 | 0.110 | 1.14 | 16.8 | 1.63 |
| 3.6 | 39.3 | 0.000467 | 0.0126 | 0.109 | 0.694 | 3.61 | 6.81 | 0.0114 | 0.120 | 0.920 | 7.53 | 0.117 | 1.20 | 16.6 | 1.72 |
| 3.8 | 38.3 | 0.000493 | 0.0132 | 0.114 | 0.722 | 3.50 | 6.26 | 0.0120 | 0.127 | 0.964 | 7.50 | 0.123 | 1.26 | 15.9 | 1.80 |
| 4.0 | 37.3 | 0.000519 | 0.0139 | 0.120 | 0.748 | 3.31 | 5.78 | 0.0126 | 0.133 | 1.01 | 7.40 | 0.129 | 1.31 | 15.5 | 1.88 |
| 5 | 32.1 | 0.000648 | 0.0173 | 0.146 | 0.846 | 2.63 | 4.04 | 0.0158 | 0.164 | 1.20 | 6.32 | 0.160 | 1.57 | 12.7 | 2.26 |
| 6 | 27.3 | 0.000776 | 0.0206 | 0.170 | 0.882 | 2.05 | 3.00 | 0.0188 | 0.194 | 1.34 | 5.26 | 0.190 | 1.79 | 9.82 | 2.56 |
| 7 | 23.7 | 0.000905 | 0.0238 | 0.191 | 0.859 | 1.62 | 2.32 | 0.0219 | 0.222 | 1.44 | 4.24 | 0.218 | 1.94 | 7.86 | 2.78 |
| 8 | 21.1 | 0.00103 | 0.0268 | 0.208 | 0.802 | 1.33 | 1.86 | 0.0248 | 0.248 | 1.47 | 3.49 | 0.245 | 2.03 | 6.43 | 2.90 |
| 9 | 18.9 | 0.00116 | 0.0298 | 0.221 | 0.711 | 1.12 | 1.52 | 0.0278 | 0.271 | 1.45 | 2.94 | 0.271 | 2.06 | 5.38 | 2.93 |
| 10 | 17.0 | 0.00129 | 0.0326 | 0.231 | 0.609 | 0.927 | 1.25 | 0.0306 | 0.292 | 1.40 | 2.50 | 0.295 | 2.02 | 4.55 | 2.88 |
| 12 | 13.9 | 0.00154 | 0.0379 | 0.236 | 0.465 | 0.704 | 0.890 | 0.0362 | 0.325 | 1.18 | 1.89 | 0.336 | 1.82 | 3.40 | 2.56 |
| 14 | 11.3 | 0.00178 | 0.0424 | 0.227 | 0.373 | 0.540 | 0.672 | 0.0414 | 0.346 | 0.939 | 1.48 | 0.349 | 1.49 | 2.65 | 2.10 |
| 16 | 9.34 | 0.00203 | 0.0462 | 0.203 | 0.306 | 0.437 | 0.527 | 0.0463 | 0.534 | 0.762 | 1.19 | 0.391 | 1.82 | 2.14 | 1.71 |
| 18 | 7.92 | 0.00227 | 0.0492 | 0.176 | 0.257 | 0.363 | 0.418 | 0.0508 | 0.350 | 0.648 | 0.985 | 0.403 | 1.02 | 1.76 | 1.44 |
| 20 | 6.84 | 0.00250 | 0.0513 | 0.151 | 0.219 | 0.303 | 0.344 | 0.0549 | 0.334 | 0.555 | 0.826 | 0.405 | 0.880 | 1.48 | 1.24 |

Tl ( Z=81 ) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(1) 3d(10) 4d(10) 5d(10) 4f(14)

| Q/Rs | ----> | 48.08 | 14.30 | 6.301 | 2.995 | 1.288 | 0.3958 | 15.43 | 6.400 | 2.902 | 1.155 | 0.2977 | 6.623 | 2.712 | 0.8538 | 2.419 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 6p(1) | 3d(10) | 4d(10) | 5d(10) | 4f(14) |
| 0.2 | 16.9 | 2.38(-5) | 0.000670 | 0.00591 | 0.0403 | 0.330 | 5.47 | 0.000601 | 0.00648 | 0.0513 | 0.525 | 9.05 | 0.00626 | 0.0656 | 1.21 | 0.0924 |
| 0.4 | 36.5 | 4.92(-5) | 0.00135 | 0.0118 | 0.0804 | 0.663 | 11.4 | 0.00122 | 0.0130 | 0.103 | 1.06 | 20.4 | 0.0126 | 0.131 | 2.44 | 0.185 |
| 0.6 | 55.8 | 7.44(-5) | 0.00203 | 0.0177 | 0.121 | 0.995 | 17.8 | 0.00184 | 0.0195 | 0.154 | 1.58 | 31.0 | 0.0189 | 0.197 | 3.65 | 0.277 |
| 0.8 | 64.1 | 9.95(-5) | 0.00270 | 0.0236 | 0.161 | 1.33 | 23.8 | 0.00246 | 0.0260 | 0.205 | 2.11 | 30.9 | 0.0252 | 0.263 | 4.87 | 0.370 |
| 1.0 | 64.1 | 0.000125 | 0.00338 | 0.0296 | 0.201 | 1.65 | 27.1 | 0.00307 | 0.0325 | 0.256 | 2.63 | 25.3 | 0.0315 | 0.328 | 6.07 | 0.462 |
| 1.2 | 60.8 | 0.000153 | 0.00405 | 0.0355 | 0.241 | 1.98 | 26.7 | 0.00369 | 0.0389 | 0.307 | 3.14 | 20.1 | 0.0377 | 0.393 | 7.25 | 0.554 |
| 1.4 | 56.5 | 0.000175 | 0.00472 | 0.0413 | 0.280 | 2.29 | 23.9 | 0.00430 | 0.0454 | 0.358 | 3.65 | 16.4 | 0.0439 | 0.458 | 8.41 | 0.645 |
| 1.6 | 52.0 | 0.000200 | 0.00539 | 0.0472 | 0.319 | 2.59 | 20.0 | 0.00492 | 0.0519 | 0.408 | 4.14 | 13.6 | 0.0502 | 0.522 | 9.53 | 0.735 |
| 1.8 | 49.2 | 0.000225 | 0.00606 | 0.0530 | 0.357 | 2.87 | 17.3 | 0.00553 | 0.0584 | 0.458 | 4.61 | 11.4 | 0.0565 | 0.586 | 10.6 | 0.825 |
| 2.0 | 47.3 | 0.000250 | 0.00673 | 0.0588 | 0.395 | 3.11 | 15.1 | 0.00614 | 0.0648 | 0.507 | 5.06 | 9.77 | 0.0628 | 0.650 | 11.6 | 0.914 |
| 2.2 | 45.9 | 0.000275 | 0.00741 | 0.0645 | 0.432 | 3.33 | 13.2 | 0.00675 | 0.0712 | 0.556 | 5.48 | 8.46 | 0.0690 | 0.712 | 12.5 | 1.00 |
| 2.4 | 44.9 | 0.000300 | 0.00808 | 0.0702 | 0.468 | 3.49 | 11.7 | 0.00736 | 0.0776 | 0.604 | 5.87 | 7.40 | 0.0752 | 0.774 | 13.3 | 1.09 |
| 2.6 | 44.2 | 0.000325 | 0.00875 | 0.0759 | 0.504 | 3.61 | 10.5 | 0.00797 | 0.0839 | 0.651 | 6.21 | 6.53 | 0.0814 | 0.836 | 13.9 | 1.18 |
| 2.8 | 43.4 | 0.000350 | 0.00941 | 0.0815 | 0.538 | 3.67 | 9.39 | 0.00858 | 0.0903 | 0.698 | 6.51 | 5.82 | 0.0876 | 0.896 | 14.4 | 1.26 |
| 3.0 | 42.7 | 0.000374 | 0.0101 | 0.0871 | 0.571 | 3.68 | 8.48 | 0.00919 | 0.0965 | 0.744 | 6.74 | 5.21 | 0.0938 | 0.956 | 14.7 | 1.35 |
| 3.2 | 42.0 | 0.000399 | 0.0107 | 0.0926 | 0.603 | 3.65 | 7.70 | 0.00980 | 0.103 | 0.789 | 6.92 | 4.70 | 0.0999 | 1.02 | 14.8 | 1.43 |
| 3.4 | 41.1 | 0.000424 | 0.0114 | 0.0981 | 0.634 | 3.57 | 7.04 | 0.0104 | 0.109 | 0.833 | 7.04 | 4.26 | 0.106 | 1.07 | 14.8 | 1.51 |
| 3.6 | 40.2 | 0.000450 | 0.0121 | 0.104 | 0.663 | 3.46 | 6.44 | 0.0110 | 0.115 | 0.876 | 7.09 | 3.89 | 0.112 | 1.13 | 14.7 | 1.59 |
| 3.8 | 39.2 | 0.000474 | 0.0127 | 0.109 | 0.690 | 3.36 | 5.93 | 0.0116 | 0.121 | 0.918 | 7.09 | 3.56 | 0.118 | 1.18 | 14.4 | 1.67 |
| 4.0 | 38.1 | 0.000499 | 0.0134 | 0.114 | 0.716 | 3.22 | 5.48 | 0.0122 | 0.127 | 0.959 | 7.03 | 3.28 | 0.124 | 1.24 | 14.0 | 1.74 |
| 5 | 32.7 | 0.000623 | 0.0166 | 0.139 | 0.813 | 2.61 | 3.85 | 0.0153 | 0.157 | 1.14 | 6.16 | 2.26 | 0.154 | 1.49 | 11.8 | 2.09 |
| 6 | 27.9 | 0.000747 | 0.0198 | 0.162 | 0.852 | 2.03 | 2.87 | 0.0182 | 0.186 | 1.29 | 5.18 | 1.67 | 0.182 | 1.69 | 9.33 | 2.38 |
| 7 | 24.0 | 0.000870 | 0.0229 | 0.182 | 0.836 | 1.62 | 2.23 | 0.0211 | 0.213 | 1.38 | 4.14 | 1.26 | 0.210 | 1.85 | 7.50 | 2.60 |
| 8 | 21.3 | 0.000994 | 0.0258 | 0.199 | 0.784 | 1.32 | 1.78 | 0.0241 | 0.237 | 1.42 | 3.43 | 0.982 | 0.236 | 1.94 | 6.14 | 2.73 |
| 9 | 19.0 | 0.00112 | 0.0287 | 0.212 | 0.702 | 1.10 | 1.47 | 0.0269 | 0.262 | 1.41 | 2.89 | 0.787 | 0.261 | 1.97 | 5.16 | 2.78 |
| 10 | 17.2 | 0.00124 | 0.0314 | 0.222 | 0.604 | 0.931 | 1.22 | 0.0297 | 0.281 | 1.36 | 2.46 | 0.652 | 0.283 | 1.95 | 4.37 | 2.74 |
| 12 | 14.0 | 0.00148 | 0.0365 | 0.229 | 0.458 | 0.697 | 0.877 | 0.0351 | 0.313 | 1.16 | 1.86 | 0.459 | 0.324 | 1.78 | 3.29 | 2.49 |
| 14 | 11.4 | 0.00172 | 0.0409 | 0.221 | 0.368 | 0.543 | 0.658 | 0.0402 | 0.335 | 0.931 | 1.46 | 0.342 | 0.356 | 1.47 | 2.57 | 2.07 |
| 16 | 9.44 | 0.00195 | 0.0446 | 0.200 | 0.304 | 0.435 | 0.514 | 0.0449 | 0.344 | 0.757 | 1.18 | 0.273 | 0.378 | 1.21 | 2.07 | 1.69 |
| 18 | 7.98 | 0.00218 | 0.0476 | 0.174 | 0.254 | 0.358 | 0.415 | 0.0493 | 0.341 | 0.644 | 0.972 | 0.216 | 0.391 | 1.01 | 1.70 | 1.41 |
| 20 | 6.90 | 0.00241 | 0.0497 | 0.150 | 0.216 | 0.299 | 0.340 | 0.0533 | 0.327 | 0.552 | 0.820 | 0.182 | 0.394 | 0.864 | 1.43 | 1.22 |

Pb ( Z=82 ) 1s(2)2s(2)3s(2)4s(2)5s(2)2p(6)3p(6)4p(6)5p(6)3d(10)4d(10)5d(10)4f(14) [6s(2)6p(2)/free(4)]

| Q/Rs | ----> | 48.66 | 14.47 | 6.392 | 3.048 | 1.332 | 0.4353 | 15.63 | 6.496 | 2.957 | 1.202 | 0.3435 | 6.725 | 2.773 | 0.917 | 2.493 | 2.304 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 6p(2) | 3d(10) | 4d(10) | 5d(10) | 4f(14) | free(4) |
| 0.2 | 14.0 / 6.54 | 2.30(-5) | 0.000649 | 0.00569 | 0.0385 | 0.304 | 4.38 | 0.000585 | 0.00623 | 0.0489 | 0.476 | 7.59 | 0.00601 | 0.0620 | 1.02 | 0.0855 | 4.51 |
| 0.4 | 29.3 / 13.4 | 4.76(-5) | 0.00131 | 0.0114 | 0.769 | 0.611 | 9.05 | 0.00118 | 0.0125 | 0.0978 | 0.956 | 16.1 | 0.0121 | 0.124 | 2.06 | 0.171 | 9.26 |
| 0.6 | 45.6 / 20.4 | 7.20(-5) | 0.00196 | 0.0171 | 0.116 | 0.916 | 14.1 | 0.00178 | 0.0188 | 0.147 | 1.43 | 25.3 | 0.0181 | 0.186 | 3.09 | 0.256 | 14.2 |
| 0.8 | 60.0 / 27.8 | 9.62(-5) | 0.00262 | 0.0227 | 0.154 | 1.22 | 18.9 | 0.00237 | 0.0250 | 0.196 | 1.91 | 32.8 | 0.0242 | 0.248 | 4.11 | 0.342 | 19.5 |
| 1.0 | 67.2 / 35.3 | 0.000121 | 0.00327 | 0.0285 | 0.192 | 1.52 | 22.4 | 0.00297 | 0.0312 | 0.244 | 2.38 | 34.5 | 0.0302 | 0.310 | 5.12 | 0.427 | 25.0 |
| 1.2 | 66.6 / 47.1 | 0.000145 | 0.00392 | 0.0342 | 0.230 | 1.82 | 23.2 | 0.00356 | 0.0374 | 0.293 | 2.85 | 31.1 | 0.0362 | 0.371 | 6.12 | 0.512 | 34.8 |
| 1.4 | 62.5 / 49.1 | 0.000169 | 0.00457 | 0.0398 | 0.268 | 2.11 | 21.8 | 0.00416 | 0.0437 | 0.341 | 3.30 | 26.4 | 0.0422 | 0.432 | 7.10 | 0.596 | 34.8 |
| 1.6 | 57.7 / 48.0 | 0.000193 | 0.00522 | 0.0454 | 0.305 | 2.39 | 19.1 | 0.00475 | 0.0499 | 0.389 | 3.75 | 22.4 | 0.0482 | 0.493 | 8.06 | 0.680 | 31.8 |
| 1.8 | 53.7 / 46.5 | 0.000217 | 0.00587 | 0.0511 | 0.342 | 2.64 | 16.5 | 0.00534 | 0.0561 | 0.436 | 4.18 | 19.1 | 0.0543 | 0.554 | 8.97 | 0.764 | 28.4 |
| 2.0 | 50.8 / 45.2 | 0.000242 | 0.00652 | 0.0566 | 0.378 | 2.88 | 14.4 | 0.00593 | 0.0623 | 0.483 | 4.59 | 16.5 | 0.0603 | 0.613 | 9.83 | 0.846 | 25.3 |
| 2.2 | 48.7 / 44.1 | 0.000266 | 0.00717 | 0.0622 | 0.413 | 3.08 | 12.7 | 0.00652 | 0.0684 | 0.530 | 4.98 | 14.5 | 0.0663 | 0.673 | 10.6 | 0.928 | 22.6 |
| 2.4 | 47.0 / 43.2 | 0.000290 | 0.00782 | 0.0677 | 0.448 | 3.25 | 11.3 | 0.00711 | 0.0746 | 0.575 | 5.34 | 12.7 | 0.0722 | 0.731 | 11.3 | 1.01 | 20.2 |
| 2.6 | 45.6 / 42.4 | 0.000314 | 0.00847 | 0.0731 | 0.482 | 3.37 | 10.1 | 0.00770 | 0.0807 | 0.621 | 5.67 | 11.3 | 0.0782 | 0.789 | 12.0 | 1.09 | 18.2 |
| 2.8 | 44.5 / 41.7 | 0.000338 | 0.00912 | 0.0786 | 0.515 | 3.45 | 9.07 | 0.00828 | 0.0868 | 0.665 | 5.95 | 10.1 | 0.0841 | 0.847 | 12.5 | 1.17 | 16.4 |
| 3.0 | 43.5 / 41.1 | 0.000362 | 0.00976 | 0.0839 | 0.547 | 3.48 | 8.17 | 0.00888 | 0.0928 | 0.709 | 6.19 | 9.13 | 0.0900 | 0.903 | 12.8 | 1.25 | 14.9 |
| 3.2 | 42.5 / 40.4 | 0.000386 | 0.0104 | 0.0893 | 0.578 | 3.47 | 7.43 | 0.00947 | 0.0989 | 0.752 | 6.38 | 8.25 | 0.0959 | 0.959 | 13.1 | 1.32 | 13.6 |
| 3.4 | 41.6 / 39.6 | 0.000411 | 0.0111 | 0.0945 | 0.608 | 3.41 | 6.85 | 0.0101 | 0.105 | 0.795 | 6.52 | 7.53 | 0.102 | 1.01 | 13.2 | 1.40 | 12.4 |
| 3.6 | 40.6 / 38.8 | 0.000435 | 0.0117 | 0.0997 | 0.636 | 3.32 | 6.27 | 0.0107 | 0.111 | 0.836 | 6.60 | 6.89 | 0.108 | 1.07 | 13.2 | 1.47 | 11.4 |
| 3.8 | 39.6 / 38.1 | 0.000459 | 0.0123 | 0.105 | 0.662 | 3.23 | 5.77 | 0.0112 | 0.117 | 0.876 | 6.63 | 6.31 | 0.113 | 1.12 | 13.1 | 1.55 | 10.6 |
| 4.0 | 38.5 / 37.2 | 0.000483 | 0.0130 | 0.110 | 0.687 | 3.13 | 5.31 | 0.0118 | 0.123 | 0.915 | 6.61 | 5.82 | 0.119 | 1.17 | 12.8 | 1.62 | 9.78 |
| 5 | 32.8 / 31.9 | 0.000603 | 0.0161 | 0.134 | 0.783 | 2.56 | 3.74 | 0.0147 | 0.151 | 1.09 | 5.95 | 4.07 | 0.148 | 1.41 | 10.8 | 1.95 | 6.92 |
| 6 | 28.2 / 27.6 | 0.000722 | 0.0192 | 0.157 | 0.826 | 1.99 | 2.80 | 0.0176 | 0.179 | 1.23 | 5.09 | 3.02 | 0.175 | 1.61 | 8.90 | 2.22 | 5.19 |
| 7 | 24.3 / 23.8 | 0.000842 | 0.0222 | 0.176 | 0.815 | 1.58 | 2.17 | 0.0205 | 0.245 | 1.33 | 4.05 | 2.34 | 0.202 | 1.76 | 7.19 | 2.43 | 4.04 |
| 8 | 21.5 / 21.1 | 0.000961 | 0.0250 | 0.193 | 0.767 | 1.30 | 1.75 | 0.0233 | 0.229 | 1.37 | 3.36 | 1.87 | 0.227 | 1.86 | 5.94 | 2.57 | 3.24 |
| 9 | 19.2 / 18.9 | 0.00108 | 0.0278 | 0.206 | 0.694 | 1.08 | 1.43 | 0.0260 | 0.251 | 1.37 | 2.82 | 1.52 | 0.251 | 1.90 | 4.96 | 2.63 | 2.67 |
| 10 | 17.3 / 17.1 | 0.00120 | 0.0305 | 0.215 | 0.599 | 0.917 | 1.21 | 0.0287 | 0.271 | 1.33 | 2.42 | 1.25 | 0.273 | 1.89 | 4.23 | 2.62 | 2.24 |
| 12 | 14.1 / 14.0 | 0.00143 | 0.0354 | 0.223 | 0.451 | 0.686 | 0.874 | 0.0339 | 0.303 | 1.15 | 1.83 | 0.898 | 0.312 | 1.74 | 3.18 | 2.41 | 1.64 |
| 14 | 11.5 / 11.4 | 0.00166 | 0.0398 | 0.216 | 0.366 | 0.535 | 0.655 | 0.0389 | 0.324 | 0.923 | 1.43 | 0.677 | 0.343 | 1.46 | 2.50 | 2.03 | 1.25 |
| 16 | 9.53 / 9.49 | 0.00189 | 0.0434 | 0.197 | 0.301 | 0.429 | 0.515 | 0.0435 | 0.334 | 0.748 | 1.16 | 0.522 | 0.366 | 1.20 | 2.01 | 1.67 | 1.00 |
| 18 | 8.05 / 8.01 | 0.00211 | 0.0463 | 0.172 | 0.253 | 0.353 | 0.409 | 0.0477 | 0.332 | 0.634 | 0.958 | 0.426 | 0.379 | 0.991 | 1.66 | 1.39 | 0.794 |
| 20 | 6.96 / 6.94 | 0.00233 | 0.0484 | 0.149 | 0.215 | 0.296 | 0.342 | 0.0516 | 0.320 | 0.549 | 0.805 | 0.351 | 0.384 | 0.858 | 1.39 | 1.20 | 0.668 |

Bi ( Z=83 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(3) 3d(10) 4d(10) 5d(10) 4f(14)

| θ/Rs | ----> | 49.25 | 14.66 | 6.489 | 3.104 | 1.377 | 0.4716 | 15.85 | 6.593 | 3.014 | 1.253 | 0.3842 | 6.829 | 2.837 | 0.9724 | 2.567 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 6p(3) | 3d(10) | 4d(10) | 5d(10) | 4f(14) |
| 0.2 | 11.9 | 2.22(-5) | 0.000627 | 0.00547 | 0.0368 | 0.280 | 3.64 | 0.000563 | 0.00599 | 0.0466 | 0.430 | 6.42 | 0.00577 | 0.0584 | 0.880 | 0.0792 |
| 0.4 | 24.4 | 4.61(-5) | 0.00126 | 0.0110 | 0.0734 | 0.563 | 7.47 | 0.00114 | 0.0120 | 0.0931 | 0.862 | 13.3 | 0.0116 | 0.117 | 1.77 | 0.159 |
| 0.6 | 37.6 | 6.96(-5) | 0.00190 | 0.0164 | 0.110 | 0.844 | 11.5 | 0.00171 | 0.0180 | 0.140 | 1.29 | 20.6 | 0.0174 | 0.175 | 2.65 | 0.237 |
| 0.8 | 50.6 | 9.31(-5) | 0.00253 | 0.0219 | 0.147 | 1.12 | 15.6 | 0.00229 | 0.0240 | 0.186 | 1.72 | 27.7 | 0.0232 | 0.234 | 3.53 | 0.317 |
| 1.0 | 60.9 | 0.000117 | 0.00316 | 0.0274 | 0.183 | 1.40 | 18.8 | 0.00286 | 0.0300 | 0.233 | 2.15 | 32.9 | 0.0290 | 0.292 | 4.40 | 0.396 |
| 1.2 | 65.6 | 0.000140 | 0.00379 | 0.0329 | 0.220 | 1.68 | 20.3 | 0.00343 | 0.0360 | 0.279 | 2.57 | 34.3 | 0.0348 | 0.350 | 5.26 | 0.475 |
| 1.4 | 64.8 | 0.000163 | 0.00442 | 0.0383 | 0.256 | 1.94 | 19.7 | 0.00400 | 0.0420 | 0.325 | 2.98 | 32.3 | 0.0406 | 0.408 | 6.10 | 0.553 |
| 1.6 | 60.7 | 0.000187 | 0.00504 | 0.0437 | 0.291 | 2.20 | 18.0 | 0.00457 | 0.0480 | 0.370 | 3.38 | 28.4 | 0.0463 | 0.465 | 6.93 | 0.631 |
| 1.8 | 57.5 | 0.000210 | 0.00567 | 0.0491 | 0.326 | 2.44 | 16.4 | 0.00514 | 0.0540 | 0.415 | 3.78 | 25.0 | 0.0521 | 0.522 | 7.72 | 0.708 |
| 2.0 | 53.6 | 0.000234 | 0.00630 | 0.0545 | 0.361 | 2.66 | 14.3 | 0.00571 | 0.0599 | 0.460 | 4.15 | 21.6 | 0.0579 | 0.578 | 8.47 | 0.785 |
| 2.2 | 51.0 | 0.000257 | 0.00693 | 0.0598 | 0.395 | 2.86 | 12.7 | 0.00628 | 0.0658 | 0.504 | 4.51 | 19.1 | 0.0636 | 0.634 | 9.18 | 0.861 |
| 2.4 | 48.9 | 0.000280 | 0.00756 | 0.0651 | 0.428 | 3.02 | 11.3 | 0.00685 | 0.0717 | 0.548 | 4.84 | 17.1 | 0.0694 | 0.690 | 9.82 | 0.936 |
| 2.6 | 47.0 | 0.000304 | 0.00818 | 0.0703 | 0.461 | 3.15 | 10.1 | 0.00741 | 0.0776 | 0.591 | 5.15 | 15.2 | 0.0751 | 0.745 | 10.4 | 1.01 |
| 2.8 | 45.6 | 0.000327 | 0.00881 | 0.0756 | 0.492 | 3.23 | 9.06 | 0.00798 | 0.0835 | 0.634 | 5.42 | 13.7 | 0.0808 | 0.799 | 10.9 | 1.08 |
| 3.0 | 44.3 | 0.000351 | 0.00943 | 0.0807 | 0.523 | 3.28 | 8.19 | 0.00855 | 0.0893 | 0.676 | 5.65 | 12.4 | 0.0864 | 0.852 | 11.3 | 1.18 |
| 3.2 | 43.1 | 0.000374 | 0.0101 | 0.0859 | 0.553 | 3.28 | 7.45 | 0.00911 | 0.0951 | 0.717 | 5.85 | 11.3 | 0.0921 | 0.905 | 11.6 | 1.23 |
| 3.4 | 42.0 | 0.000397 | 0.0107 | 0.0909 | 0.581 | 3.25 | 6.81 | 0.00969 | 0.101 | 0.757 | 5.99 | 10.3 | 0.0977 | 0.957 | 11.8 | 1.30 |
| 3.6 | 40.9 | 0.000420 | 0.0113 | 0.0959 | 0.608 | 3.19 | 8.24 | 0.0103 | 0.107 | 0.797 | 6.10 | 9.43 | 0.103 | 1.01 | 11.9 | 1.37 |
| 3.8 | 39.9 | 0.000444 | 0.0119 | 0.101 | 0.634 | 3.10 | 5.76 | 0.0180 | 0.112 | 0.853 | 6.15 | 8.70 | 0.109 | 1.06 | 11.9 | 1.44 |
| 4.0 | 38.7 | 0.000467 | 0.0125 | 0.106 | 0.658 | 3.02 | 5.31 | 0.0114 | 0.118 | 0.073 | 6.17 | 7.95 | 0.115 | 1.11 | 11.8 | 1.50 |
| 5 | 33.3 | 0.000583 | 0.0156 | 0.129 | 0.753 | 2.52 | 3.75 | 0.0142 | 0.146 | 1.04 | 5.71 | 5.63 | 0.142 | 1.33 | 10.3 | 1.81 |
| 6 | 28.7 | 0.000699 | 0.0185 | 0.151 | 0.798 | 1.93 | 2.80 | 0.0170 | 0.172 | 1.18 | 4.97 | 4.23 | 0.168 | 1.53 | 8.65 | 2.07 |
| 7 | 24.4 | 0.000815 | 0.0214 | 0.170 | 0.793 | 1.55 | 2.17 | 0.0197 | 0.197 | 1.27 | 3.93 | 3.26 | 0.194 | 1.67 | 6.90 | 2.28 |
| 8 | 21.5 | 0.000930 | 0.0242 | 0.186 | 0.750 | 1.27 | 1.75 | 0.0224 | 0.220 | 1.32 | 3.27 | 2.60 | 0.218 | 1.77 | 5.71 | 2.42 |
| 9 | 19.3 | 0.00105 | 0.0269 | 0.199 | 0.685 | 1.06 | 1.44 | 0.0251 | 0.242 | 1.33 | 2.76 | 2.18 | 0.241 | 1.82 | 4.81 | 2.49 |
| 10 | 17.4 | 0.00116 | 0.0295 | 0.209 | 0.594 | 0.903 | 1.20 | 0.0277 | 0.261 | 1.29 | 2.36 | 1.79 | 0.263 | 1.82 | 4.11 | 2.49 |
| 12 | 14.2 | 0.00139 | 0.0343 | 0.217 | 0.448 | 0.676 | 0.882 | 0.0327 | 0.293 | 1.13 | 1.79 | 1.31 | 0.301 | 1.69 | 3.09 | 2.33 |
| 14 | 11.7 | 0.00161 | 0.0385 | 0.212 | 0.361 | 0.527 | 0.665 | 0.0375 | 0.314 | 0.915 | 1.41 | 0.978 | 0.331 | 1.43 | 2.44 | 1.99 |
| 16 | 9.64 | 0.00183 | 0.0421 | 0.194 | 0.299 | 0.423 | 0.515 | 0.0419 | 0.325 | 0.743 | 1.84 | 0.768 | 0.354 | 1.18 | 1.96 | 1.65 |
| 18 | 8.16 | 0.00204 | 0.0450 | 0.171 | 0.250 | 0.350 | 0.420 | 0.0461 | 0.324 | 0.630 | 0.944 | 0.633 | 0.368 | 0.983 | 1.62 | 1.37 |
| 20 | 7.00 | 0.00226 | 0.0471 | 0.148 | 0.213 | 0.292 | 0.340 | 0.0499 | 0.314 | 0.540 | 0.793 | 0.508 | 0.373 | 0.842 | 1.37 | 1.17 |

Po ( Z=84 ) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(4) 3d(10) 4d(10) 5d(10) 4f(14)

| Q/Rs | ----> | 49.88 | 14.85 | 6.578 | 3.158 | 1.421 | 0.5055 | 16.08 | 6.690 | 3.118 | 1.295 | 0.4096 | 6.910 | 2.878 | 0.9764 | 2.640 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 6p(4) | 3d(10) | 4d(10) | 5d(10) | 4f(14) |
| 0.2 | 10.7 | 2.14(-5) | 0.000605 | 0.00528 | 0.0352 | 0.259 | 3.09 | 0.000541 | 0.00576 | 0.0427 | 0.396 | 5.89 | 0.00559 | 0.0563 | 0.871 | 0.0737 |
| 0.4 | 21.9 | 4.45(-5) | 0.00122 | 0.0106 | 0.0703 | 0.521 | 6.32 | 0.00109 | 0.0116 | 0.0853 | 0.794 | 12.0 | 0.0112 | 0.113 | 1.75 | 0.147 |
| 0.6 | 33.4 | 6.72(-5) | 0.00183 | 0.0159 | 0.106 | 0.781 | 9.72 | 0.00165 | 0.0174 | 0.128 | 1.19 | 18.5 | 0.0169 | 0.169 | 2.62 | 0.221 |
| 0.8 | 45.1 | 8.99(-5) | 0.00244 | 0.0211 | 0.141 | 1.04 | 13.1 | 0.00220 | 0.0231 | 0.171 | 1.59 | 25.0 | 0.0225 | 0.225 | 3.49 | 0.295 |
| 1.0 | 55.5 | 0.000113 | 0.00305 | 0.0264 | 0.176 | 1.30 | 16.1 | 0.00275 | 0.0289 | 0.213 | 1.98 | 30.7 | 0.0281 | 0.281 | 4.35 | 0.368 |
| 1.2 | 62.6 | 0.000135 | 0.00366 | 0.0317 | 0.210 | 1.55 | 17.8 | 0.00330 | 0.0346 | 0.255 | 2.36 | 34.3 | 0.0337 | 0.337 | 5.20 | 0.441 |
| 1.4 | 65.0 | 0.000158 | 0.00427 | 0.0370 | 0.245 | 1.80 | 18.0 | 0.00385 | 0.0404 | 0.297 | 2.74 | 34.9 | 0.0393 | 0.393 | 6.04 | 0.514 |
| 1.6 | 63.9 | 0.000180 | 0.00487 | 0.0422 | 0.279 | 2.04 | 17.0 | 0.00440 | 0.0461 | 0.339 | 3.12 | 33.2 | 0.0449 | 0.448 | 6.86 | 0.587 |
| 1.8 | 61.8 | 0.000203 | 0.00548 | 0.0474 | 0.312 | 2.26 | 15.7 | 0.00494 | 0.0519 | 0.381 | 3.48 | 30.7 | 0.0505 | 0.503 | 7.64 | 0.659 |
| 2.0 | 57.1 | 0.000226 | 0.00608 | 0.0526 | 0.346 | 2.47 | 13.5 | 0.00549 | 0.0576 | 0.422 | 3.83 | 26.7 | 0.0561 | 0.557 | 8.39 | 0.730 |
| 2.2 | 54.0 | 0.000248 | 0.00669 | 0.0577 | 0.378 | 2.66 | 12.0 | 0.00604 | 0.0633 | 0.462 | 4.16 | 28.6 | 0.0616 | 0.611 | 9.09 | 0.801 |
| 2.4 | 51.5 | 0.000271 | 0.00730 | 0.0628 | 0.410 | 2.82 | 10.7 | 0.00658 | 0.0690 | 0.503 | 4.48 | 21.1 | 0.0672 | 0.665 | 9.73 | 0.871 |
| 2.6 | 49.4 | 0.000293 | 0.00790 | 0.0679 | 0.441 | 2.95 | 9.60 | 0.00713 | 0.0747 | 0.542 | 4.76 | 19.0 | 0.0728 | 0.718 | 10.3 | 0.940 |
| 2.8 | 47.7 | 0.000316 | 0.00851 | 0.0729 | 0.472 | 3.04 | 8.65 | 0.00767 | 0.0803 | 0.582 | 5.02 | 17.1 | 0.0783 | 0.770 | 10.8 | 1.01 |
| 3.0 | 46.2 | 0.000338 | 0.00911 | 0.0779 | 0.501 | 3.09 | 7.85 | 0.00822 | 0.0859 | 0.620 | 5.25 | 15.5 | 0.0838 | 0.822 | 11.2 | 1.08 |
| 3.2 | 44.8 | 0.000361 | 0.00971 | 0.0829 | 0.530 | 3.11 | 7.15 | 0.00877 | 0.0915 | 0.658 | 6.45 | 14.1 | 0.0893 | 0.872 | 11.4 | 1.14 |
| 3.4 | 43.6 | 0.000384 | 0.0103 | 0.0878 | 0.557 | 3.10 | 6.54 | 0.00931 | 0.0970 | 0.695 | 5.60 | 13.0 | 0.0947 | 0.923 | 11.7 | 1.21 |
| 3.6 | 42.3 | 0.000406 | 0.0109 | 0.0926 | 0.684 | 3.05 | 6.00 | 0.00986 | 0.103 | 0.732 | 5.72 | 11.9 | 0.100 | 0.972 | 11.8 | 1.27 |
| 3.8 | 41.1 | 0.000429 | 0.0115 | 0.0974 | 0.609 | 2.98 | 5.55 | 0.0104 | 0.108 | 0.768 | 5.79 | 11.0 | 0.106 | 1.02 | 11.8 | 1.34 |
| 4.0 | 39.9 | 0.000451 | 0.0121 | 0.102 | 0.632 | 2.90 | 5.13 | 0.0110 | 0.114 | 0.802 | 5.82 | 10.1 | 0.111 | 1.07 | 11.7 | 1.40 |
| 5 | 34.1 | 0.000563 | 0.0150 | 0.125 | 0.726 | 2.46 | 3.63 | 0.0137 | 0.140 | 0.962 | 5.50 | 7.18 | 0.138 | 1.29 | 10.3 | 1.69 |
| 6 | 29.3 | 0.000675 | 0.0179 | 0.146 | 0.772 | 1.90 | 2.71 | 0.0163 | 0.166 | 1.09 | 4.84 | 5.38 | 0.163 | 1.47 | 8.63 | 1.94 |
| 7 | 24.9 | 0.000787 | 0.0207 | 0.164 | 0.772 | 1.52 | 2.12 | 0.0190 | 0.190 | 1.18 | 3.87 | 4.20 | 0.188 | 1.62 | 6.89 | 2.14 |
| 8 | 21.9 | 0.000898 | 0.0234 | 0.180 | 0.734 | 1.25 | 1.70 | 0.0216 | 0.213 | 1.24 | 3.21 | 3.37 | 0.212 | 1.72 | 5.71 | 2.28 |
| 9 | 19.5 | 0.00101 | 0.0260 | 0.193 | 0.675 | 1.05 | 1.40 | 0.0241 | 0.233 | 1.25 | 2.72 | 2.77 | 0.234 | 1.77 | 4.81 | 2.36 |
| 10 | 17.5 | 0.00112 | 0.0285 | 0.203 | 0.588 | 0.885 | 1.17 | 0.0266 | 0.252 | 1.23 | 2.33 | 2.33 | 0.255 | 1.77 | 4.10 | 2.38 |
| 12 | 14.4 | 0.00134 | 0.0332 | 0.211 | 0.443 | 0.666 | 0.865 | 0.0315 | 0.283 | 1.10 | 1.77 | 1.71 | 0.292 | 1.66 | 3.09 | 2.25 |
| 14 | 11.8 | 0.00155 | 0.0373 | 0.207 | 0.359 | 0.520 | 0.653 | 0.0361 | 0.305 | 0.899 | 1.39 | 1.31 | 0.323 | 1.42 | 2.43 | 1.95 |
| 16 | 9.80 | 0.00177 | 0.0408 | 0.192 | 0.295 | 0.418 | 0.514 | 0.0404 | 0.316 | 0.733 | 1.13 | 1.02 | 0.345 | 1.18 | 1.96 | 1.63 |
| 18 | 8.26 | 0.00198 | 0.0437 | 0.169 | 0.248 | 0.344 | 0.411 | 0.0444 | 0.316 | 0.616 | 0.932 | 0.817 | 0.359 | 0.978 | 1.62 | 1.36 |
| 20 | 7.08 | 0.00218 | 0.0458 | 0.147 | 0.212 | 0.289 | 0.337 | 0.0481 | 0.307 | 0.529 | 0.783 | 0.672 | 0.365 | 0.838 | 1.36 | 1.15 |

At ( Z=85 ) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(5) 3d(10) 4d(10) 5d(10) 4f(14)

| Q/Rs | ----> | 50.49 | 15.21 | 6.670 | 3.213 | 1.465 | 0.5377 | 16.28 | 6.786 | 3.128 | 1.337 | 0.4381 | 7.035 | 2.961 | 1.080 | 2.713 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 6p(5) | 3d(10) | 4d(10) | 5d(10) | 4f(14) |
| 0.2 | 9.46 | 2.07(-5) | 5.67(-4) | 0.00509 | 0.0337 | 0.241 | 2.68 | 0.000523 | 0.00554 | 0.0423 | 0.366 | 5.28 | 0.00533 | 0.0523 | 0.679 | 0.0686 |
| 0.4 | 19.2 | 4.30(-5) | 0.00114 | 0.0102 | 0.0672 | 0.483 | 5.45 | 0.00106 | 0.0111 | 0.0846 | 0.733 | 10.7 | 0.0107 | 0.105 | 1.36 | 0.137 |
| 0.6 | 29.2 | 6.50(-5) | 0.00172 | 0.0153 | 0.101 | 0.725 | 8.36 | 0.00159 | 0.0167 | 0.127 | 1.10 | 16.3 | 0.0161 | 0.157 | 2.04 | 0.207 |
| 0.8 | 39.3 | 8.69(-5) | 0.00229 | 0.0204 | 0.135 | 0.965 | 11.3 | 0.00213 | 0.0223 | 0.169 | 1.46 | 22.0 | 0.0214 | 0.209 | 2.72 | 0.274 |
| 1.0 | 48.8 | 1.09(-4) | 0.00286 | 0.0255 | 0.168 | 1.20 | 13.9 | 0.00266 | 0.0278 | 0.211 | 1.83 | 27.4 | 0.0268 | 0.261 | 3.39 | 0.343 |
| 1.2 | 56.4 | 1.31(-4) | 0.00343 | 0.0305 | 0.201 | 1.44 | 14.8 | 0.00319 | 0.0333 | 0.253 | 2.18 | 31.7 | 0.0321 | 0.313 | 4.05 | 0.411 |
| 1.4 | 60.8 | 1.53(-4) | 0.00400 | 0.0356 | 0.234 | 1.67 | 16.3 | 0.00372 | 0.0389 | 0.295 | 2.54 | 34.1 | 0.0374 | 0.365 | 4.70 | 0.479 |
| 1.6 | 61.8 | 1.74(-4) | 0.00457 | 0.0407 | 0.267 | 1.89 | 15.7 | 0.00425 | 0.0444 | 0.336 | 2.88 | 34.2 | 0.0428 | 0.416 | 5.34 | 0.548 |
| 1.8 | 60.2 | 1.96(-4) | 0.00514 | 0.0457 | 0.299 | 2.10 | 14.4 | 0.00478 | 0.0480 | 0.378 | 3.22 | 32.6 | 0.0481 | 0.467 | 5.97 | 0.614 |
| 2.0 | 58.1 | 2.18(-4) | 0.00570 | 0.0507 | 0.331 | 2.30 | 13.0 | 0.00531 | 0.0555 | 0.418 | 3.54 | 30.6 | 0.0535 | 0.518 | 6.56 | 0.680 |
| 2.2 | 54.1 | 2.40(-4) | 0.00628 | 0.0556 | 0.362 | 2.48 | 11.4 | 0.00584 | 0.0610 | 0.459 | 3.85 | 26.9 | 0.0588 | 0.568 | 7.13 | 0.747 |
| 2.4 | 51.0 | 2.62(-4) | 0.00684 | 0.0606 | 0.393 | 2.63 | 10.2 | 0.00637 | 0.0665 | 0.499 | 4.15 | 23.8 | 0.0641 | 0.618 | 7.66 | 0.812 |
| 2.6 | 48.8 | 2.84(-4) | 0.00741 | 0.0655 | 0.423 | 2.76 | 9.21 | 0.00689 | 0.0719 | 0.538 | 4.42 | 21.6 | 0.0694 | 0.667 | 8.15 | 0.877 |
| 2.8 | 46.9 | 3.06(-4) | 0.00798 | 0.0703 | 0.452 | 2.86 | 8.35 | 0.00472 | 0.0773 | 0.577 | 4.67 | 19.5 | 0.0746 | 0.716 | 8.59 | 0.941 |
| 3.0 | 45.3 | 3.27(-4) | 0.00854 | 0.0752 | 0.480 | 2.92 | 7.56 | 0.00795 | 0.0827 | 0.615 | 4.89 | 17.8 | 0.0799 | 0.764 | 8.98 | 1.00 |
| 3.2 | 43.8 | 3.49(-4) | 0.00911 | 0.0800 | 0.508 | 2.95 | 6.89 | 0.00848 | 0.0881 | 0.653 | 5.08 | 16.3 | 0.0851 | 0.812 | 9.30 | 1.07 |
| 3.4 | 42.5 | 3.71(-4) | 0.00967 | 0.0847 | 0.534 | 2.95 | 6.31 | 0.00901 | 0.0935 | 0.690 | 5.24 | 14.9 | 0.0903 | 0.858 | 9.56 | 1.13 |
| 3.6 | 41.3 | 3.93(-4) | 0.0102 | 0.0894 | 0.560 | 2.91 | 5.82 | 0.00953 | 0.0988 | 0.726 | 5.36 | 13.8 | 0.0955 | 0.904 | 9.74 | 1.19 |
| 3.8 | 40.1 | 4.14(-4) | 0.0108 | 0.0940 | 0.584 | 2.87 | 5.36 | 0.0101 | 0.104 | 0.761 | 5.45 | 12.7 | 0.101 | 0.949 | 9.85 | 1.25 |
| 4.0 | 39.0 | 4.36(-4) | 0.0113 | 0.0986 | 0.607 | 2.79 | 4.96 | 0.0106 | 0.109 | 0.796 | 5.50 | 11.8 | 0.106 | 0.994 | 9.90 | 1.31 |
| 5 | 33.7 | 5.45(-4) | 0.0141 | 0.121 | 0.699 | 2.35 | 3.53 | 0.0132 | 0.135 | 0.954 | 5.29 | 8.43 | 0.131 | 1.21 | 9.29 | 1.58 |
| 6 | 29.2 | 6.53(-4) | 0.0168 | 0.141 | 0.747 | 1.85 | 2.64 | 0.0158 | 0.160 | 1.08 | 4.67 | 6.34 | 0.156 | 1.39 | 8.15 | 1.82 |
| 7 | 24.8 | 7.61(-4) | 0.0194 | 0.159 | 0.751 | 1.49 | 2.07 | 0.0183 | 0.183 | 1.18 | 3.82 | 4.96 | 0.179 | 1.52 | 6.47 | 2.01 |
| 8 | 21.8 | 8.69(-4) | 0.0220 | 0.174 | 0.717 | 1.23 | 1.69 | 0.0289 | 0.205 | 1.23 | 3.15 | 4.00 | 0.202 | 1.62 | 5.37 | 2.15 |
| 9 | 19.4 | 9.76(-4) | 0.0244 | 0.187 | 0.665 | 1.03 | 1.37 | 0.0233 | 0.225 | 1.24 | 2.67 | 3.30 | 0.224 | 1.68 | 4.54 | 2.24 |
| 10 | 17.5 | 0.00108 | 0.0268 | 0.197 | 0.583 | 0.872 | 1.17 | 0.0258 | 0.244 | 1.22 | 2.29 | 2.77 | 0.244 | 1.69 | 3.89 | 2.26 |
| 12 | 14.4 | 0.00129 | 0.0312 | 0.206 | 0.440 | 0.657 | 0.845 | 0.0305 | 0.274 | 1.09 | 1.74 | 2.05 | 0.280 | 1.61 | 2.96 | 2.17 |
| 14 | 11.9 | 0.00150 | 0.0352 | 0.203 | 0.353 | 0.513 | 0.649 | 0.0349 | 0.295 | 0.898 | 1.37 | 1.58 | 0.309 | 1.39 | 2.33 | 1.91 |
| 16 | 9.85 | 0.00171 | 0.0385 | 0.189 | 0.293 | 0.413 | 0.506 | 0.0391 | 0.307 | 0.732 | 1.11 | 1.25 | 0.332 | 1.16 | 1.88 | 1.60 |
| 18 | 8.30 | 0.00191 | 0.0413 | 0.167 | 0.245 | 0.340 | 0.406 | 0.0431 | 0.309 | 0.615 | 0.920 | 1.00 | 0.346 | 0.968 | 1.56 | 1.34 |
| 20 | 7.13 | 0.00211 | 0.0435 | 0.146 | 0.209 | 0.285 | 0.334 | 0.0466 | 0.301 | 0.529 | 0.777 | 0.825 | 0.353 | 0.821 | 1.32 | 1.14 |

Rn ( Z=86 ) 1s(2)2s(2)3s(2)4s(2)5s(2)6s(2)2p(6)3p(6)4p(6)5p(6)6p(6)3d(10)4d(10)5d(10)4f(14)

| Q/Rs | ----> | 51.11 | 15.23 | 6.761 | 3.271 | 1.508 | 0.5686 | 16.48 | 6.882 | 3.184 | 1.391 | 0.4676 | 7.139 | 3.025 | 1.132 | 2.785 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6p(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 6p(6) | 3d(10) | 4d(10) | 5d(10) | 4f(14) |
| 0.2 | 8.42 | 2.00(-5) | 5.65(-4) | 0.00491 | 0.0322 | 0.224 | 2.35 | 0.000506 | 0.00534 | 0.0404 | 0.331 | 4.71 | 0.00512 | 0.0495 | 0.604 | 0.0641 |
| 0.4 | 17.0 | 1.46(-5) | 0.00114 | 0.00985 | 0.0642 | 0.450 | 4.77 | 0.00102 | 0.0107 | 0.0808 | 0.664 | 9.61 | 0.0103 | 0.0990 | 1.21 | 0.128 |
| 0.6 | 25.8 | 6.28(-5) | 0.00171 | 0.0148 | 0.966 | 0.675 | 7.29 | 0.00154 | 0.0161 | 0.121 | 0.996 | 14.4 | 0.0155 | 0.148 | 1.82 | 0.192 |
| 0.8 | 34.7 | 8.40(-5) | 0.00228 | 0.0196 | 0.129 | 0.898 | 9.84 | 0.00206 | 0.0215 | 0.162 | 1.33 | 19.6 | 0.0206 | 0.198 | 2.42 | 0.256 |
| 1.0 | 43.2 | 1.05(-4) | 0.00285 | 0.0246 | 0.161 | 1.12 | 12.2 | 0.00257 | 0.0268 | 0.202 | 1.60 | 24.2 | 0.0258 | 0.247 | 3.01 | 0.321 |
| 1.2 | 50.6 | 1.26(-4) | 0.00342 | 0.0295 | 0.192 | 1.34 | 14.0 | 0.00309 | 0.0321 | 0.242 | 1.98 | 28.5 | 0.0309 | 0.296 | 3.60 | 0.384 |
| 1.4 | 55.9 | 1.48(-4) | 0.00399 | 0.0344 | 0.224 | 1.55 | 14.8 | 0.00360 | 0.0375 | 0.282 | 2.30 | 31.7 | 0.0360 | 0.345 | 4.19 | 0.448 |
| 1.6 | 58.6 | 1.69(-4) | 0.00455 | 0.0393 | 0.255 | 1.76 | 14.6 | 0.00411 | 0.0428 | 0.321 | 2.61 | 33.2 | 0.0411 | 0.394 | 4.76 | 0.511 |
| 1.8 | 58.7 | 1.90(-4) | 0.00512 | 0.0441 | 0.286 | 1.96 | 13.6 | 0.00463 | 0.0481 | 0.361 | 2.92 | 33.9 | 0.0463 | 0.442 | 5.31 | 0.574 |
| 2.0 | 57.5 | 2.11(-4) | 0.00568 | 0.0489 | 0.316 | 2.15 | 12.6 | 0.00514 | 0.0535 | 0.400 | 3.21 | 31.6 | 0.0514 | 0.490 | 5.85 | 0.636 |
| 2.2 | 55.2 | 2.32(-4) | 0.00625 | 0.0537 | 0.346 | 2.31 | 11.0 | 0.00565 | 0.0588 | 0.438 | 3.50 | 29.8 | 0.0565 | 0.538 | 6.36 | 0.698 |
| 2.4 | 52.0 | 2.53(-4) | 0.00682 | 0.0585 | 0.375 | 2.46 | 9.87 | 0.00616 | 0.0640 | 0.476 | 3.77 | 26.7 | 0.0616 | 0.585 | 6.85 | 0.759 |
| 2.6 | 49.4 | 2.74(-4) | 0.00739 | 0.0632 | 0.404 | 2.59 | 8.90 | 0.00697 | 0.0693 | 0.514 | 4.02 | 24.0 | 0.0667 | 0.632 | 7.30 | 0.820 |
| 2.8 | 47.4 | 2.95(-4) | 0.00795 | 0.0679 | 0.432 | 2.69 | 8.04 | 0.00718 | 0.0745 | 0.551 | 4.26 | 21.9 | 0.0718 | 0.678 | 7.71 | 0.880 |
| 3.0 | 45.6 | 3.17(-4) | 0.00851 | 0.0726 | 0.460 | 2.76 | 7.72 | 0.00769 | 0.0797 | 0.588 | 4.47 | 20.0 | 0.0768 | 0.723 | 8.08 | 0.939 |
| 3.2 | 44.0 | 3.38(-4) | 0.00908 | 0.0772 | 0.486 | 2.80 | 6.68 | 0.00820 | 0.0849 | 0.624 | 4.65 | 18.4 | 0.0819 | 0.768 | 8.39 | 0.998 |
| 3.4 | 42.7 | 3.59(-4) | 0.00964 | 0.0818 | 0.512 | 2.81 | 6.13 | 0.00871 | 0.0901 | 0.660 | 4.81 | 16.9 | 0.0869 | 0.813 | 8.66 | 1.06 |
| 3.6 | 41.4 | 3.80(-4) | 0.0102 | 0.0863 | 0.536 | 2.79 | 5.65 | 0.00922 | 0.0952 | 0.694 | 4.94 | 15.7 | 0.0919 | 0.857 | 8.86 | 1.11 |
| 3.8 | 40.1 | 4.01(-4) | 0.0108 | 0.0908 | 0.559 | 2.75 | 5.22 | 0.00973 | 0.100 | 0.728 | 5.04 | 14.5 | 0.0968 | 0.900 | 9.01 | 1.17 |
| 4.0 | 39.0 | 4.22(-4) | 0.0113 | 0.0952 | 0.582 | 2.69 | 4.83 | 0.0102 | 0.105 | 0.762 | 5.10 | 13.5 | 0.102 | 0.942 | 9.10 | 1.22 |
| 5 | 33.7 | 5.27(-4) | 0.0141 | 0.117 | 0.672 | 2.23 | 3.44 | 0.0128 | 0.130 | 0.914 | 5.01 | 9.67 | 0.126 | 1.14 | 8.76 | 1.48 |
| 6 | 29.1 | 6.31(-4) | 0.0167 | 0.136 | 0.722 | 1.82 | 2.58 | 0.0153 | 0.154 | 1.04 | 4.43 | 7.30 | 0.150 | 1.31 | 7.73 | 1.71 |
| 7 | 25.1 | 7.36(-4) | 0.0194 | 0.154 | 0.729 | 1.47 | 2.02 | 0.0178 | 0.177 | 1.13 | 3.75 | 5.72 | 0.173 | 1.45 | 6.35 | 1.89 |
| 8 | 21.8 | 8.40(-4) | 0.0219 | 0.169 | 0.701 | 1.21 | 1.63 | 0.0202 | 0.198 | 1.19 | 3.07 | 4.63 | 0.195 | 1.55 | 5.21 | 2.03 |
| 9 | 19.4 | 9.44(-4) | 0.0247 | 0.181 | 0.654 | 1.01 | 1.34 | 0.0226 | 0.218 | 1.21 | 2.60 | 3.82 | 0.215 | 1.61 | 4.42 | 2.12 |
| 10 | 17.5 | 0.00105 | 0.0267 | 0.191 | 0.577 | 0.860 | 1.13 | 0.0249 | 0.235 | 1.19 | 2.25 | 3.22 | 0.235 | 1.63 | 3.81 | 2.16 |
| 12 | 14.4 | 0.00125 | 0.0311 | 0.201 | 0.437 | 0.649 | 0.829 | 0.0295 | 0.265 | 1.08 | 1.70 | 2.39 | 0.270 | 1.56 | 2.90 | 2.10 |
| 14 | 12.0 | 0.00145 | 0.0351 | 0.199 | 0.351 | 0.507 | 0.639 | 0.0338 | 0.287 | 0.889 | 1.35 | 1.84 | 0.299 | 1.37 | 2.28 | 1.87 |
| 16 | 9.95 | 0.00165 | 0.0384 | 0.186 | 0.289 | 0.408 | 0.502 | 0.0379 | 0.299 | 0.727 | 1.09 | 1.46 | 0.321 | 1.15 | 1.85 | 1.58 |
| 18 | 8.39 | 0.00185 | 0.0412 | 0.166 | 0.244 | 0.337 | 0.403 | 0.0417 | 0.301 | 0.605 | 0.906 | 1.19 | 0.336 | 0.959 | 1.53 | 1.33 |
| 20 | 7.19 | 0.00204 | 0.0433 | 0.144 | 0.208 | 0.282 | 0.332 | 0.0452 | 0.295 | 0.526 | 0.762 | 0.981 | 0.343 | 0.815 | 1.29 | 1.12 |

F r (Z=87) 1s(2) 2s(2) 3s(2) 4S(2) 5s(2) 6s(2) 7s(1) 2p(6) 3p(6) 4p(6) 5p(6) 6p(6) 3d(10) 4d(10) 5d(10) 4f(14)

| Q/Rs | ----> | 51.59 | 15.41 | 6.856 | 3.327 | 1.554 | 0.6183 | 0.1842 | 16.67 | 6.972 | 3.245 | 1.439 | 0.5257 | 7.243 | 3.088 | 1.186 | 2.857 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 7s(1) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 6p(6) | 3d(10) | 4d(10) | 5d(10) | 4f(14) |
| 0.2 | 35.3 | 0.195(-4) | 5.48(-4) | 0.00474 | 0.0308 | 0.208 | 1.93 | 28.5 | 0.000490 | 0.00516 | 0.0385 | 0.305 | 3.57 | 0.00493 | 0.0469 | 0.538 | 0.0600 |
| 0.4 | 81.7 | 0.495(-4) | 0.00110 | 0.00949 | 0.0615 | 0.418 | 3.90 | 68.1 | 0.000992 | 0.0104 | 0.0769 | 0.610 | 7.18 | 0.00991 | 0.0938 | 1.08 | 0.120 |
| 0.6 | 81.9 | 0.612(-4) | 0.00166 | 0.0142 | 0.0925 | 0.626 | 5.94 | 61.3 | 0.00149 | 0.0156 | 0.115 | 0.915 | 10.9 | 0.0149 | 0.141 | 1.62 | 0.180 |
| 0.8 | 71.2 | 0.819(-4) | 0.00221 | 0.0189 | 0.1232 | 0.834 | 8.01 | 43.7 | 0.00119 | 0.0207 | 0.154 | 1.22 | 14.6 | 0.0198 | 0.187 | 2.15 | 0.240 |
| 1.0 | 66.7 | 0.000103 | 0.00276 | 0.0237 | 0.154 | 1.04 | 9.97 | 32.4 | 0.00249 | 0.0259 | 0.192 | 1.52 | 18.2 | 0.0248 | 0.234 | 2.68 | 0.300 |
| 1.2 | 65.6 | 0.000123 | 0.00331 | 0.0284 | 0.184 | 1.24 | 11.6 | 25.0 | 0.00299 | 0.0310 | 0.230 | 1.82 | 21.6 | 0.0297 | 0.281 | 3.21 | 0.360 |
| 1.4 | 65.5 | 0.000144 | 0.00386 | 0.0331 | 0.214 | 1.44 | 12.6 | 19.9 | 0.00349 | 0.0362 | 0.268 | 2.11 | 24.4 | 0.0346 | 0.327 | 3.73 | 0.419 |
| 1.6 | 65.3 | 0.000164 | 0.00441 | 0.0378 | 0.244 | 1.64 | 12.9 | 16.2 | 0.00399 | 0.0414 | 0.306 | 2.40 | 26.4 | 0.0396 | 0.373 | 4.24 | 0.478 |
| 1.8 | 64.2 | 0.000185 | 0.00496 | 0.0425 | 0.274 | 1.82 | 12.5 | 13.5 | 0.00448 | 0.0465 | 0.344 | 2.68 | 27.3 | 0.0445 | 0.419 | 4.73 | 0.537 |
| 2.0 | 62.3 | 0.000206 | 0.00551 | 0.0472 | 0.303 | 2.00 | 11.7 | 11.5 | 0.00498 | 0.0517 | 0.381 | 2.96 | 27.1 | 0.0495 | 0.469 | 5.22 | 0.595 |
| 2.2 | 59.6 | 0.000226 | 0.00606 | 0.0518 | 0.332 | 2.16 | 10.5 | 9.84 | 0.00548 | 0.0568 | 0.417 | 3.22 | 26.1 | 0.0544 | 0.510 | 5.68 | 0.653 |
| 2.4 | 56.7 | 0.000247 | 0.00661 | 0.0564 | 0.360 | 2.30 | 9.27 | 8.56 | 0.00597 | 0.0619 | 0.454 | 3.47 | 24.7 | 0.0593 | 0.555 | 6.12 | 0.711 |
| 2.6 | 53.5 | 0.000267 | 0.00716 | 0.0610 | 0.387 | 2.42 | 8.38 | 7.52 | 0.00647 | 0.0670 | 0.490 | 3.71 | 22.5 | 0.0642 | 0.599 | 6.53 | 0.768 |
| 2.8 | 52.1 | 0.000288 | 0.00770 | 0.0655 | 0.413 | 2.52 | 7.64 | 6.67 | 0.00696 | 0.0720 | 0.525 | 3.93 | 21.8 | 0.0691 | 0.643 | 6.91 | 0.824 |
| 3.0 | 49.5 | 0.000308 | 0.00825 | 0.0700 | 0.441 | 2.60 | 6.97 | 5.96 | 0.00745 | 0.0771 | 0.560 | 4.13 | 19.7 | 0.0739 | 0.686 | 7.26 | 0.880 |
| 3.2 | 47.4 | 0.000329 | 0.00879 | 0.0745 | 0.466 | 2.65 | 6.37 | 5.36 | 0.00795 | 0.0821 | 0.595 | 4.31 | 18.2 | 0.0788 | 0.729 | 7.57 | 0.935 |
| 3.4 | 45.5 | 0.000350 | 0.00934 | 0.0789 | 0.491 | 2.67 | 5.85 | 4.84 | 0.00845 | 0.0870 | 0.629 | 4.47 | 16.7 | 0.0836 | 0.771 | 7.83 | 0.989 |
| 3.6 | 43.9 | 0.000370 | 0.00988 | 0.0833 | 0.514 | 2.66 | 5.40 | 4.40 | 0.00894 | 0.0920 | 0.662 | 4.60 | 15.4 | 0.0884 | 0.813 | 8.05 | 1.04 |
| 3.8 | 42.4 | 0.000391 | 0.0104 | 0.0876 | 0.537 | 2.64 | 4.99 | 4.01 | 0.00943 | 0.0969 | 0.695 | 4.70 | 14.3 | 0.0932 | 0.854 | 8.21 | 1.10 |
| 4.0 | 40.9 | 0.000411 | 0.0110 | 0.0919 | 0.559 | 2.59 | 4.62 | 3.65 | 0.00993 | 0.102 | 0.726 | 4.78 | 13.3 | 0.0980 | 0.894 | 8.33 | 1.15 |
| 5 | 34.9 | 0.000513 | 0.0136 | 0.113 | 0.647 | 2.17 | 3.32 | 2.43 | 0.0124 | 0.126 | 0.873 | 4.77 | 9.61 | 0.122 | 1.08 | 8.22 | 1.39 |
| 6 | 29.8 | 0.000615 | 0.0162 | 0.132 | 0.698 | 1.79 | 2.50 | 1.72 | 0.0148 | 0.149 | 0.995 | 4.27 | 7.26 | 0.144 | 1.25 | 7.30 | 1.61 |
| 7 | 25.8 | 0.000717 | 0.0188 | 0.149 | 0.709 | 1.44 | 1.96 | 1.30 | 0.0172 | 0.171 | 1.09 | 3.70 | 5.69 | 0.166 | 1.38 | 6.23 | 1.79 |
| 8 | 22.3 | 0.000819 | 0.0212 | 0.164 | 0.685 | 1.19 | 1.58 | 1.02 | 0.0196 | 0.192 | 1.14 | 3.01 | 4.60 | 0.188 | 1.48 | 5.09 | 1.92 |
| 9 | 19.8 | 0.000920 | 0.0236 | 0.176 | 0.642 | 0.995 | 1.30 | 0.812 | 0.0219 | 0.211 | 1.17 | 2.55 | 3.81 | 0.208 | 1.54 | 4.32 | 2.01 |
| 10 | 17.8 | 0.00102 | 0.0259 | 0.185 | 0.571 | 0.848 | 1.10 | 0.681 | 0.0242 | 0.228 | 1.16 | 2.19 | 3.20 | 0.227 | 1.57 | 3.71 | 2.06 |
| 12 | 14.6 | 0.00122 | 0.0302 | 0.196 | 0.434 | 0.640 | 0.809 | 0.473 | 0.0286 | 0.257 | 1.06 | 1.67 | 2.37 | 0.261 | 1.52 | 2.83 | 2.02 |
| 14 | 12.1 | 0.00142 | 0.0341 | 0.194 | 0.346 | 0.501 | 0.624 | 0.352 | 0.0328 | 0.279 | 0.880 | 1.33 | 1.83 | 0.289 | 1.35 | 2.24 | 1.83 |
| 16 | 10.1 | 0.00161 | 0.0374 | 0.183 | 0.288 | 0.403 | 0.495 | 0.290 | 0.0368 | 0.291 | 0.721 | 1.08 | 1.47 | 0.311 | 1.14 | 1.81 | 1.56 |
| 18 | 8.52 | 0.00180 | 0.0401 | 0.164 | 0.241 | 0.333 | 0.399 | 0.227 | 0.0405 | 0.294 | 0.601 | 0.894 | 1.19 | 0.326 | 0.951 | 1.50 | 1.31 |
| 20 | 7.31 | 0.00199 | 0.0422 | 0.143 | 0.207 | 0.279 | 0.329 | 0.192 | 0.0440 | 0.289 | 0.517 | 0.756 | 0.997 | 0.333 | 0.804 | 1.27 | 1.11 |

Ra ( Z=88 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 7s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(6) 3d(10) 4d(10) 5d(10) 4f(14)

| Q/Rs | ----> | 52.22 | 15.60 | 6.950 | 3.384 | 1.596 | 0.6679 | 0.2185 | 16.88 | 7.067 | 3.303 | 1.486 | 0.5754 | 7.346 | 3.150 | 1.239 | 2.929 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 7s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 6p(6) | 3d(10) | 4d(10) | 5d(10) | 4f(14) |
| 0.2 | 27.4 | 1.88(-5) | 5.30(-4) | 0.00457 | 0.0295 | 0.195 | 1.61 | 21.7 | 4.74(-4) | 0.00498 | 0.0367 | 0.281 | 2.87 | 0.00475 | 0.0445 | 0.482 | 0.0562 |
| 0.4 | 61.1 | 3.92(-5) | 0.00107 | 0.00916 | 0.0590 | 0.391 | 3.25 | 49.8 | 9.59(-4) | 0.00999 | 0.0735 | 0.563 | 5.78 | 0.00954 | 0.0891 | 0.966 | 0.113 |
| 0.6 | 89.9 | 5.92(-5) | 0.00160 | 0.0137 | 0.886 | 0.586 | 4.93 | 72.8 | 0.00144 | 0.0150 | 0.110 | 0.844 | 8.72 | 0.0143 | 0.133 | 1.45 | 0.169 |
| 0.8 | 88.9 | 7.92(-5) | 0.00214 | 0.0183 | 0.118 | 0.781 | 6.63 | 66.1 | 0.00193 | 0.0199 | 0.147 | 1.12 | 11.7 | 0.0191 | 0.178 | 1.93 | 0.225 |
| 1.0 | 79.4 | 9.92(-5) | 0.00267 | 0.0229 | 0.147 | 0.974 | 8.27 | 50.8 | 0.00241 | 0.0250 | 0.184 | 1.40 | 14.6 | 0.0239 | 0.222 | 2.41 | 0.281 |
| 1.2 | 74.3 | 1.19(-4) | 0.00321 | 0.0274 | 0.176 | 1.16 | 9.71 | 40.4 | 0.00289 | 0.0299 | 0.220 | 1.68 | 17.4 | 0.0286 | 0.267 | 2.88 | 0.337 |
| 1.4 | 71.3 | 1.39(-4) | 0.00374 | 0.0320 | 0.205 | 1.35 | 10.8 | 32.8 | 0.00337 | 0.0349 | 0.256 | 1.95 | 19.8 | 0.0334 | 0.311 | 3.34 | 0.393 |
| 1.6 | 69.3 | 1.59(-4) | 0.00427 | 0.0365 | 0.234 | 1.53 | 11.3 | 27.2 | 0.00385 | 0.0399 | 0.292 | 2.22 | 21.8 | 0.0381 | 0.355 | 3.80 | 0.448 |
| 1.8 | 67.2 | 1.79(-4) | 0.00480 | 0.0410 | 0.262 | 1.71 | 11.2 | 22.9 | 0.00433 | 0.0449 | 0.328 | 2.48 | 23.0 | 0.0429 | 0.398 | 4.25 | 0.503 |
| 2.0 | 64.8 | 1.99(-4) | 0.00533 | 0.0455 | 0.290 | 1.87 | 10.7 | 19.6 | 0.00481 | 0.0498 | 0.364 | 2.73 | 23.5 | 0.0476 | 0.442 | 4.68 | 0.558 |
| 2.2 | 62.2 | 2.19(-4) | 0.00586 | 0.0500 | 0.318 | 2.02 | 10.0 | 17.0 | 0.00529 | 0.0548 | 0.399 | 2.98 | 23.2 | 0.0524 | 0.484 | 5.10 | 0.613 |
| 2.4 | 59.1 | 2.39(-4) | 0.00640 | 0.0544 | 0.345 | 2.16 | 8.94 | 14.8 | 0.00577 | 0.0597 | 0.434 | 3.21 | 22.3 | 0.0571 | 0.527 | 5.50 | 0.666 |
| 2.6 | 56.1 | 2.59(-4) | 0.00693 | 0.0588 | 0.371 | 2.28 | 8.00 | 13.1 | 0.00625 | 0.0646 | 0.468 | 3.43 | 21.0 | 0.0618 | 0.569 | 5.88 | 0.720 |
| 2.8 | 53.4 | 2.78(-4) | 0.00746 | 0.0632 | 0.397 | 2.38 | 7.31 | 11.6 | 0.00673 | 0.0695 | 0.502 | 3.64 | 19.7 | 0.0665 | 0.611 | 6.24 | 0.773 |
| 3.0 | 51.4 | 2.98(-4) | 0.00798 | 0.0676 | 0.422 | 2.46 | 6.70 | 10.4 | 0.00720 | 0.0743 | 0.536 | 3.83 | 18.7 | 0.0712 | 0.652 | 6.56 | 0.825 |
| 3.2 | 48.7 | 3.18(-4) | 0.00851 | 0.0719 | 0.447 | 2.51 | 6.12 | 9.42 | 0.00768 | 0.0792 | 0.569 | 4.01 | 17.0 | 0.0759 | 0.693 | 6.86 | 0.877 |
| 3.4 | 46.7 | 3.38(-4) | 0.00904 | 0.0761 | 0.471 | 2.54 | 5.66 | 8.55 | 0.00816 | 0.0840 | 0.601 | 4.16 | 15.7 | 0.0805 | 0.733 | 7.11 | 0.928 |
| 3.6 | 44.8 | 3.58(-4) | 0.00956 | 0.0804 | 0.494 | 2.55 | 5.21 | 7.80 | 0.00864 | 0.0888 | 0.633 | 4.29 | 14.5 | 0.0852 | 0.773 | 7.33 | 0.979 |
| 3.8 | 43.2 | 3.78(-4) | 0.0101 | 0.0846 | 0.515 | 2.53 | 4.83 | 7.14 | 0.00912 | 0.0898 | 0.664 | 4.40 | 13.5 | 0.0936 | 0.812 | 7.51 | 1.03 |
| 4.0 | 41.7 | 3.98(-4) | 0.0106 | 0.0887 | 0.536 | 2.50 | 4.48 | 6.57 | 0.00960 | 0.0944 | 0.695 | 4.48 | 12.6 | 0.0983 | 0.850 | 7.65 | 1.08 |
| 5 | 35.4 | 4.96(-4) | 0.0132 | 0.109 | 0.623 | 2.12 | 3.22 | 4.53 | 0.0120 | 0.122 | 0.836 | 4.55 | 9.12 | 0.117 | 1.03 | 7.71 | 1.31 |
| 6 | 30.3 | 5.95(-4) | 0.0157 | 0.127 | 0.674 | 1.76 | 2.44 | 3.30 | 0.0143 | 0.144 | 0.955 | 4.14 | 6.94 | 0.139 | 1.19 | 6.97 | 1.51 |
| 7 | 26.2 | 6.94(-4) | 0.0182 | 0.144 | 0.689 | 1.42 | 1.91 | 2.48 | 0.0166 | 0.165 | 1.05 | 3.63 | 5.46 | 0.160 | 1.32 | 6.10 | 1.69 |
| 8 | 22.6 | 7.92(-4) | 0.0206 | 0.158 | 0.669 | 1.17 | 1.55 | 1.94 | 0.0189 | 0.185 | 1.10 | 2.96 | 4.43 | 0.181 | 1.42 | 4.95 | 1.82 |
| 9 | 20.0 | 8.90(-4) | 0.0229 | 0.170 | 0.630 | 0.981 | 1.28 | 1.56 | 0.0212 | 0.204 | 1.13 | 2.51 | 3.66 | 0.200 | 1.48 | 4.20 | 1.91 |
| 10 | 17.9 | 9.90(-4) | 0.0251 | 0.180 | 0.565 | 0.836 | 1.07 | 1.29 | 0.0234 | 0.221 | 1.12 | 2.16 | 3.09 | 0.219 | 1.51 | 3.63 | 1.96 |
| 12 | 14.7 | 0.00118 | 0.0293 | 0.190 | 0.432 | 0.632 | 0.793 | 0.914 | 0.0277 | 0.249 | 1.04 | 1.65 | 2.29 | 0.252 | 1.47 | 2.77 | 1.95 |
| 14 | 12.2 | 0.00137 | 0.0330 | 0.190 | 0.344 | 0.495 | 0.612 | 0.688 | 0.0318 | 0.270 | 0.871 | 1.31 | 1.77 | 0.279 | 1.32 | 2.19 | 1.78 |
| 16 | 10.2 | 0.00156 | 0.0363 | 0.180 | 0.284 | 0.400 | 0.490 | 0.539 | 0.0357 | 0.283 | 0.716 | 1.06 | 1.42 | 0.301 | 1.12 | 1.78 | 1.53 |
| 18 | 8.60 | 0.00174 | 0.0390 | 0.162 | 0.240 | 0.329 | 0.399 | 0.429 | 0.0393 | 0.287 | 0.594 | 0.882 | 1.16 | 0.316 | 0.943 | 1.47 | 1.30 |
| 20 | 7.38 | 0.00193 | 0.0411 | 0.142 | 0.204 | 0.277 | 0.326 | 0.359 | 0.0426 | 0.283 | 0.514 | 0.746 | 0.970 | 0.324 | 0.799 | 1.25 | 1.10 |

Ac ( Z =89 )  1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 7s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(6) 3d(10) 4d(10) 5d(10) 6d(1) 4f(14)

| a/Rs | ----> | 52.54 | 15.78 | 7.041 | 3.441 | 1.640 | 0.7029 | 0.2318 | 17.09 | 7.159 | 3.363 | 1.533 | 0.6110 | 7.458 | 3.212 | 1.281 | 0.3816 | 3.001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 7s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 6p(6) | 3d(10) | 4d(10) | 5d(10) | 6d(1) | 4f(14) |
| 0.2 | 29.0 | 1.85(-5) | 5.14(-4) | 0.00442 | 0.0283 | 0.182 | 1.42 | 18.9 | 4.58(-4) | 0.00481 | 0.0351 | 0.260 | 2.49 | 0.00456 | 0.0423 | 0.444 | 5.08 | 0.0528 |
| 0.4 | 63.8 | 3.85(-5) | 0.00103 | 0.00885 | 0.0565 | 0.366 | 2.87 | 42.9 | 9.27(-4) | 0.00966 | 0.0702 | 0.521 | 5.00 | 0.00916 | 0.0847 | 0.888 | 11.0 | 0.106 |
| 0.6 | 97.0 | 5.82(-5) | 0.00155 | 0.0133 | 0.0849 | 0.548 | 4.35 | 64.6 | 0.00140 | 0.0145 | 0.105 | 0.781 | 7.54 | 0.0138 | 0.127 | 1.33 | 17.3 | 0.158 |
| 0.8 | 104 | 7.79(-5) | 0.00207 | 0.0177 | 0.113 | 0.730 | 5.85 | 63.0 | 0.00186 | 0.0193 | 0.140 | 1.04 | 10.1 | 0.0183 | 0.169 | 1.77 | 21.2 | 0.211 |
| 1.0 | 96.9 | 9.75(-5) | 0.00259 | 0.0221 | 0.141 | 0.910 | 7.30 | 51.3 | 0.00233 | 0.0241 | 0.175 | 1.30 | 12.6 | 0.0229 | 0.211 | 2.21 | 20.4 | 0.264 |
| 1.2 | 87.6 | 1.17(-4) | 0.00311 | 0.0265 | 0.169 | 1.09 | 8.61 | 40.9 | 0.00280 | 0.0290 | 0.210 | 1.55 | 15.0 | 0.0275 | 0.254 | 2.65 | 16.8 | 0.316 |
| 1.4 | 81.4 | 1.37(-4) | 0.00363 | 0.0310 | 0.197 | 1.26 | 9.65 | 33.2 | 0.00326 | 0.0337 | 0.245 | 1.80 | 17.2 | 0.0320 | 0.296 | 3.08 | 14.0 | 0.369 |
| 1.6 | 76.9 | 1.56(-4) | 0.00414 | 0.0353 | 0.224 | 1.43 | 10.2 | 27.5 | 0.00373 | 0.0386 | 0.279 | 2.05 | 19.0 | 0.0366 | 0.337 | 3.50 | 11.8 | 0.421 |
| 1.8 | 73.2 | 1.76(-4) | 0.00465 | 0.0397 | 0.251 | 1.60 | 10.4 | 23.1 | 0.00419 | 0.0434 | 0.313 | 2.29 | 20.4 | 0.0412 | 0.379 | 3.91 | 9.98 | 0.473 |
| 2.0 | 69.7 | 1.96(-4) | 0.00517 | 0.0440 | 0.278 | 1.75 | 10.0 | 19.7 | 0.00466 | 0.0482 | 0.347 | 2.53 | 21.1 | 0.0457 | 0.420 | 4.31 | 8.61 | 0.524 |
| 2.2 | 66.5 | 2.15(-4) | 0.00568 | 0.0483 | 0.305 | 1.90 | 9.54 | 17.1 | 0.00512 | 0.0530 | 0.381 | 2.76 | 21.1 | 0.0503 | 0.461 | 4.70 | 7.51 | 0.575 |
| 2.4 | 63.0 | 2.35(-4) | 0.00620 | 0.0526 | 0.331 | 2.03 | 8.67 | 15.0 | 0.00558 | 0.0577 | 0.414 | 2.98 | 20.6 | 0.0548 | 0.501 | 5.07 | 6.59 | 0.626 |
| 2.6 | 60.2 | 2.54(-4) | 0.00672 | 0.0569 | 0.356 | 2.15 | 8.43 | 13.1 | 0.00605 | 0.0624 | 0.447 | 3.18 | 19.9 | 0.0594 | 0.541 | 5.43 | 5.84 | 0.676 |
| 2.8 | 56.8 | 2.74(-4) | 0.00723 | 0.0611 | 0.381 | 2.25 | 6.61 | 11.7 | 0.00651 | 0.0671 | 0.480 | 3.38 | 18.5 | 0.0639 | 0.581 | 5.76 | 5.23 | 0.726 |
| 3.0 | 54.6 | 2.93(-4) | 0.00774 | 0.0653 | 0.405 | 2.32 | 6.91 | 10.5 | 0.00697 | 0.0720 | 0.511 | 3.56 | 18.0 | 0.0684 | 0.620 | 6.07 | 4.70 | 0.775 |
| 3.2 | 51.7 | 3.13(-4) | 0.00825 | 0.0695 | 0.429 | 2.38 | 6.32 | 9.51 | 0.00743 | 0.0765 | 0.543 | 3.73 | 16.5 | 0.0729 | 0.659 | 6.35 | 4.25 | 0.824 |
| 3.4 | 49.1 | 3.32(-4) | 0.00876 | 0.0736 | 0.452 | 2.41 | 5.85 | 8.60 | 0.00789 | 0.0812 | 0.574 | 3.88 | 15.0 | 0.0773 | 0.698 | 6.60 | 3.88 | 0.872 |
| 3.6 | 47.0 | 3.52(-4) | 0.00927 | 0.0777 | 0.474 | 2.43 | 5.38 | 7.86 | 0.00836 | 0.0858 | 0.605 | 4.01 | 13.9 | 0.0818 | 0.735 | 6.82 | 3.53 | 0.916 |
| 3.8 | 45.1 | 3.71(-4) | 0.00978 | 0.0818 | 0.495 | 2.43 | 4.99 | 7.19 | 0.00882 | 0.0904 | 0.635 | 4.12 | 13.0 | 0.0862 | 0.773 | 7.00 | 3.24 | 0.967 |
| 4.0 | 43.3 | 3.91(-4) | 0.0103 | 0.0858 | 0.515 | 2.20 | 4.63 | 6.59 | 0.00928 | 0.0950 | 0.664 | 4.21 | 12.1 | 0.0907 | 0.809 | 7.15 | 3.00 | 1.01 |
| 5 | 36.5 | 4.88(-4) | 0.0128 | 0.105 | 0.605 | 2.08 | 3.39 | 4.55 | 0.0116 | 0.118 | 0.800 | 4.33 | 8.81 | 0.112 | 0.982 | 7.32 | 2.08 | 1.23 |
| 6 | 31.2 | 5.85(-4) | 0.0152 | 0.123 | 0.652 | 1.74 | 2.50 | 3.34 | 0.0139 | 0.139 | 0.915 | 4.00 | 6.73 | 0.134 | 1.13 | 6.74 | 1.55 | 1.43 |
| 7 | 26.9 | 6.80(-4) | 0.0176 | 0.139 | 0.669 | 1.40 | 1.94 | 2.52 | 0.0161 | 0.160 | 1.00 | 3.57 | 5.32 | 0.154 | 1.26 | 5.98 | 1.20 | 1.59 |
| 8 | 23.2 | 7.79(-4) | 0.0120 | 0.154 | 0.653 | 1.16 | 1.59 | 1.99 | 0.0183 | 0.179 | 1.06 | 2.92 | 4.31 | 0.174 | 1.36 | 4.89 | 0.952 | 1.72 |
| 9 | 20.3 | 8.75(-4) | 0.0222 | 0.165 | 0.618 | 0.967 | 1.31 | 1.56 | 0.0205 | 0.197 | 1.09 | 2.26 | 3.58 | 0.193 | 1.42 | 4.12 | 0.762 | 1.82 |
| 10 | 18.2 | 9.71(-4) | 0.0244 | 0.175 | 0.558 | 0.825 | 1.10 | 1.28 | 0.0226 | 0.214 | 1.09 | 2.12 | 3.02 | 0.210 | 1.46 | 3.57 | 0.626 | 1.87 |
| 12 | 14.9 | 0.00116 | 0.0285 | 0.186 | 0.429 | 0.624 | 0.808 | 0.923 | 0.0268 | 0.242 | 1.02 | 1.62 | 2.24 | 0.243 | 1.43 | 2.73 | 0.453 | 1.87 |
| 14 | 12.4 | 0.00135 | 0.0321 | 0.186 | 0.339 | 0.489 | 0.630 | 0.692 | 0.0308 | 0.263 | 0.861 | 1.29 | 1.74 | 0.270 | 1.30 | 2.15 | 0.340 | 1.73 |
| 16 | 10.3 | 0.00153 | 0.0353 | 0.177 | 0.283 | 0.396 | 0.501 | 0.564 | 0.0345 | 0.276 | 0.710 | 1.05 | 1.39 | 0.291 | 1.11 | 1.75 | 0.266 | 1.51 |
| 18 | 8.72 | 0.00172 | 0.0379 | 0.160 | 0.239 | 0.325 | 0.410 | 0.436 | 0.0381 | 0.280 | 0.590 | 0.870 | 1.14 | 0.306 | 0.935 | 1.45 | 0.209 | 1.28 |
| 20 | 7.46 | 0.00189 | 0.0400 | 0.141 | 0.203 | 0.274 | 0.328 | 0.349 | 0.0413 | 0.277 | 0.505 | 0.737 | 0.954 | 0.315 | 0.793 | 1.23 | 0.174 | 1.09 |

Th ( Z=90 ) 1s(2) 2s(2) 3s(2) 4s(2) 5s(2) 6s(2) 7s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(6) 3d(10) 4d(10) 5d(10) 6d(1) 4f(14) 5f(1)

| Q/Rs ----> | | 53.39 | 15.98 | 7.132 | 3.498 | 1.679 | 0.7184 | 0.2340 | 17.31 | 7.251 | 3.423 | 1.572 | 0.6245 | 7.563 | 3.279 | 1.325 | 0.4012 | 3.024 | 0.8423 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 7s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 6p(6) | 3d(10) | 4d(10) | 5d(10) | 6d(10) | 4f(14) | 5f(1) |
| 0.2 | 28.5 | 1.77(-5) | 4.96(-4) | 0.00427 | 0.0271 | 0.172 | 1.35 | 18.5 | 0.000442 | 0.00465 | 0.0335 | 0.244 | 2.36 | 0.00439 | 0.0401 | 0.408 | 4.52 | 0.0517 | 0.801 |
| 0.4 | 62.6 | 3.68(-5) | 0.00100 | 0.00856 | 0.0542 | 0.345 | 2.72 | 41.8 | 0.00895 | 0.00933 | 0.0670 | 0.489 | 4.74 | 0.00883 | 0.0803 | 0.816 | 9.67 | 0.104 | 1.62 |
| 0.6 | 95.3 | 5.57(-5) | 0.00150 | 0.0128 | 0.0814 | 0.517 | 4.13 | 63.3 | 0.00135 | 0.0140 | 0.100 | 0.733 | 7.15 | 0.0133 | 0.120 | 1.22 | 15.3 | 0.155 | 2.46 |
| 0.8 | 104 | 7.45(-5) | 0.00200 | 0.0171 | 0.109 | 0.689 | 5.54 | 62.5 | 0.00180 | 0.0187 | 0.134 | 0.976 | 9.56 | 0.0177 | 0.160 | 1.63 | 19.3 | 0.267 | 3.31 |
| 1.0 | 98.0 | 9.33(-5) | 0.00251 | 0.0213 | 0.135 | 0.859 | 6.92 | 51.0 | 0.00225 | 0.0233 | 0.167 | 1.22 | 11.9 | 0.0221 | 0.200 | 2.03 | 19.1 | 0.259 | 4.13 |
| 1.2 | 90.9 | 0.000112 | 0.00301 | 0.0256 | 0.162 | 1.03 | 8.18 | 40.6 | 0.00270 | 0.0280 | 0.201 | 1.46 | 14.2 | 0.0265 | 0.240 | 2.43 | 17.1 | 0.310 | 4.85 |
| 1.4 | 84.8 | 0.000131 | 0.00350 | 0.0299 | 0.189 | 1.19 | 9.19 | 33.0 | 0.00315 | 0.0326 | 0.234 | 1.69 | 16.3 | 0.0309 | 0.280 | 2.83 | 14.1 | 0.362 | 5.38 |
| 1.6 | 80.5 | 0.000150 | 0.00400 | 0.0341 | 0.215 | 1.35 | 9.82 | 27.3 | 0.00360 | 0.0373 | 0.267 | 1.93 | 18.1 | 0.0352 | 0.320 | 3.21 | 11.9 | 0.413 | 5.63 |
| 1.8 | 76.8 | 0.000168 | 0.00450 | 0.0383 | 0.241 | 1.51 | 9.99 | 23.0 | 0.00405 | 0.0419 | 0.299 | 2.15 | 19.5 | 0.0397 | 0.359 | 3.59 | 10.1 | 0.463 | 5.59 |
| 2.0 | 73.3 | 0.000187 | 0.00499 | 0.0425 | 0.267 | 1.66 | 9.76 | 19.7 | 0.00450 | 0.0466 | 0.332 | 2.38 | 20.2 | 0.0441 | 0.398 | 3.97 | 8.71 | 0.514 | 5.32 |
| 2.2 | 69.8 | 0.000206 | 0.00550 | 0.0467 | 0.292 | 1.79 | 9.28 | 17.0 | 0.00495 | 0.0512 | 0.364 | 2.59 | 20.4 | 0.0485 | 0.437 | 4.33 | 7.58 | 0.564 | 5.01 |
| 2.4 | 66.0 | 0.000225 | 0.00599 | 0.0509 | 0.317 | 1.92 | 8.56 | 14.9 | 0.00539 | 0.0558 | 0.396 | 2.80 | 20.0 | 0.0258 | 0.475 | 4.67 | 6.66 | 0.614 | 4.47 |
| 2.6 | 62.7 | 0.000243 | 0.00649 | 0.0550 | 0.342 | 2.03 | 8.13 | 13.1 | 0.00584 | 0.0604 | 0.427 | 3.00 | 19.4 | 0.0572 | 0.513 | 5.00 | 5.92 | 0.663 | 4.01 |
| 2.8 | 59.2 | 0.000262 | 0.00699 | 0.0591 | 0.366 | 2.13 | 7.50 | 11.7 | 0.00629 | 0.0649 | 0.458 | 3.18 | 18.2 | 0.0616 | 0.551 | 5.31 | 5.28 | 0.712 | 3.65 |
| 3.0 | 56.6 | 0.000281 | 0.00748 | 0.0632 | 0.389 | 2.21 | 6.85 | 10.5 | 0.00673 | 0.0695 | 0.489 | 3.36 | 17.5 | 0.0659 | 0.588 | 5.61 | 4.75 | 0.760 | 3.35 |
| 3.2 | 53.6 | 0.000299 | 0.00798 | 0.0672 | 0.412 | 2.27 | 6.30 | 9.43 | 0.00718 | 0.0740 | 0.519 | 3.52 | 16.3 | 0.0702 | 0.625 | 5.87 | 4.29 | 0.808 | 3.06 |
| 3.4 | 50.8 | 0.000318 | 0.00847 | 0.0712 | 0.434 | 2.31 | 5.78 | 8.58 | 0.00762 | 0.0785 | 0.549 | 3.66 | 14.8 | 0.0745 | 0.662 | 6.12 | 3.90 | 0.855 | 2.83 |
| 3.6 | 48.4 | 0.000337 | 0.00896 | 0.0752 | 0.455 | 2.33 | 5.34 | 7.79 | 0.00807 | 0.0830 | 0.578 | 3.79 | 13.7 | 0.0788 | 0.698 | 6.33 | 3.57 | 0.902 | 2.60 |
| 3.8 | 46.4 | 0.000355 | 0.00945 | 0.0791 | 0.476 | 2.33 | 4.94 | 7.16 | 0.00852 | 0.0874 | 0.607 | 3.90 | 12.8 | 0.0831 | 0.733 | 6.51 | 3.28 | 0.948 | 2.41 |
| 4.0 | 44.5 | 0.000374 | 0.00994 | 0.0830 | 0.495 | 2.32 | 4.59 | 6.58 | 0.00896 | 0.0919 | 0.635 | 3.99 | 11.9 | 0.0874 | 0.768 | 6.67 | 3.02 | 0.993 | 2.24 |
| 5 | 37.2 | 0.000467 | 0.0124 | 0.102 | 0.578 | 2.04 | 3.29 | 4.54 | 0.0112 | 0.114 | 0.767 | 4.16 | 8.71 | 0.108 | 0.933 | 6.93 | 2.10 | 1.21 | 1.61 |
| 6 | 31.8 | 0.000560 | 0.0147 | 0.119 | 0.631 | 1.72 | 2.49 | 3.35 | 0.0134 | 0.135 | 0.878 | 3.89 | 6.66 | 0.129 | 1.08 | 6.49 | 1.56 | 1.40 | 1.22 |
| 7 | 27.5 | 0.000653 | 0.0171 | 0.135 | 0.650 | 1.37 | 1.95 | 2.52 | 0.0156 | 0.155 | 0.965 | 3.50 | 5.27 | 0.149 | 1.20 | 5.84 | 1.20 | 1.56 | 0.956 |
| 8 | 23.6 | 0.000745 | 0.0193 | 0.149 | 0.638 | 1.14 | 1.57 | 1.98 | 0.0177 | 0.173 | 1.03 | 2.89 | 4.27 | 0.168 | 1.30 | 4.82 | 0.955 | 1.70 | 0.772 |
| 9 | 20.6 | 0.000837 | 0.0215 | 0.161 | 0.606 | 0.960 | 1.30 | 1.57 | 0.0198 | 0.191 | 1.06 | 2.42 | 3.54 | 0.186 | 1.36 | 4.04 | 0.772 | 1.79 | 0.638 |
| 10 | 18.4 | 0.000929 | 0.0236 | 0.170 | 0.552 | 0.819 | 1.09 | 1.30 | 0.0219 | 0.207 | 1.06 | 2.09 | 2.99 | 0.203 | 1.40 | 3.48 | 0.638 | 1.85 | 0.535 |
| 12 | 15.1 | 0.000111 | 0.0276 | 0.181 | 0.426 | 0.617 | 0.809 | 0.915 | 0.259 | 0.235 | 0.994 | 1.61 | 2.22 | 0.234 | 1.39 | 2.68 | 0.461 | 1.85 | 0.397 |
| 14 | 12.5 | 0.000129 | 0.0311 | 0.182 | 0.337 | 0.484 | 0.620 | 0.686 | 0.0298 | 0.256 | 0.851 | 1.27 | 1.73 | 0.261 | 1.27 | 2.12 | 0.345 | 1.72 | 0.306 |
| 16 | 10.5 | 0.000147 | 0.0342 | 0.174 | 0.279 | 0.391 | 0.495 | 0.556 | 0.0334 | 0.269 | 0.705 | 1.04 | 1.38 | 0.282 | 1.10 | 1.73 | 0.266 | 1.50 | 0.245 |
| 18 | 8.83 | 0.000164 | 0.0368 | 0.158 | 0.235 | 0.323 | 0.406 | 0.434 | 0.0368 | 0.274 | 0.586 | 0.860 | 1.13 | 0.297 | 0.927 | 1.43 | 0.212 | 1.28 | 0.199 |
| 20 | 7.57 | 0.000181 | 0.0389 | 0.140 | 0.201 | 0.272 | 0.338 | 0.360 | 0.0400 | 0.271 | 0.502 | 0.728 | 0.946 | 0.306 | 0.787 | 1.21 | 0.172 | 1.09 | 0.163 |

Pa ( Z=91 ) 1s(2) 2s(2) 3s(2) 4S(2) 5s(2) 6s(2) 7s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(6) 3d(10) 4d(10) 5d(10) 6d(1) 4f(14) 5f(2)

| θ/Rs | ----> | 54.06 | 16.16 | 7.225 | 3.553 | 1.713 | 0.7310 | 0.2356 | 17.51 | 7.347 | 3.480 | 1.607 | 0.6360 | 7.669 | 3.339 | 1.361 | 0.4120 | 3.081 | 0.9146 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 7s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 6p(6) | 3d(10) | 4d(10) | 5d(10) | 6d(1) | 4f(14) | 5f(2) |
| 0.2 | 27.7 | 1.71(-5) | 4.82(-4) | 0.00413 | 0.0261 | 0.163 | 1.30 | 18.2 | 0.000428 | 0.00449 | 0.0321 | 0.231 | 2.26 | 0.00423 | 0.0382 | 0.381 | 4.25 | 0.0493 | 0.759 |
| 0.4 | 60.7 | 3.56(-5) | 9.70(-4) | 0.00827 | 0.0520 | 0.328 | 2.61 | 41.1 | 0.000868 | 0.00901 | 0.0642 | 0.462 | 4.54 | 0.00850 | 0.0766 | 0.763 | 9.06 | 0.0987 | 1.52 |
| 0.6 | 92.6 | 5.38(-5) | 0.00146 | 0.0124 | 0.0782 | 0.492 | 3.96 | 62.4 | 0.00131 | 0.0135 | 0.0961 | 0.694 | 6.84 | 0.0128 | 0.115 | 1.14 | 14.3 | 0.148 | 2.29 |
| 0.8 | 102 | 7.20(-5) | 0.00195 | 0.0165 | 0.104 | 0.655 | 5.31 | 62.1 | 0.00174 | 0.0180 | 0.128 | 0.924 | 9.14 | 0.0170 | 0.153 | 1.52 | 18.2 | 0.197 | 3.07 |
| 1.0 | 95.6 | 9.01(-5) | 0.00243 | 0.0206 | 0.130 | 0.817 | 6.64 | 50.6 | 0.00218 | 0.0225 | 0.160 | 1.15 | 11.4 | 0.0213 | 0.191 | 1.90 | 18.4 | 0.246 | 3.83 |
| 1.2 | 88.8 | 0.000108 | 0.00292 | 0.0248 | 0.156 | 0.977 | 7.85 | 40.4 | 0.00262 | 0.0270 | 0.192 | 1.38 | 13.6 | 0.0255 | 0.229 | 2.27 | 16.8 | 0.296 | 4.57 |
| 1.4 | 82.8 | 0.000126 | 0.00340 | 0.0289 | 0.181 | 1.13 | 8.84 | 32.8 | 0.00305 | 0.0315 | 0.224 | 1.60 | 15.6 | 0.0297 | 0.267 | 2.64 | 13.8 | 0.344 | 5.25 |
| 1.6 | 78.9 | 0.000145 | 0.00388 | 0.0330 | 0.207 | 1.29 | 9.48 | 27.2 | 0.00349 | 0.0360 | 0.256 | 1.82 | 17.4 | 0.0340 | 0.305 | 3.01 | 11.6 | 0.393 | 5.83 |
| 1.8 | 75.8 | 0.000123 | 0.00437 | 0.0371 | 0.232 | 1.44 | 9.70 | 22.9 | 0.00392 | 0.0405 | 0.287 | 2.04 | 18.7 | 0.0382 | 0.342 | 3.36 | 9.91 | 0.441 | 6.28 |
| 2.0 | 72.9 | 0.000181 | 0.00485 | 0.0411 | 0.256 | 1.58 | 9.53 | 19.6 | 0.00436 | 0.0450 | 0.318 | 2.25 | 19.5 | 0.0425 | 0.380 | 3.71 | 8.56 | 0.490 | 6.54 |
| 2.2 | 69.8 | 0.000199 | 0.00533 | 0.0452 | 0.281 | 1.71 | 9.08 | 17.0 | 0.00479 | 0.0494 | 0.349 | 2.45 | 19.8 | 0.0467 | 0.417 | 4.05 | 7.45 | 0.537 | 6.63 |
| 2.4 | 66.7 | 0.000217 | 0.00582 | 0.0492 | 0.305 | 1.83 | 8.46 | 14.8 | 0.00523 | 0.0539 | 0.379 | 2.65 | 19.5 | 0.0509 | 0.453 | 4.37 | 6.56 | 0.585 | 6.53 |
| 2.6 | 63.5 | 0.000235 | 0.00630 | 0.0532 | 0.328 | 1.94 | 7.80 | 13.1 | 0.00566 | 0.0583 | 0.410 | 2.84 | 18.9 | 0.0551 | 0.490 | 4.69 | 5.83 | 0.632 | 6.33 |
| 2.8 | 60.4 | 0.000253 | 0.00678 | 0.0571 | 0.352 | 2.04 | 7.42 | 11.7 | 0.00609 | 0.0627 | 0.439 | 3.02 | 17.9 | 0.0593 | 0.526 | 4.98 | 5.20 | 0.678 | 5.98 |
| 3.0 | 57.5 | 0.000271 | 0.00726 | 0.0611 | 0.374 | 2.12 | 6.77 | 10.4 | 0.00652 | 0.0671 | 0.469 | 3.19 | 17.0 | 0.0635 | 0.562 | 5.26 | 4.68 | 0.724 | 5.70 |
| 3.2 | 54.9 | 0.000289 | 0.00774 | 0.0650 | 0.396 | 2.18 | 6.22 | 9.41 | 0.00696 | 0.0715 | 0.498 | 3.34 | 16.1 | 0.0677 | 0.597 | 5.52 | 4.23 | 0.770 | 5.38 |
| 3.4 | 51.8 | 0.000307 | 0.00822 | 0.0689 | 0.417 | 2.22 | 5.71 | 8.54 | 0.00739 | 0.0758 | 0.527 | 3.48 | 14.7 | 0.0718 | 0.632 | 5.75 | 3.86 | 0.815 | 4.91 |
| 3.6 | 49.3 | 0.000325 | 0.00870 | 0.0727 | 0.438 | 2.25 | 5.28 | 7.79 | 0.00782 | 0.0801 | 0.555 | 3.61 | 13.6 | 0.0760 | 0.666 | 5.96 | 3.53 | 0.860 | 4.52 |
| 3.8 | 47.2 | 0.000343 | 0.00917 | 0.0765 | 0.458 | 2.26 | 4.90 | 7.13 | 0.00826 | 0.0845 | 0.582 | 3.72 | 12.7 | 0.0801 | 0.700 | 6.15 | 3.23 | 0.904 | 4.22 |
| 4.0 | 45.2 | 0.000361 | 0.00965 | 0.0803 | 0.477 | 2.25 | 4.54 | 6.56 | 0.00869 | 0.0887 | 0.610 | 3.81 | 11.8 | 0.0842 | 0.733 | 6.30 | 2.98 | 0.947 | 3.93 |
| 5 | 37.7 | 0.000451 | 0.0120 | 0.0985 | 0.558 | 2.01 | 3.26 | 4.53 | 0.0108 | 0.110 | 0.736 | 4.00 | 8.62 | 0.104 | 0.892 | 6.63 | 2.08 | 1.15 | 2.88 |
| 6 | 32.2 | 0.000541 | 0.0143 | 0.115 | 0.611 | 1.71 | 2.46 | 3.35 | 0.0130 | 0.130 | 0.844 | 3.79 | 6.60 | 0.124 | 1.03 | 6.29 | 1.54 | 1.34 | 2.20 |
| 7 | 27.8 | 0.000630 | 0.0166 | 0.131 | 0.632 | 1.36 | 1.94 | 2.52 | 0.0151 | 0.149 | 0.930 | 3.44 | 5.22 | 0.143 | 1.15 | 5.71 | 1.19 | 1.50 | 1.74 |
| 8 | 23.9 | 0.000720 | 0.0188 | 0.144 | 0.623 | 1.12 | 1.56 | 1.97 | 0.0172 | 0.168 | 0.990 | 2.86 | 4.23 | 0.162 | 1.25 | 4.77 | 0.955 | 1.63 | 1.42 |
| 9 | 20.8 | 0.000809 | 0.0209 | 0.156 | 0.594 | 0.948 | 1.29 | 1.57 | 0.0192 | 0.185 | 1.02 | 2.38 | 3.51 | 0.179 | 1.31 | 3.97 | 0.772 | 1.72 | 1.17 |
| 10 | 18.6 | 0.000898 | 0.0229 | 0.165 | 0.545 | 0.810 | 1.08 | 1.30 | 0.0212 | 0.201 | 1.03 | 2.07 | 2.97 | 0.196 | 1.35 | 3.42 | 0.633 | 1.78 | 0.993 |
| 12 | 15.2 | 0.00107 | 0.0268 | 0.177 | 0.423 | 0.614 | 0.799 | 0.918 | 0.0251 | 0.228 | 0.974 | 1.59 | 2.21 | 0.226 | 1.35 | 2.64 | 0.450 | 1.79 | 0.737 |
| 14 | 12.6 | 0.00125 | 0.0303 | 0.178 | 0.332 | 0.481 | 0.621 | 0.684 | 0.0289 | 0.248 | 0.841 | 1.26 | 1.71 | 0.252 | 1.25 | 2.10 | 0.340 | 1.69 | 0.571 |
| 16 | 10.6 | 0.00142 | 0.0333 | 0.171 | 0.277 | 0.388 | 0.495 | 0.549 | 0.0324 | 0.261 | 0.699 | 1.03 | 1.37 | 0.273 | 1.08 | 1.71 | 0.269 | 1.48 | 0.457 |
| 18 | 8.93 | 0.00159 | 0.0359 | 0.156 | 0.234 | 0.320 | 0.401 | 0.433 | 0.0358 | 0.267 | 0.583 | 0.855 | 1.12 | 0.288 | 0.919 | 1.42 | 0.210 | 1.27 | 0.376 |
| 20 | 7.67 | 0.00175 | 0.0380 | 0.139 | 0.200 | 0.270 | 0.332 | 0.363 | 0.0389 | 0.266 | 0.500 | 0.724 | 0.943 | 0.298 | 0.781 | 1.21 | 0.173 | 1.08 | 0.315 |

U ( Z=92 ) 1s(2) 2s(2) 3s(2) 4S(2) 5s(2) 6s(2) 7s(2) 2p(6) 3p(6) 4p(6) 5p(6) 6p(6) 3d(10) 4d(10) 5d(10) 4f(14) 5f(4)

| Q/Rs | ----> | 54.51 | 16.35 | 7.318 | 3.608 | 1.745 | 0.7252 | 0.2282 | 17.71 | 7.440 | 3.537 | 1.633 | 0.6267 | 7.766 | 3.396 | 1.387 | 3.167 | 0.9010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | TOTAL | 1s(2) | 2s(2) | 3s(2) | 4s(2) | 5s(2) | 6s(2) | 7s(2) | 2p(6) | 3p(6) | 4p(6) | 5p(6) | 6p(6) | 3d(10) | 4d(10) | 5d(10) | 4f(14) | 5f(4) |
| 0.2 | 25.1 | 1.67(-5) | 0.000467 | 0.00399 | 0.0251 | 0.156 | 1.32 | 19.6 | 0.000415 | 0.00434 | 0.0308 | 0.222 | 2.34 | 0.00409 | 0.0366 | 0.363 | 0.0459 | 0.900 |
| 0.4 | 55.6 | 3.47(-5) | 0.000940 | 0.00800 | 0.0500 | 0.314 | 2.66 | 44.6 | 0.000841 | 0.00872 | 0.0616 | 0.444 | 4.70 | 0.00822 | 0.0733 | 0.727 | 0.0918 | 1.81 |
| 0.6 | 83.3 | 5.27(-5) | 0.00141 | 0.0120 | 0.0751 | 0.470 | 4.03 | 66.8 | 0.00127 | 0.0131 | 0.0922 | 0.666 | 7.08 | 0.0124 | 0.110 | 1.09 | 0.138 | 2.71 |
| 0.8 | 85.9 | 7.03(-5) | 0.00188 | 0.0160 | 0.100 | 0.626 | 5.41 | 63.8 | 0.00169 | 0.0174 | 0.123 | 0.887 | 8.47 | 0.0165 | 0.146 | 1.45 | 0.183 | 3.61 |
| 1.0 | 79.0 | 8.81(-5) | 0.00236 | 0.0199 | 0.125 | 0.780 | 6.77 | 51.4 | 0.00211 | 0.0218 | 0.154 | 1.11 | 11.8 | 0.0206 | 0.183 | 1.81 | 0.229 | 4.51 |
| 1.2 | 74.0 | 0.000106 | 0.00183 | 0.0240 | 0.150 | 0.933 | 8.00 | 41.1 | 0.00254 | 0.0261 | 0.184 | 1.32 | 14.1 | 0.0247 | 0.219 | 2.17 | 0.275 | 5.39 |
| 1.4 | 70.8 | 0.000124 | 0.00330 | 0.0279 | 0.174 | 1.08 | 9.00 | 33.2 | 0.00296 | 0.0304 | 0.215 | 1.54 | 16.2 | 0.0288 | 0.256 | 2.52 | 0.321 | 6.23 |
| 1.6 | 69.1 | 0.000141 | 0.00376 | 0.0319 | 0.199 | 1.23 | 9.64 | 27.4 | 0.00338 | 0.0348 | 0.245 | 1.75 | 18.0 | 0.0328 | 0.292 | 2.87 | 0.356 | 7.02 |
| 1.8 | 68.0 | 0.000159 | 0.00423 | 0.0358 | 0.223 | 1.37 | 9.83 | 23.3 | 0.00381 | 0.0391 | 0.275 | 1.96 | 19.3 | 0.0369 | 0.328 | 3.21 | 0.411 | 7.72 |
| 2.0 | 66.5 | 0.000177 | 0.00470 | 0.0398 | 0.247 | 1.51 | 9.64 | 19.7 | 0.00423 | 0.0435 | 0.305 | 2.16 | 20.1 | 0.0410 | 0.363 | 3.54 | 0.456 | 8.31 |
| 2.2 | 64.9 | 0.000194 | 0.00517 | 0.0417 | 0.270 | 1.64 | 9.17 | 17.2 | 0.00465 | 0.0478 | 0.334 | 2.36 | 20.3 | 0.0451 | 0.399 | 3.86 | 0.500 | 8.76 |
| 2.4 | 62.7 | 0.000212 | 0.00564 | 0.0476 | 0.293 | 1.75 | 8.50 | 15.0 | 0.00507 | 0.0521 | 0.364 | 2.55 | 19.9 | 0.0492 | 0.434 | 4.18 | 0.544 | 9.04 |
| 2.6 | 60.6 | 0.000230 | 0.00611 | 0.0514 | 0.316 | 1.86 | 7.93 | 13.2 | 0.00549 | 0.0564 | 0.393 | 2.73 | 19.3 | 0.0533 | 0.469 | 4.48 | 0.588 | 9.15 |
| 2.8 | 58.2 | 0.000247 | 0.00657 | 0.0553 | 0.338 | 1.96 | 7.48 | 11.8 | 0.00591 | 0.0616 | 0.421 | 2.91 | 18.1 | 0.0574 | 0.503 | 4.76 | 0.632 | 9.11 |
| 3.0 | 56.1 | 0.000265 | 0.00704 | 0.0591 | 0.360 | 2.03 | 6.83 | 10.6 | 0.00633 | 0.0649 | 0.500 | 3.07 | 17.4 | 0.0614 | 0.538 | 5.03 | 0.675 | 8.93 |
| 3.2 | 53.5 | 0.000283 | 0.00750 | 0.0629 | 0.381 | 2.10 | 6.27 | 9.43 | 0.00674 | 0.0691 | 0.478 | 3.22 | 16.2 | 0.0654 | 0.571 | 5.28 | 0.717 | 8.63 |
| 3.4 | 51.0 | 0.000300 | 0.00797 | 0.0666 | 0.402 | 2.14 | 5.76 | 8.65 | 0.00717 | 0.0733 | 0.505 | 3.36 | 14.8 | 0.0695 | 0.605 | 5.51 | 0.760 | 8.28 |
| 3.6 | 48.9 | 0.000318 | 0.00843 | 0.0703 | 0.422 | 2.17 | 5.32 | 7.90 | 0.00759 | 0.0775 | 0.532 | 3.48 | 16.6 | 0.0735 | 0.638 | 5.71 | 0.801 | 8.00 |
| 3.8 | 46.8 | 0.000336 | 0.00889 | 0.0740 | 0.441 | 2.18 | 4.91 | 7.24 | 0.00801 | 0.0817 | 0.559 | 3.59 | 12.7 | 0.0775 | 0.670 | 5.90 | 0.842 | 7.48 |
| 4.0 | 44.8 | 0.000353 | 0.00935 | 0.0777 | 0.460 | 2.18 | 4.58 | 6.54 | 0.00843 | 0.0859 | 0.585 | 3.69 | 11.9 | 0.0814 | 0.703 | 6.05 | 0.883 | 6.95 |
| 5 | 37.5 | 0.000441 | 0.0116 | 0.0953 | 0.539 | 1.97 | 3.28 | 4.62 | 0.0105 | 0.106 | 0.707 | 3.89 | 8.70 | 0.101 | 0.855 | 6.41 | 1.08 | 5.10 |
| 6 | 32.0 | 0.000529 | 0.0139 | 0.112 | 0.591 | 1.69 | 2.48 | 3.33 | 0.0126 | 0.126 | 0.812 | 3.72 | 6.65 | 0.120 | 0.991 | 6.14 | 1.25 | 3.97 |
| 7 | 27.6 | 0.000616 | 0.0161 | 0.127 | 0.614 | 1.34 | 1.94 | 2.51 | 0.0146 | 0.145 | 0.896 | 3.38 | 5.24 | 0.139 | 1.11 | 5.60 | 1.40 | 3.16 |
| 8 | 23.8 | 0.000704 | 0.0182 | 0.140 | 0.609 | 1.11 | 1.57 | 1.94 | 0.0166 | 0.162 | 0.956 | 2.84 | 4.26 | 0.157 | 1.20 | 4.72 | 1.53 | 2.58 |
| 9 | 20.8 | 0.000791 | 0.0203 | 0.151 | 0.582 | 0.937 | 1.30 | 1.59 | 0.0186 | 0.179 | 0.991 | 2.36 | 3.54 | 0.174 | 1.27 | 3.92 | 1.62 | 2.15 |
| 10 | 18.6 | 0.000878 | 0.0222 | 0.161 | 0.538 | 0.801 | 1.09 | 1.29 | 0.0206 | 0.194 | 1.00 | 2.04 | 2.99 | 0.190 | 1.31 | 3.40 | 1.68 | 1.83 |
| 12 | 15.2 | 0.00105 | 0.0160 | 0.172 | 0.420 | 0.607 | 0.804 | 0.939 | 0.0244 | 0.221 | 0.954 | 1.57 | 2.22 | 0.219 | 1.31 | 2.61 | 1.71 | 1.37 |
| 14 | 12.7 | 0.00122 | 0.0294 | 0.174 | 0.330 | 0.476 | 0.624 | 0.707 | 0.0280 | 0.241 | 0.831 | 1.25 | 1.72 | 0.245 | 1.23 | 2.08 | 1.63 | 1.06 |
| 16 | 10.6 | 0.00139 | 0.0324 | 0.168 | 0.276 | 0.386 | 0.498 | 0.534 | 0.0315 | 0.255 | 0.694 | 1.02 | 1.38 | 0.265 | 1.07 | 1.69 | 1.45 | 0.855 |
| 18 | 8.99 | 0.00155 | 0.0349 | 0.154 | 0.231 | 0.319 | 0.402 | 0.444 | 0.0347 | 0.261 | 0.579 | 0.846 | 1.13 | 0.280 | 0.911 | 1.41 | 1.25 | 0.702 |
| 20 | 7.70 | 0.00172 | 0.0370 | 0.137 | 0.199 | 0.268 | 0.337 | 0.350 | 0.0378 | 0.260 | 0.491 | 0.717 | 0.946 | 0.290 | 0.776 | 1.19 | 1.07 | 0.590 |

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